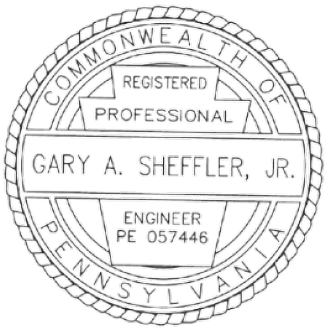
Sheffler & Company, Inc.
ENGINEERING • SURVEYING

POST-CONSTRUCTION STORM WATER MANAGEMENT PLAN

SUMMERWIND TOWNHOMES RESIDENTIAL DEVELOPMENT

SITUATE IN:
CRANBERRY TOWNSHIP
BUTLER COUNTY, PENNSYLVANIA

PREPARED FOR:
Freedom Road Management, LLC.
290 Northgate Drive
Warrendale, PA 15086



4293

April 2024

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Executive Summary

The Summerwind Townhomes Residential Development Plan project is located off of Freedom Road in Cranberry Township, Butler County, Pennsylvania. The applicant/owner Freedom Road Management, LLC is located at 290 Northgate Drive Warrendale, PA 15086

This proposed project consists of the construction of a residential development. The site currently consists of existing houses with some wooded and open meadow areas. Due to existing site topography, the site consists of one drainage area. Drainage Area 1 (POI-1), consists of all of the site flows to the MS4 storm sewers owned by Cranberry Township. The MS4 discharges to a UNT of Brush Run Creek. Brush Run Creek has a Chapter 93 designation of Warm Water Fishes (WWF). The PA Water Plan watershed is Upper Ohio River. There is an approved ACT 167 Plan for Butler County. The sites' past (50 years) and present (5 years) use is residential.

Stabilization of the site will consist of either grass for the lawn areas to minimize impervious areas or impervious surfacing for the structures and paved areas. Land clearing and grading will be minimized by only clearing and grading land areas are going to be utilized for construction. New impervious areas have been minimized by strategic placement of the proposed roadway layout. Compaction in the basin areas and soil compaction will be minimized by primarily traveling over disturbed areas rather than non-paved areas. The proposed schedule for the project's start of grading could be as soon as approvals are obtained, with an anticipated project life of two years before construction is completed.

Two (2) permanent storm water management facilities will attenuate post-development peak flow rates from the proposed site improvements. This project will preserve the integrity of stream channels and maintain and protect the physical, biological and chemical qualities of the receiving streams and maximize the protection of drainage features and existing vegetation.

The purpose of this report is to determine the effect that the development will have on storm water runoff volume and peak flow rates. Specifically, the means of controlling increases in runoff volume for the 2-year 24-hour event and storm water peak flow rate during the 1-, 2-, 10-, 25-, 50-, and 100-year storms. The site is located within the Ohio River Watershed in Butler County.

Methodology

The storm water calculations in this report were generated using the program Hydraflow Hydrographs 2016. This program uses both the USDA SCS TR-55 methodology defined in Technical Release No. 55 and the previous version, TR-20 to calculate time of concentrations and develop pre- and post-development hydrographs. The Modified Puls method is also used in this program to route the hydrographs through the storm water facilities. Rainfall amounts for the indicated storms above were taken from the NOAA Atlas 14 Server. The rainfall amounts for the indicated storms are as follows for this site:

RAINFALL DATA

Design Storm	Precipitation (Inches)
1 YR	2.02
2 YR	2.41
10 YR	3.38
25 YR	4.00
50 YR	4.50
100 YR	5.03

The soils present on the site were determined from the NRCS Soil Survey Mapping (refer to Appendix B). All ground coverage was assumed to be in good condition.

Existing Conditions

Due to existing site topography, the site consists of one drainage area. Drainage Area 1 (DA-1), consists of all of the site flows to the to Cranberry MS4 storm sewers which ultimately discharge to a UNT to Brush Run Creek. Brush Run Creek has a Chapter 93 designation of Warm Water Fishes (WWF). The PA Water Plan watershed is Upper Ohio River. There is an approved ACT 167 Plan for Butler County. The sites' past (50 years) and present (5 years) use is primarily woodland and some meadow.

Using the rainfall data, curve numbers, and time of concentrations, a hydrograph was developed for the drainage area. The ground cover and peak flows were calculated for the existing pre-development site conditions and can be seen in the following two (2) tables.

POI-1 consists of Pre DA-1 which has a drainage areas equal to 7.36 acres.

POI = Downstream Point of Interest
DA = Drainage Area

PRE-DEVELOPMENT CONDITIONS – COVER TYPE

Cover Type/Condition	Hydrologic Soil Group	CN Value
Meadow	D	78
Woods	D	77
Impervious Pavement	NA	98

Storm Frequency (yr)	PRE POI-1 Peak Flow (cfs)
1	3.143
2	4.907
10	9.949
25	13.5
50	16.5
100	19.75

Proposed Conditions – With Post Construction Stormwater Management (PCSM) Facilities

For this project 1 basin and 1 underground detention tank are proposed to be installed during the E&S and site grading phase to control and limit sediment laden runoff from leaving the site. Once site construction is completed and the site is stabilized, the sediment basin will be converted into a detention basin. The basins will serve as the primary means of storm water management for the project site.

Due to existing site topography, the site has 1 drainage area. Drainage Area 1 (DA-1) flows to Cranberry's MS4 storm sewers which ultimately discharges to a UNT to Brush Run Creek. During Post Development conditions, the drainage areas are subdivided as follows for analysis:

<u>The Post-Construction (POST) Drainage Area (DA) contributing to POI-1 was analyzed as follows:</u>

- The overall contributing DA consists of 3 component sub-DA's.
- Two (2) DAs will be collected and conveyed through 1 Detention Basin and 1 Underground Detention Tank for release rate and 2-yr storm volume control.
    - DA-1B flows to an underground detention tank and has a contributing area of approximately 1.40 acres.
    - DA-1C flows to an dry extended detention basin and has a contributing area of approximately 3.76 acres.
    - DA-1D flows to a Rain Garden and has a contributing area of approximately 0.44 acres
- One (1) DAs, will be released uncontrolled. POST DA-1A will be uncontrolled and has a contributing area of 1.16 acres.

PCSM Facilities

The stormwater basins will provide storm water management for the increased runoff caused by the additional impervious and open space area resulting from the development. The basins have been designed, and routing calculations performed, to demonstrate that the post-development flow is reduced to levels less than or equal to those of the pre-development conditions when analyzed at the same downstream Points of Interest (POI). The above ground detention basins will be routed through a Type M inlet outlet control structure to regulate the discharge of the basin. The basins will detain up to a 2-year runoff volume for the given drainage areas which will improve the water quality downstream.

Below are stage storage table (available basin volume) and outlet structure characteristics for the proposed basins:

UNDERGROUND DETENTION BASIN
STAGE STORAGE TABLE

Elevation (ft)	Area (sf)	Storage (cf)
1062	2,700	0
1062.6		700
1063.2		1,468
1063.8		2,622
1064.4		3,944
1065		5,333
1065.6		6,723
1066.2		8,043
1066.8		9,196
1067.4		9,965
1068		10,665

Outlet Structure Configuration –
15" Outlet Pipe @ Elevation 1061.0
(3) Perforated 4' Diameter CPP Pipe Chambers @ ELEV: 1063.0
Weir Wall Top @ Elevation 1068.0
3.5" Diameter Orifice @ Elevation 1063.0

UNDERGROUND DETENTION BASIN ROUTING SUMMARY

Storm Frequency	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Stage (ELEV)	Peak Storage Volume (cf)
1	2.764	0.281	1063.91	2,860
2	3.546	0.350	1064.33	3,787
10	5.505	0.482	1065.39	6,235
25	6.756	0.551	1066.08	7,771
50	7.761	0.606	1066.70	8,996
100	8.822	0.683	1067.66	10,263

Using the outlet structure and the available volume in the storm water management facilities, the following routings were calculated:

DRY EXTENDED DETENTION BASIN

STAGE STORAGE TABLE

Elevation (ft)	Area (sf)	Storage (cf)
1076	7,444	0
1077	8,306	7,870
1078	9,257	16,647
1079	10,295	26,417
1080	11,425	37,271
1081	12,659	49,307
1082	13,949	62,604

Outlet Structure Configuration

15” Outlet Pipe @ Elevation 1072.5
3” Diameter Orifice (with Trash Rack) @ Elevation 1076.0
Top of 2’x4’ Concrete Outlet Structure (with Trash Rack) @ Elevation 1080.0
Top of 2’x4’ Concrete Outlet Structure Emergency Spillway @ Elevation 1080.5
Top of 10' Wide Berm 1082.0

Using the outlet structure and the available volume in the storm water management facilities, the following routings were calculated:

DRY EXTENDED DETENTION BASIN ROUTING SUMMARY

Storm Frequency	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Stage (ELEV)	Peak Storage Volume (cf)
1	7.838	0.247	1077.2	9,813
2	9.950	0.285	1077.58	12,939
10	15.21	0.362	1078.47	21,193
25	18.56	0.403	1079.03	26,739
50	21.25	0.431	1079.45	31,337
100	24.08	0.460	1079.91	36,297

RAIN GARDEN

STAGE STORAGE TABLE

Elevation (ft)	Area (sf)	Storage (cf)
1070.5		0
1070.8		88.6
1071.1		186
1071.4		332
1071.7		499
1072		675
1072.3		851
1072.6		1,018
1072.9		1,164
1073.2		1,261
1073.5		1,350
1074	183	1,380
1074.5	314	1,503
1075	465	1,696
1076	794	2,318

Outlet Structure Configuration

15” Outlet Pipe @ Elevation 1070.0
(6) Perforated 2’ Diameter CPP Pipe Chambers @ Elevation: 1071.0
6” Diameter Orifice (with Trash Rack) @ Elevation 1074.0
3” Diameter Orifice @ Elevation 1071.0
Top of 2’ Circular Riser Outlet Structure (with Trash Rack) @ Elevation 1075.0
Top of 10' Wide Berm 1076.0

Using the outlet structure and the available volume in the storm water management facilities, the following routings were calculated:

RAIN GARDEN ROUTING SUMMARY

Storm Frequency	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Stage (ELEV)	Peak Storage Volume (cf)
1	1.061	0.266	1072.39	900
2	1.308	0.304	1072.78	1,105
10	1.915	0.930	1074.52	1,512
25	2.300	1.272	1074.98	1,689
50	2.608	2.112	1075.11	1,764
100	2.934	2.774	1075.16	1,796

Computer printouts of the hydrographs and routing calculations are found in appendix D.

The following table summarizes the results of the outflow hydrographs from the basin when added to the hydrograph from the remaining post drainage areas that are not routed through the basin to find the total combined peak rates for the study areas.

POI-1 PEAK RATE COMPARISON – POI-1 – With PCSM Facilities

Storm Frequency (YR)	Pre-Development Peak Rate (cfs)	50% Allowable Rate (cfs)	Post-Development Peak Rate (cfs)	Change In Peak Flow Rate (cfs)
1	3.143	1.572	1.519	(-) 1.624
2	4.907	2.454	2.126	(-) 2.781
10	9.949	4.975	3.722	(-) 6.227
25	13.5	6.750	5.435	(-) 8.065
50	16.5	8.250	6.648	(-) 9.852
100	19.75	9.875	8.844	(-) 10.906

Computer printouts of the routing may be found in the appendices of this report. The total outflow is not always the sum of the basin outflows plus the undetained outflows. The reason for this is that the basin peak discharges and undetained areas peak discharge occur at different times. The total outflow is the peak discharge from the combined hydrographs.

2-YR RUNOFF VOUME (ENTIRE SITE, POI-1)

Pre-Development Volume (Cuft)	Post-Development Volume (No BMPs) (Cuft)	Required Control Volume (Cuft)	Treated Volume Provided (with BMPs) Cuft)	Volume Reduction (Cuft)
18,366	31,950	13,584	13,873	(-) 289

Because the net 2-yr runoff volume is decreased from the pre-development to post-development conditions, it is implied that adequate volume storage is provided by the PCSM facilities. Calculations for runoff volume and volume detention provided can be found on BMP Worksheets 4 and 5 in the appendices of this report. Calculations and hydrographs to support the peak rates tabulated in the report narrative can be found in the appendices as well

BMP Volume Credits

Post construction, the sediment basin will be converted to an detention basin designed to detain and slowly infiltrate the additional 2-year volume, thus providing the detention necessary to reduce runoff volumes to below pre-development levels for the 2-year storm. This approach will maximize the opportunity for evapotranspiration and plant update treatment of this additional runoff volume. The storm water management facilities will release runoff slowly, providing detention, for the 1-, 2-, 10-, 25-, 50-, and 100-year storms, to manage the peak discharge rates to below pre-development rates. The reduction of runoff rate and volume can be seen numerically in the previous tables accompanying this narrative.

Storm Sewer System

A storm sewer system will capture impervious road storm water runoff and convey the runoff to the detention basins. Once routed through the basin, that runoff which is not infiltrated through the soil media and which accumulates to a volume that crests at least the lowest orifice, will be routed through the outlet structure and eventually discharge to the existing streams.

Conclusion and Act 167 Consistency

From the calculations and report as submitted, the proposed Basin for the development will reduce storm water peak flow rates to less than the pre-developed conditions. According to the Cranberry Township Stormwater Management Ordinance and the storm water requirements of the Pennsylvania Department of Environmental Protection (Chapter 102), the runoff rate leaving a proposed development site may not exceed the runoff rate that existed prior to construction. This standard was analyzed and demonstrated to be achievable at the site for the 1-, 2-, 10-, 25-, 50-, and 100-year design storms. A reduction in the post-development total runoff volume for all storms equal to or less than the 2-year 24-hour event was achieved for the drainage area within the proposed development. Due to existing site topography, the site drains to unnamed tributaries to MS4 storm sewers owned by Cranberry township which discharge to Brush Run Creek, classified as Warm Water Fishes (WWF). The PA Water Plan watershed is Upper Ohio River. Butler County does have an approved ACT 167 Plan.

The following narrative is in accordance with PA Title 25, Chapter 102, Section 102.8, Post Construction Stormwater Management Requirements:

102.8(b)(1) Preserve the integrity of stream channels and maintain and protect the physical, biological and chemical qualities of the receiving stream.

The proposed plan utilizes structural and non-structural BMP's which reduce runoff volume and rate and provide water quality measures.

102.8(b)(2) Prevent an increase in the rate of storm water runoff.

As shown in the tables in the PCSM report narrative along with supporting calculations in Appendix D, the proposed detention basin will reduce storm water discharge rates to less than the historical peak rates from the site for the 1-, 2-, 10-, 25-, 50-, and 100-year design storms.

102.8(b)(3) Minimize an increase in storm water runoff volume.

As shown in the tables in the PCSM report narrative along with supporting calculations from the PADEP Worksheets in the Appendix, the proposed detention basin will reduce runoff volume for up the 2-year storm event.

102.8(b)(4) Minimize impervious areas**.**

The proposed development was designed in a manner to reduce paving to the largest extent possible.

102.8(b)(5) Maximize the protection of existing drainage features and existing vegetation.

The existing drainage features and vegetation will be protected by disturbing only those areas required for construction of the site.

102.8(b)(6) Minimize land clearing and grading**.**

Land clearing and grading will be minimized by clearing and grading only those areas required for construction of the site.

102.8(b)(7) Minimize soil compaction.

Contractors should spend minimal time in areas that are not to be graded, in order to minimize soil compaction.

102.8(b)(8) Utilize other structural or nonstructural BMPs that prevent or minimize changes in storm water runoff.

Areas of proposed disturbance will be revegetated. Existing vegetation on the property will be protected by clearly delineating the limit of disturbance on the plans. The site will be revegetated with an approved landscape plan.

102.8.f The PCSM Plan must contain drawings and a narrative consistent with the requirements of this chapter. The PCSM Plan shall be designed to minimize the threat to human health, safety and the environment to the greatest extent practicable. PCSM Plans must contain at a minimum the following:

102.8.f.1 The existing topographic features of the project site and immediate surrounding area.

Existing contours are shown on the attached PCSM Plan at 1 foot intervals.

102.8.f.2 The types, depth, slope, locations and limitations of the soils and geological formations.

Refer to Appendix B for soils information.

102.8.f.3 The characteristics of the project site, including the past, present and proposed land uses and the proposed alteration to the project site.

The current and past land use (over 50 years) of the site has been a primarily wooded area with some meadow. The proposed site consists of houses and impervious drive ways, open space/lawn areas, storm water basins, utility installation, and erosion and sediment control practices.

Topsoil and debris will be stripped and stockpiled at the approximate locations shown on the Erosion and Sediment Control Plan. Stockpiled topsoil will be utilized when construction operations are complete.

102.8.f.4 An identification of the net change in volume and rate of storm water from pre-construction hydrology to post construction hydrology for the entire project site and each drainage area.

The watershed boundaries are shown by the existing topography and proposed grades on the attached PCSM Plan. An detention basin will be installed to control the rate of runoff from the proposed disturbance. The post-development runoff rate will be less than the pre-development rate for the 1-, 2-, 10-, 25-, 50-, and 100-year storm events. According to Chapter 102 of the Pennsylvania Department of Environmental Protection, the 2-year runoff volume increase must be stored on-site. Refer to the PCSM plans for details of these facilities. The methods used to calculate runoff include the SCS method and methods described in the DEP Erosion and Sediment Pollution Control Manual.

102.8.f.5 An identification of the location of surface waters of this Commonwealth, which may receive runoff within or from the project site and their classification under Chapter 93 (relating to water quality standards).

The receiving streams are UNT to Brush Run Creek, classified as Warm Water Fishes (WWF). The PA Water Plan watershed is Upper Ohio River. Refer to Appendix A, Site Location Map, for stream locations. The project site discharges to waters that are classified as impaired due to

HIGHWAY/ROAD/BRIDGE RUNOFF (NON-CONSTRUCTION RELATED) – SILTATION' RURAL (RESIDENTIAL AREAS) – CAUSE UNKNOWN

according to the PA Integrated Water Quality Monitoring & Assessment Report.

102.8.f.6 A written description of the location and type of PCSM BMPs including construction details for permanent storm water BMPs including permanent stabilization specifications and locations.

Permanent control measures include one (1) dry extended detention basin (converted from sediment basins), one (1) underground detention basin, one (1) rain garden, interceptor & diversion channels, riprap aprons, and permanent seeding. Disturbed areas will be stabilized in accordance with temporary, permanent and/or steep slope seeding specifications.

102.8.f.7 A sequence of PCSM BMP implementation or installation in relation to earth disturbance activities of the project site and a schedule of inspections for critical stages of PCSM BMP installation.

PCSM Construction Sequence:

1. Once grading operations are complete, permanently seed and mulch all disturbed areas per the seeding specifications.
2. Convert Sediment Basin to Detention Basin by: **(Critical Stage: A licensed professional or designee shall be on-site to oversee the installation of the detention basin, including the permanent outlet structure, outfall protection, emergency spillway, and grading.)**

1) Dewater as necessary using pumped water filter bag.
2) Remove all accumulated sediment from the sediment basin.
3) Remove the skimmer systems from the from the sediment basins.
4) Remove orifice coverings installed during E&S phase.
5) Install 2' underdrain system

102.8.f.8 Supporting calculations.

Supporting calculations can be found in the appendices.

102.8.f.9 Plan drawings.

Refer to the Post Construction Storm Water Management Plan.

102.8.f.10 A long-term operation and maintenance schedule, which provides for inspection of PCSM BMPs, including the repair, replacement, or other routine maintenance of the PCSM BMPs to ensure proper function and operation. The program must provide for completion of a written report documenting each inspection and all BMP repair and maintenance activities and how access to the PCSM BMPs will be provided.

Refer to the Appendix for a long-term operation and maintenance schedule.

102.8.f.11 Procedures which ensure that the proper measures for the recycling or disposal of materials associated with or from the PCSM BMPs are in accordance with Department laws, regulations and requirements.

A differentiation must be identified between construction waste (waste generated before the site is entirely stabilized, completed, and converted) to the post construction phase.

Erosion control wastes differ from post constructions generated materials and must be addressed and handled separately from the traditional form of recycling criteria that often is outlined in erosion and sedimentation control plan guidelines.

Regarding wastes generated after the plan is fully operational, all wastes from post construction BMPs, such as silt/gravel, trash/litter/floatables, grass clippings, branches, leaves, etc. shall be removed from the site and recycled or disposed of in accordance with the departments solid waste management regulations at Title 25 PA Code 260.1 et seq., 271.1., and 287.1 et seq. No wastes or other materials shall be burned, buried, dumped, or discharged at the site.

102.8.f.12 An identification of naturally occurring geologic formations or soil conditions that may have the potential to cause pollution after earth disturbance activities are completed and PCSM BMPs are operational and development of a management plan to avoid or minimize potential pollution and its impacts.

A review of available resources does not indicate the presence of any current or historical deep mining actives underlying the site.

There are no know geologic formations or soil conditions that have potential to cause pollution. Refer to Appendix B for soil limitations and resolutions to any limitations.

102.8.f.13 An identification of potential thermal impacts from post construction storm water to surface waters of this Commonwealth including BMPs to avoid, minimize or mitigate potential pollution from thermal impacts.

Establishment of permanent vegetation over all disturbed areas will further mitigate thermal impacts.

All storm water runoff from the detention basins will discharge to MS4 Storm Sewers owned by Cranberry Township. Storm water runoff from other areas of the site will discharge to vegetated areas prior to entering any surface waters of the Commonwealth.

102.8.f.14 A riparian forest buffer management plan when required under Chapter 102.14 (relating to riparian buffer requirements).

The proposed work will not disturb areas within riparian forest buffers. Design precautions were implemented in an effort to eliminate such impacts.

102.8.g PCSM Plan storm water analysis.

Refer to appendices for pre and post development storm water analysis.

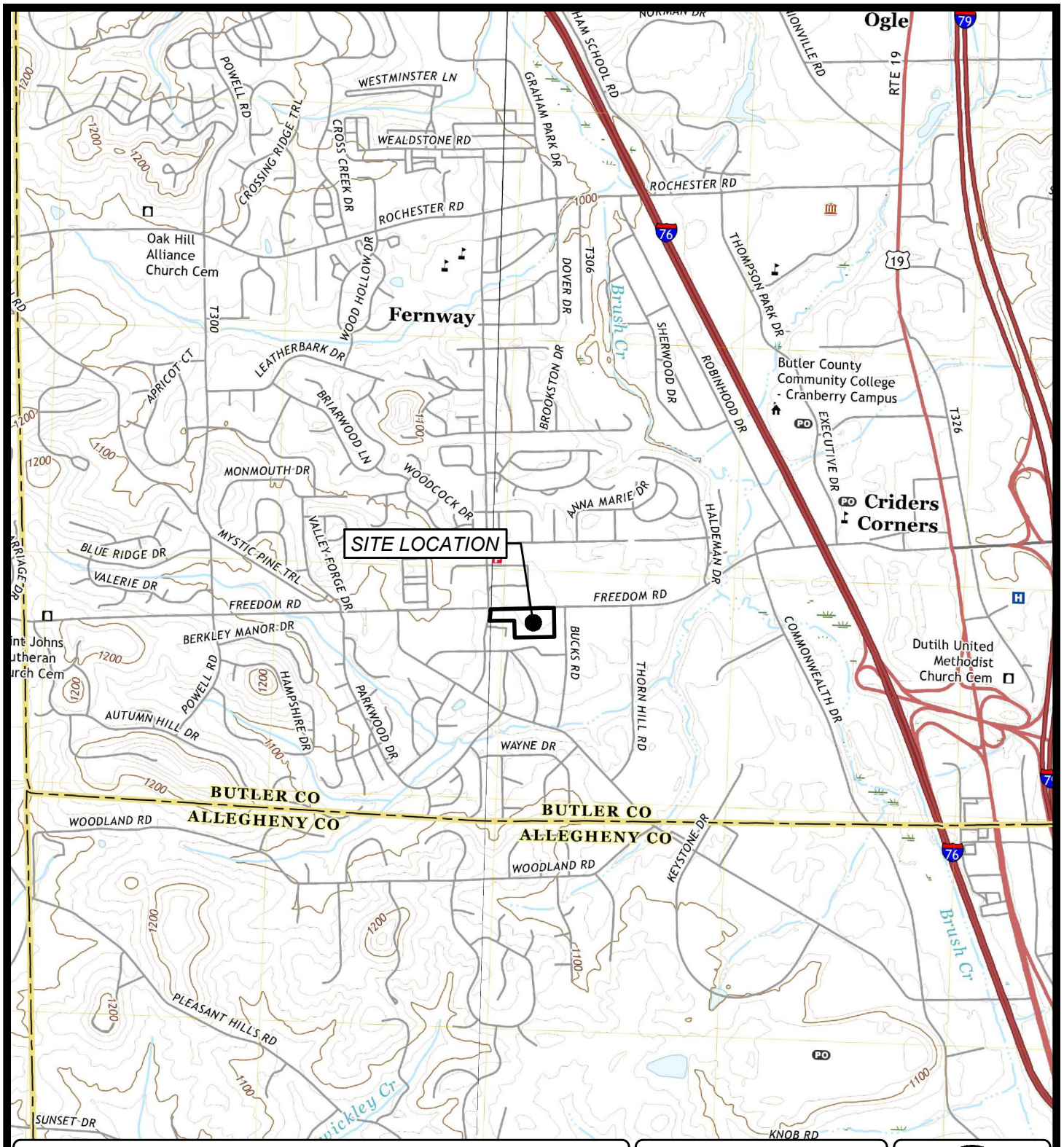
102.8.k Licensed professional oversight of critical stages**.**

A licensed professional or designee shall oversee the installation of the detention basin, including the permanent outlet structure, outfall protections, underdrains, emergency spillways, and grading. A licensed professional or designee shall also verify establishment of permanent vegetation at the site.

102.8.m PCSM long-term operation and maintenance requirements**.**

Refer to Appendix for PCSM long-term operation and maintenance requirements.

APPENDIX A



Site Location Map

Freedom Road

Mars, PA USGS Quad Map

Cranberry Township, Butler County, Commonwealth of Pennsylvania

Sheffler & Company, Inc.

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DRAWN BY:	ASB
REVIEWED BY:	ASB
DATE:	11/1/2022
SCALE:	1"=2000'
PROJECT NUMBER:	4293

MAP

APPENDIX B

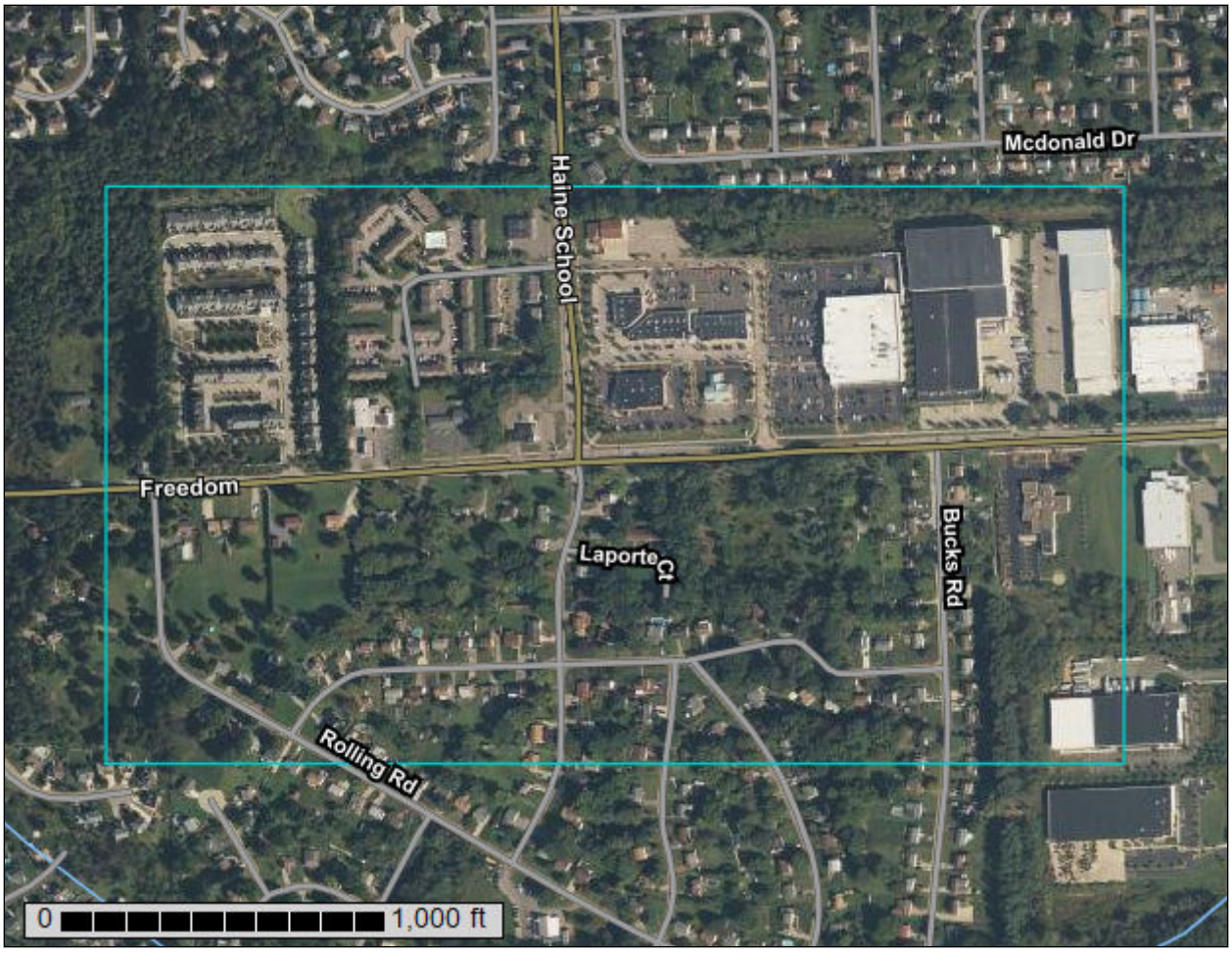
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Butler County, Pennsylvania



October 24, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Butler County, Pennsylvania
Survey Area Data: Version 17, Sep 6, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2021—Sep 19, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BrB	Brinkerton silt loam, 3 to 8 percent slopes	30.8	24.0%
ClA	Cavode silt loam, 0 to 3 percent slopes	1.5	1.2%
ClB	Cavode silt loam, 3 to 8 percent slopes	52.8	41.2%
ClC	Cavode silt loam, 8 to 15 percent slopes	5.4	4.2%
GoC	Gilpin-Weikert channery silt loams, 8 to 15 percent slopes	0.1	0.1%
TaA	Tilsit silt loam, 0 to 3 percent slopes	3.7	2.9%
TaB	Tilsit silt loam, 3 to 8 percent slopes	33.3	26.0%
WaB	Wharton silt loam, 3 to 8 percent slopes	0.2	0.2%
WaC	Wharton silt loam, 8 to 15 percent slopes	0.3	0.3%
Totals for Area of Interest		**128.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They

generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Butler County, Pennsylvania

BrB—Brinkerton silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2zj14
Elevation: 760 to 1,990 feet
Mean annual precipitation: 48 to 52 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 130 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Brinkerton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brinkerton

Setting

Landform: Colluvial aprons, hillslopes
Landform position (two-dimensional): Footslope, toeslope, backslope
Landform position (three-dimensional): Base slope, head slope, side slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Acid fine-silty colluvium derived from sedimentary rock

Typical profile

Ap - 0 to 8 inches: silt loam
Btg - 8 to 21 inches: silty clay loam
Btxg - 21 to 42 inches: silty clay loam
BC - 42 to 65 inches: channery silty clay loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 29 inches to fragipan
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.33 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Ecological site: F127XY007WV - Wet Uplands, F126XY002OH - Footslope
Other vegetative classification: Wetlands (W3)
Hydric soil rating: Yes

Minor Components

Ernest

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Lobdell

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

ClA—Cavode silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2wdpb
Elevation: 970 to 1,900 feet
Mean annual precipitation: 38 to 50 inches
Mean annual air temperature: 46 to 51 degrees F
Frost-free period: 120 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cavode and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cavode

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid clayey residuum weathered from clayey shale

Typical profile

Ap - 0 to 10 inches: silt loam
Btg - 10 to 47 inches: silty clay loam
BCg - 47 to 57 inches: channery silt loam
R - 57 to 67 inches: bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 40 to 80 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F124XY002OH - Acid Mixed Sedimentary Upland
Hydric soil rating: No

Minor Components

Brinkerton

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Wharton

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Gilpin

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

CIB—Cavode silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2wdpc
Elevation: 780 to 2,960 feet
Mean annual precipitation: 38 to 58 inches
Mean annual air temperature: 46 to 51 degrees F
Frost-free period: 110 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cavode and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cavode

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Acid clayey residuum weathered from clayey shale

Typical profile

Ap - 0 to 10 inches: silt loam
Btg - 10 to 47 inches: silty clay loam
BCg - 47 to 57 inches: channery silt loam
R - 57 to 67 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 40 to 80 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F124XY002OH - Acid Mixed Sedimentary Upland
Hydric soil rating: No

Minor Components

Gilpin

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Brinkerton

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

CIC—Cavode silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2wdpd
Elevation: 770 to 1,990 feet
Mean annual precipitation: 38 to 50 inches
Mean annual air temperature: 46 to 51 degrees F
Frost-free period: 110 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cavode and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cavode

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave, convex, linear
Across-slope shape: Concave, linear
Parent material: Acid clayey residuum weathered from clayey shale

Typical profile

Ap - 0 to 10 inches: silt loam
Btg - 10 to 47 inches: silty clay loam
BCg - 47 to 57 inches: channery silt loam
R - 57 to 67 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 40 to 80 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F124XY002OH - Acid Mixed Sedimentary Upland
Hydric soil rating: No

Minor Components

Gilpin

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Brinkerton

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

GoC—Gilpin-Weikert channery silt loams, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2wds1
Elevation: 840 to 2,830 feet
Mean annual precipitation: 39 to 49 inches
Mean annual air temperature: 48 to 51 degrees F
Frost-free period: 163 to 190 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Gilpin and similar soils: 55 percent

Weikert and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, interfluve, crest
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Acid fine-loamy residuum weathered from shale and siltstone

Typical profile

Ap - 0 to 8 inches: channery silt loam
Bt - 8 to 24 inches: channery silt loam
C - 24 to 33 inches: extremely channery loam
R - 33 to 43 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 30 to 36 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F124XY002OH - Acid Mixed Sedimentary Upland
Hydric soil rating: No

Description of Weikert

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from shale

Typical profile

Ap - 0 to 7 inches: channery silt loam
Bw - 7 to 15 inches: very channery silt loam
C - 15 to 17 inches: extremely channery silt loam
R - 17 to 26 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 14 to 19 inches to lithic bedrock
Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F124XY010OH - Fine Terrace and Plain, F124XY001OH - Shallow Acid Mixed Sedimentary Upland
Hydric soil rating: No

Minor Components

Hazleton

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Wharton

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, interfluve, crest
Down-slope shape: Linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Cavode

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, interfluve, crest
Down-slope shape: Linear
Across-slope shape: Convex, linear
Hydric soil rating: No

TaA—Tilsit silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2t1lx
Elevation: 780 to 1,520 feet
Mean annual precipitation: 39 to 45 inches

Mean annual air temperature: 49 to 53 degrees F
Frost-free period: 139 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Tilsit and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tilsit

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Residuum weathered from shale and siltstone

Typical profile

Ap - 0 to 7 inches: silt loam
BA - 7 to 11 inches: silt loam
Bt - 11 to 24 inches: silt loam
Btx - 24 to 44 inches: silty clay loam
C - 44 to 60 inches: channery silty clay loam
R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 14 to 34 inches to fragipan; 48 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 10 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: F124XY002OH - Acid Mixed Sedimentary Upland
Forage suitability group: Unnamed (G124XYF-3OH)
Other vegetative classification: Unnamed (G124XYF-3OH)
Hydric soil rating: No

Minor Components

Gilpin

Percent of map unit: 8 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex

Hydric soil rating: No

Coolville

Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Other vegetative classification: Fertile Loams (FL3)
Hydric soil rating: No

TaB—Tilsit silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t1ly
Elevation: 630 to 2,230 feet
Mean annual precipitation: 38 to 47 inches
Mean annual air temperature: 47 to 55 degrees F
Frost-free period: 139 to 199 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Tilsit and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tilsit

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Residuum weathered from shale and siltstone

Typical profile

Ap - 0 to 7 inches: silt loam
BA - 7 to 11 inches: silt loam
Bt - 11 to 24 inches: silt loam
Btx - 24 to 44 inches: silty clay loam
C - 44 to 60 inches: channery silty clay loam
R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 14 to 34 inches to fragipan; 48 to 80 inches to lithic bedrock
Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 10 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: F124XY002OH - Acid Mixed Sedimentary Upland
Forage suitability group: Unnamed (G124XYF-3OH)
Other vegetative classification: Unnamed (G124XYF-3OH)
Hydric soil rating: No

Minor Components

Wharton

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Gilpin

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

WaB—Wharton silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t185
Elevation: 760 to 2,860 feet
Mean annual precipitation: 37 to 57 inches
Mean annual air temperature: 46 to 53 degrees F
Frost-free period: 158 to 205 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Wharton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wharton

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy residuum weathered from shale and siltstone

Typical profile

Ap - 0 to 9 inches: silt loam
Bt1 - 9 to 16 inches: silt loam
Bt2 - 16 to 22 inches: silt loam
Bt3 - 22 to 31 inches: silt loam
BC - 31 to 46 inches: silty clay loam
C - 46 to 69 inches: channery silty clay loam
Cr - 69 to 79 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 40 to 71 inches to paralithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 16 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F124XY002OH - Acid Mixed Sedimentary Upland
Hydric soil rating: No

Minor Components

Cavode

Percent of map unit: 8 percent
Landform: Hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Gilpin

Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Brinkerton

Percent of map unit: 5 percent
Landform: Depressions on hillslopes
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

WaC—Wharton silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2t5mm
Elevation: 620 to 2,160 feet
Mean annual precipitation: 37 to 51 inches
Mean annual air temperature: 47 to 53 degrees F
Frost-free period: 161 to 205 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wharton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wharton

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from shale and siltstone

Typical profile

Ap - 0 to 9 inches: silt loam
Bt1 - 9 to 16 inches: silt loam
Bt2 - 16 to 22 inches: silt loam
Bt3 - 22 to 31 inches: silt loam
BC - 31 to 46 inches: silty clay loam
C - 46 to 69 inches: channery silty clay loam
Cr - 69 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 40 to 71 inches to paralithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 16 to 28 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: F126XY003OH - Moist Ridge
Forage suitability group: Unnamed (G126XYA-6OH)
Other vegetative classification: Unnamed (G126XYA-6OH)
Hydric soil rating: No

Minor Components

Gilpin

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Ernest

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Rarden

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

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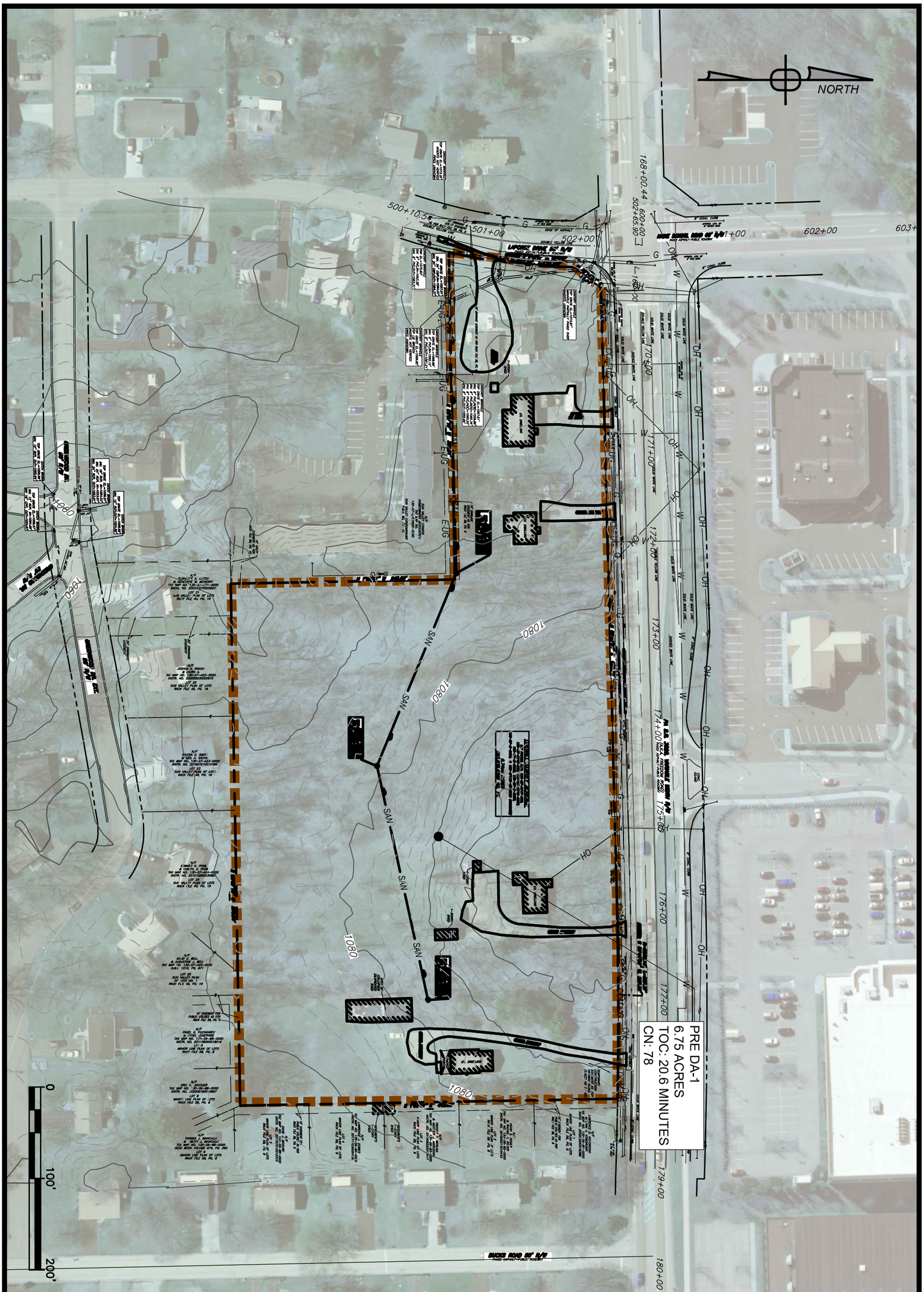
APPENDIX C



DRAWN BY:	ASB
REVIEWED BY:	GAS
DATE:	2/3/2023
SCALE:	1"=100'
PROJECT NUMBER:	4293

EXHIBIT "A"

Prepared By:

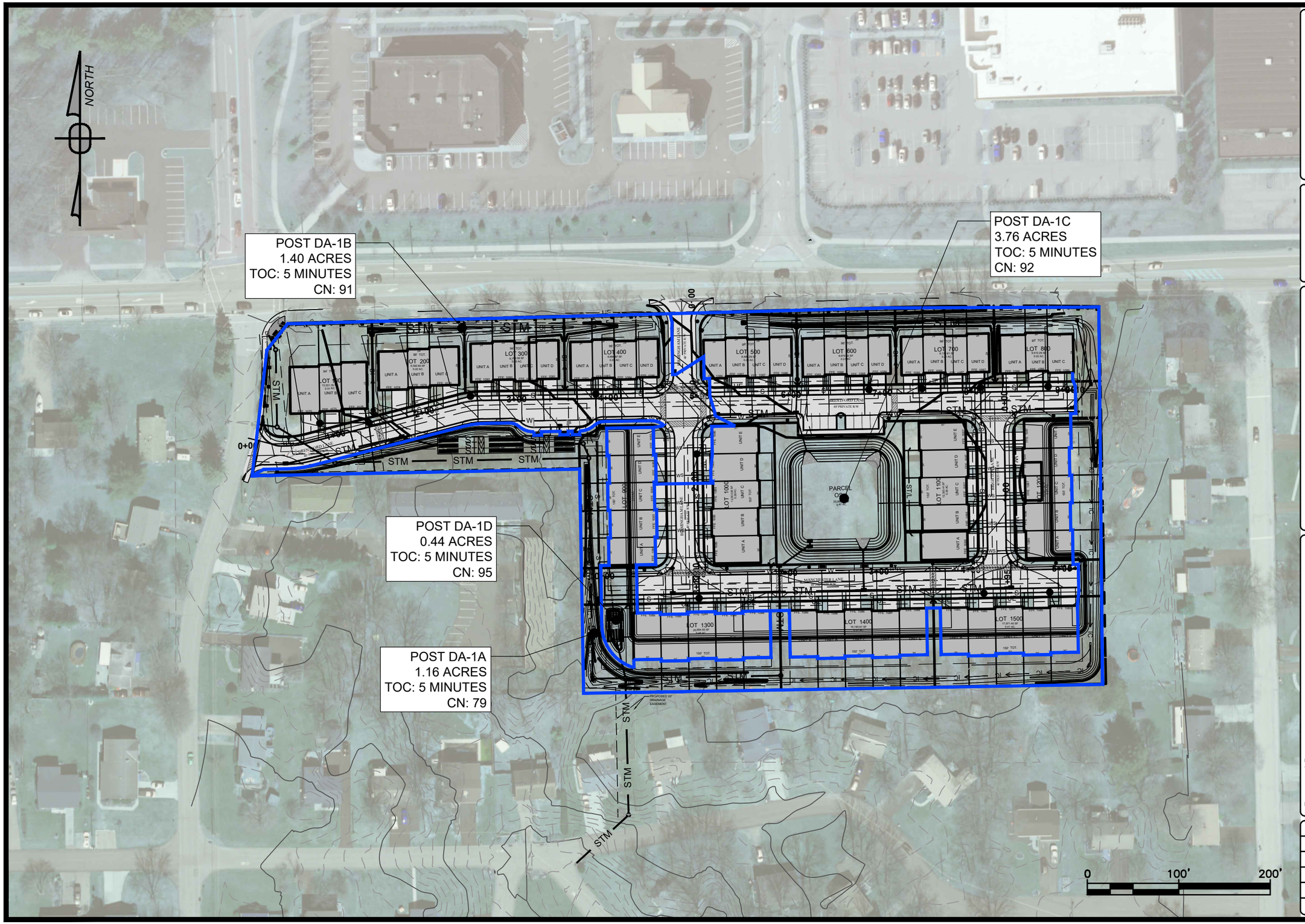
Sheffler & Company, Inc.
ENGINEERING • SURVEYING

1712 Mount Nebo Road
Sewickley, PA 15143-8780
Phone: 412-219-4509
E-mail: info@shefflerco.com

PRE-DA MAP

811 Know what's **below.** **Call** before you dig.

PLAN REVISIONS	
DATE	DESCRIPTION
-	-



811 Know what's **below.** **Call** before you dig.

POST-DA MAP

PLAN REVISIONS

DESCRIPTION	DATE
-	-

Prepared By:
Sheffler & Company, Inc.
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1712 Mount Nebo Road
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Phone: 412-219-4509
E-mail: info@shefflerco.com

DRAWN BY:	ASB
REVIEWED BY:	GAS
DATE:	2/3/2023
SCALE:	1"=100'
PROJECT NUMBER:	4293

EXHIBIT "B"

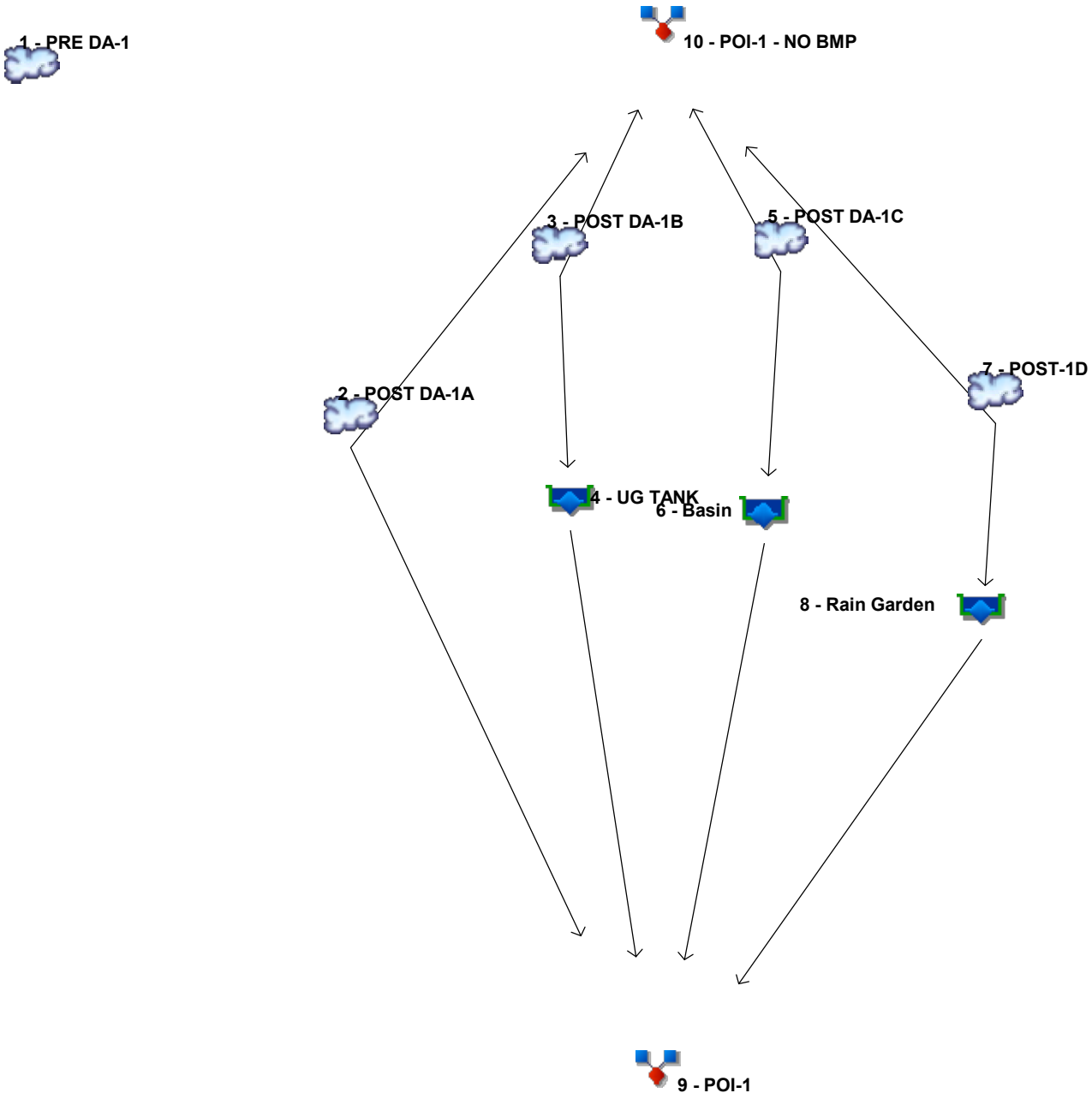
APPENDIX D

CURVE NUMBER CALCULATION
Project: Summerwind Townhomes
Project Number: 4293

DRAINAGE AREA - RUNOFF CURVE NUMBER

Sub-basin	Landuse	Soil Group				Subtotal	CN by Landuse				Sub-CN	Weighted CN
		A	B	C	D		A	B	C	D		
EXISTING CONDITIONS DRAINAGE AREA (PRE DA-1)	Impervious	0.00	0.00	0.00	0.51	0.51	89	89	89	89	89	77
	Open Space/grass	0.00	0.00	0.00	0.00	0.00	39	61	74	80	64	
	Meadow	0.00	0.00	0.00	0.44	0.44	30	58	71	78	78	
	Brush	0.00	0.00	0.00	0.00	0.00	30	48	65	73	54	
	Woodlands	0.00	0.00	0.00	5.80	5.80	30	55	70	77	77	
1 Total		0.00	0.00	0.00	6.75	**6.75**						
Grand Total		**0.00**	**0.00**	**0.00**	**6.75**	**6.75**						
PROPOSED CONDITIONS DRAINAGE AREA (POST DA-1A) UNDETAINED	Impervious	0.00	0.00	0.00	0.00	0.00	98	98	98	98	98	79
	Open Space	0.00	0.00	0.00	0.91	0.91	39	61	74	80	80	
	Meadow	0.00	0.00	0.00	0.00	0.00	30	58	71	78	59	
	Brush	0.00	0.00	0.00	0.00	0.00	30	48	65	73	54	
	Woodlands	0.00	0.00	0.00	0.25	0.25	30	55	70	77	77	
2 Total		0.00	0.00	0.00	1.16	**1.16**						
PROPOSED CONDITIONS DRAINAGE AREA (POST DA-1B) TO UNDERGROUND	Impervious	0.00	0.00	0.00	0.89	0.89	98	98	98	98	98	91
	Open Space	0.00	0.00	0.00	0.51	0.51	39	61	74	80	80	
	Meadow	0.00	0.00	0.00	0.00	0.00	30	58	71	78	59	
	Brush	0.00	0.00	0.00	0.00	0.00	30	48	65	73	54	
	Woodlands	0.00	0.00	0.00	0.00	0.00	30	55	70	77	58	
2 Total		0.00	0.00	0.00	1.40	**1.40**						
PROPOSED CONDITIONS DRAINAGE AREA (POST DA-1C) TO BASIN	Impervious	0.00	0.00	0.00	2.51	2.51	98	98	98	98	98	92
	Open Space	0.00	0.00	0.00	1.25	1.25	39	61	74	80	80	
	Meadow	0.00	0.00	0.00	0.00	0.00	30	58	71	78	59	
	Brush	0.00	0.00	0.00	0.00	0.00	30	48	65	73	54	
	Woodlands	0.00	0.00	0.00	0.00	0.00	30	55	70	77	58	
2 Total		0.00	0.00	0.00	3.76	**3.76**						
PROPOSED CONDITIONS DRAINAGE AREA (POST DA-1D) TO RAIN GARDEN	Impervious	0.00	0.00	0.00	0.35	0.35	98	98	98	98	98	95
	Open Space	0.00	0.00	0.00	0.08	0.08	39	61	74	80	80	
	Meadow	0.00	0.00	0.00	0.00	0.00	30	58	71	78	59	
	Brush	0.00	0.00	0.00	0.00	0.00	30	48	65	73	54	
	Woodlands	0.00	0.00	0.00	0.00	0.00	30	55	70	77	58	
2 Total		0.00	0.00	0.00	0.44	**0.44**						
Grand Total		**0.00**	**0.00**	**0.00**	**6.76**	**6.76**						

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	PRE DA-1
2	SCS Runoff	POST DA-1A
3	SCS Runoff	POST DA-1B
4	Reservoir	UG TANK
5	SCS Runoff	POST DA-1C
6	Reservoir	Basin
7	SCS Runoff	POST-1D
8	Reservoir	Rain Garden
9	Combine	POI-1
10	Combine	POI-1 - NO BMP

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	3.134	4.907	-------	-------	9.949	13.50	16.50	19.75	PRE DA-1
2	SCS Runoff	------	0.873	1.338	-------	-------	2.647	3.554	4.322	5.168	POST DA-1A
3	SCS Runoff	------	2.764	3.546	-------	-------	5.505	6.756	7.761	8.822	POST DA-1B
4	Reservoir	3	0.281	0.350	-------	-------	0.482	0.551	0.606	0.683	UG TANK
5	SCS Runoff	------	7.838	9.950	-------	-------	15.21	18.56	21.25	24.08	POST DA-1C
6	Reservoir	5	0.247	0.285	-------	-------	0.362	0.403	0.431	0.460	Basin
7	SCS Runoff	------	1.061	1.308	-------	-------	1.915	2.300	2.608	2.934	POST-1D
8	Reservoir	7	0.266	0.304	-------	-------	0.930	1.272	2.112	2.774	Rain Garden
9	Combine	2, 4, 6, 8	1.519	2.126	-------	-------	3.722	5.435	6.648	8.845	POI-1
10	Combine	2, 3, 5, 7,	12.47	16.08	-------	-------	25.24	31.16	35.94	41.01	POI-1 - NO BMP

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

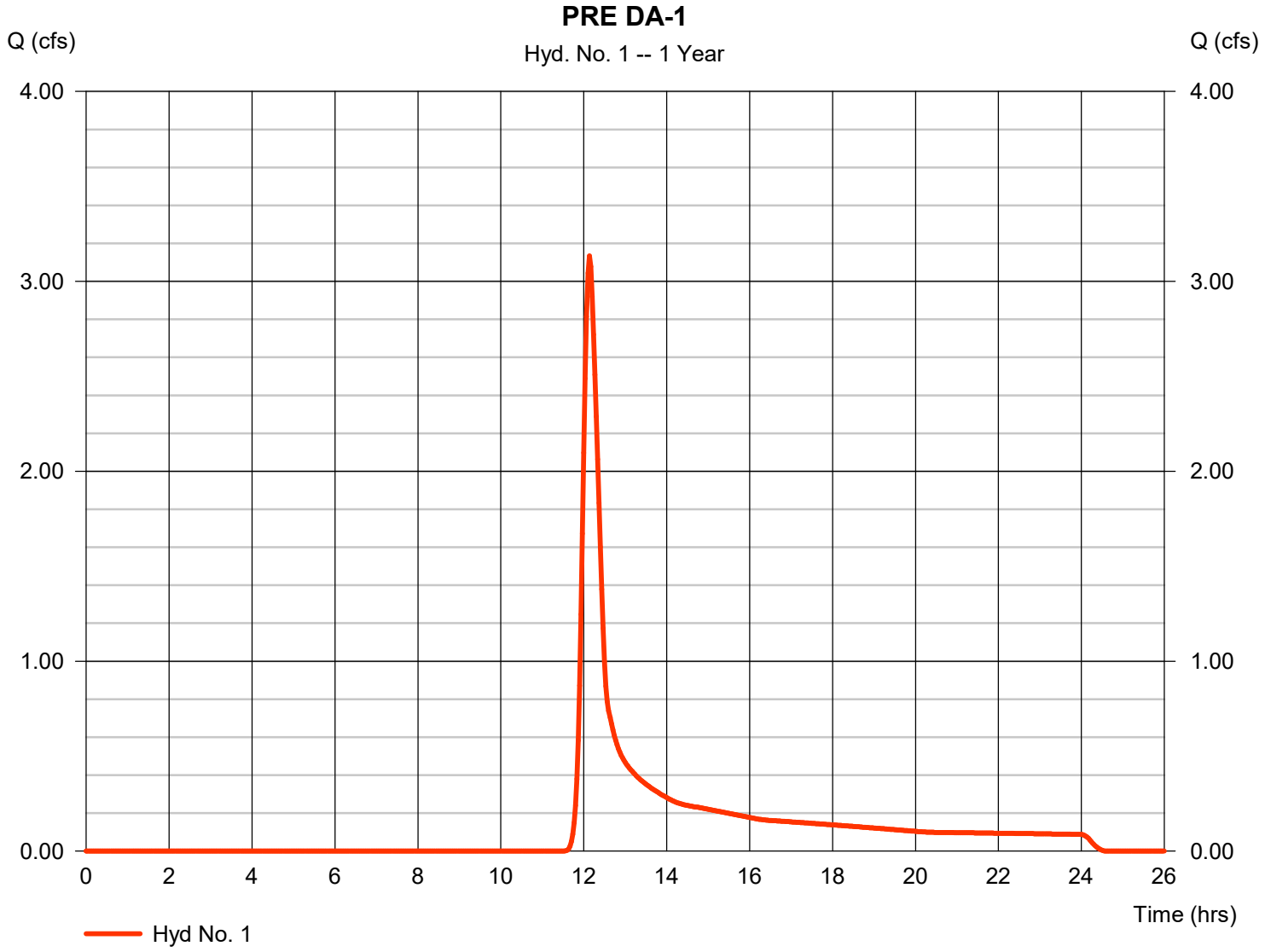
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.134	2	728	12,362	------	------	------	PRE DA-1
2	SCS Runoff	0.873	2	718	1,812	------	------	------	POST DA-1A
3	SCS Runoff	2.764	2	716	5,627	------	------	------	POST DA-1B
4	Reservoir	0.281	2	742	4,389	3	1063.91	2,860	UG TANK
5	SCS Runoff	7.838	2	716	16,058	------	------	------	POST DA-1C
6	Reservoir	0.247	2	834	16,019	5	1077.22	9,814	Basin
7	SCS Runoff	1.061	2	716	2,249	------	------	------	POST-1D
8	Reservoir	0.266	2	724	2,090	7	1072.39	900	Rain Garden
9	Combine	1.519	2	718	24,310	2, 4, 6, 8	------	------	POI-1
10	Combine	12.47	2	716	25,746	2, 3, 5, 7,	------	------	POI-1 - NO BMP

Hydrograph Report

Hyd. No. 1

PRE DA-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.134 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	12,362 cuft
Drainage area	=	6.750 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.60 min
Total precip.	=	2.02 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

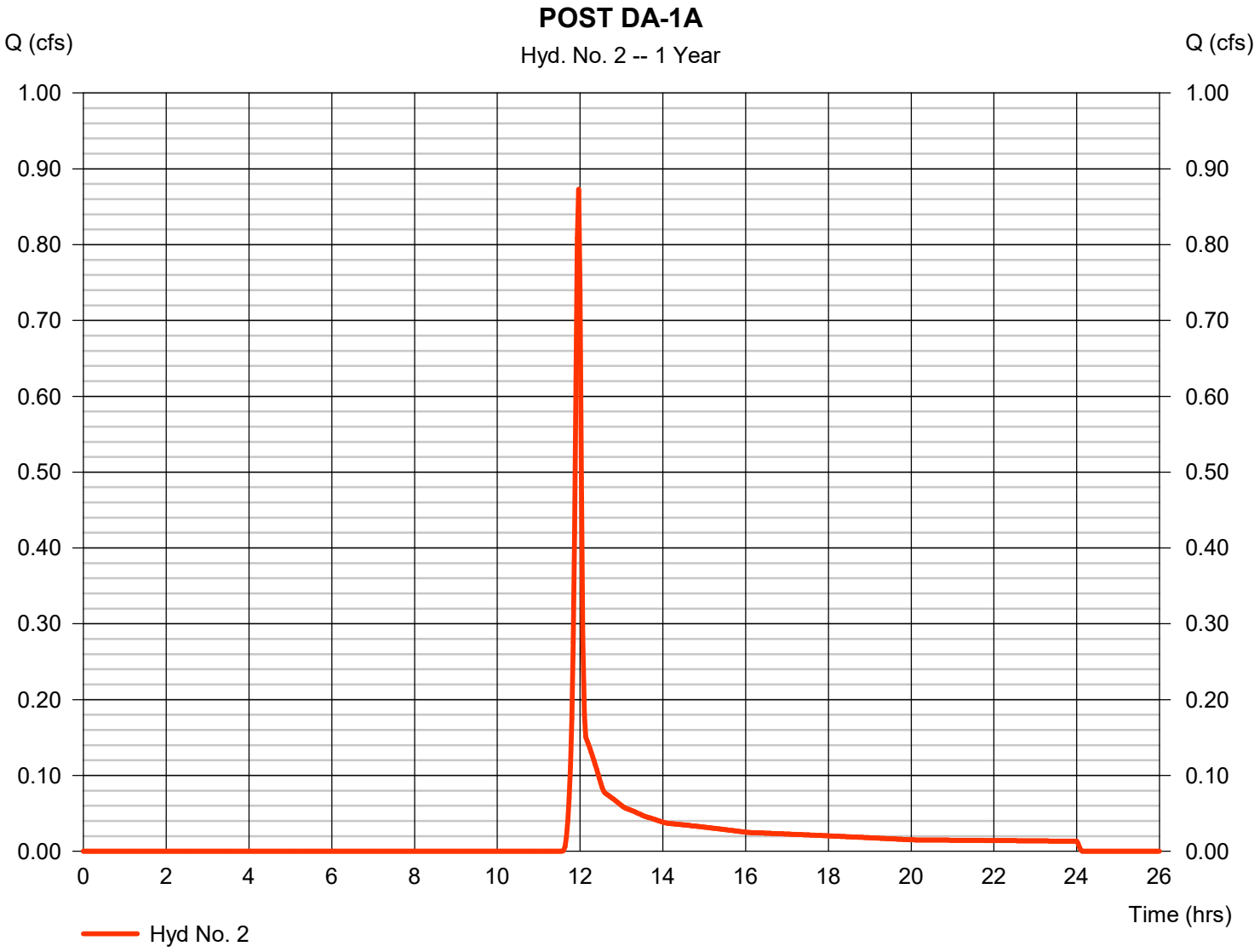


Hydrograph Report

Hyd. No. 2

POST DA-1A

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.873 cfs
Storm frequency	=	1 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	1,812 cuft
Drainage area	=	1.160 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.02 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

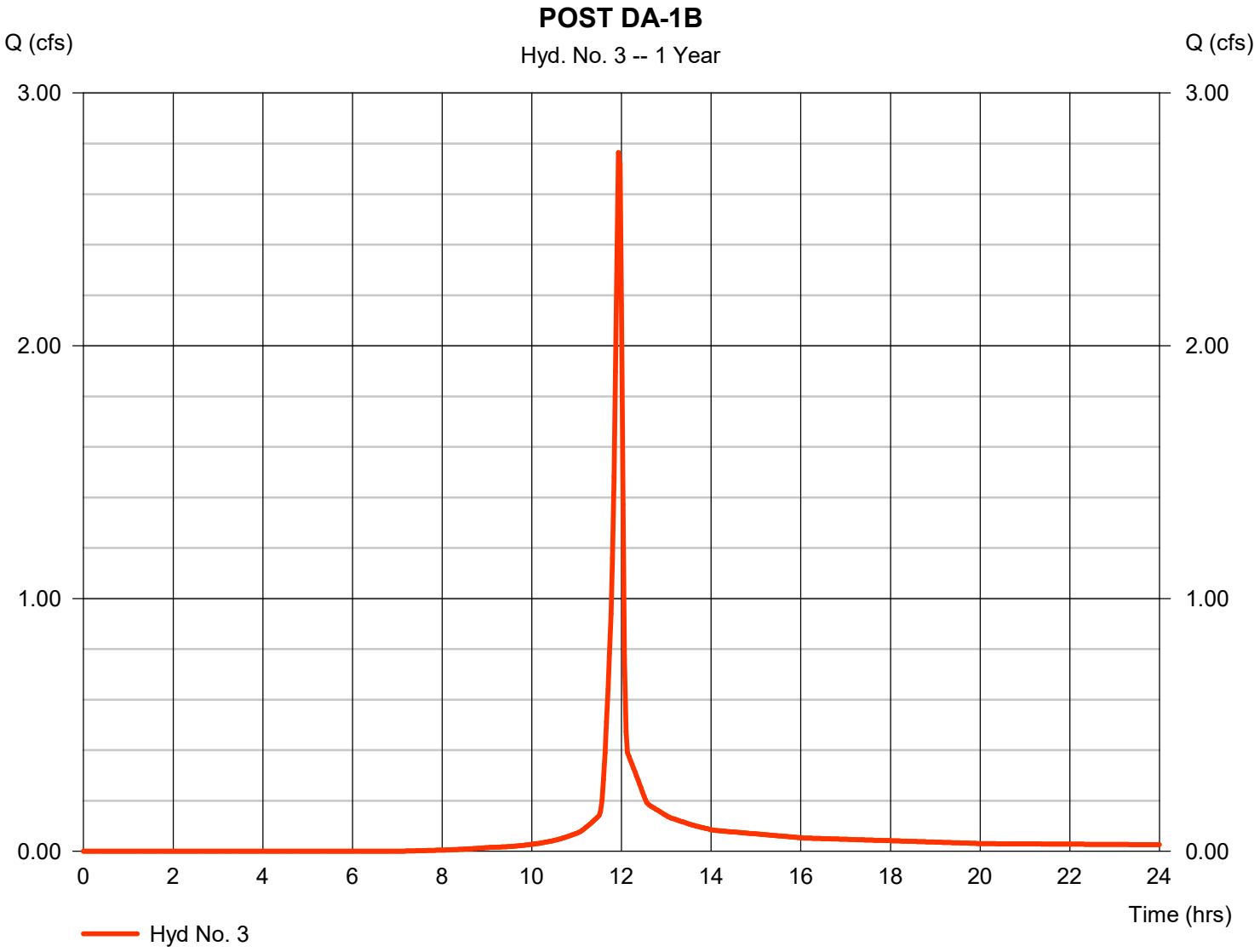


Hydrograph Report

Hyd. No. 3

POST DA-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.764 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 5,627 cuft
Drainage area	= 1.400 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



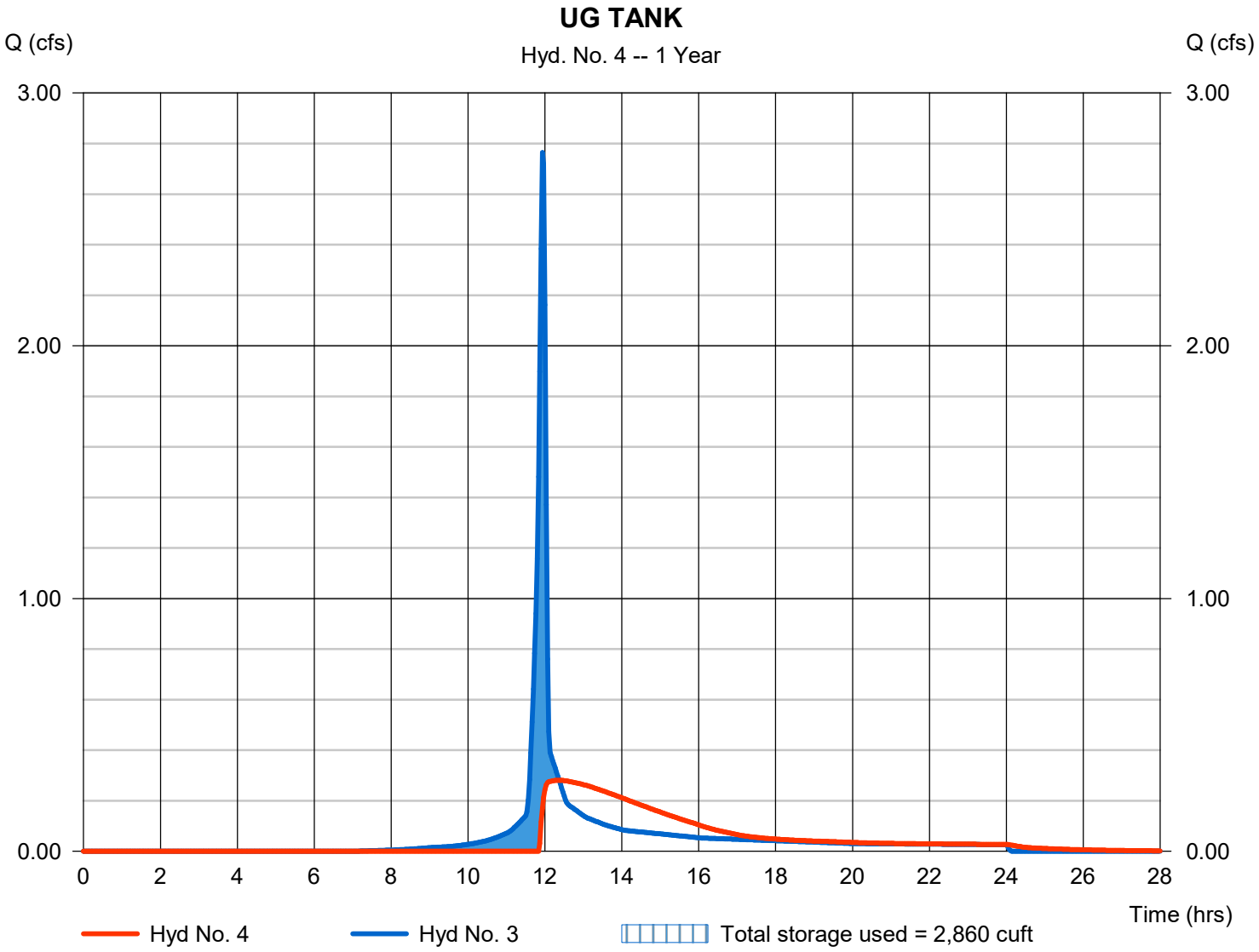
Hydrograph Report

Hyd. No. 4

UG TANK

Hydrograph type	=	Reservoir	Peak discharge	=	0.281 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.37 hrs
Time interval	=	2 min	Hyd. volume	=	4,389 cuft
Inflow hyd. No.	=	3 - POST DA-1B	Max. Elevation	=	1063.91 ft
Reservoir name	=	UG Tank	Max. Storage	=	2,860 cuft

Storage Indication method used.



Pond No. 2 - UG Tank

Pond Data

UG Chambers -Invert elev. = 1063.00 ft, Rise x Span = 4.00 x 4.00 ft, Barrel Len = 150.00 ft, No. Barrels = 3, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 1062.00 ft, Width = 6.00 ft, Height = 6.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1062.00	n/a	0	0
0.60	1062.60	n/a	700	700
1.20	1063.20	n/a	768	1,468
1.80	1063.80	n/a	1,154	2,622
2.40	1064.40	n/a	1,322	3,944
3.00	1065.00	n/a	1,389	5,333
3.60	1065.60	n/a	1,390	6,723
4.20	1066.20	n/a	1,321	8,043
4.80	1066.80	n/a	1,153	9,196
5.40	1067.40	n/a	768	9,965
6.00	1068.00	n/a	700	10,665

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.50	0.00	0.00
Span (in)	= 15.00	3.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1061.00	1063.00	0.00	0.00
Length (ft)	= 9.00	0.00	0.00	0.00
Slope (%)	= 1.00	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)	= 6.28	0.00	0.00	0.00
Crest El. (ft)	= 1076.32	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1062.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.06	70	1062.06	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.12	140	1062.12	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.18	210	1062.18	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.24	280	1062.24	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.30	350	1062.30	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.36	420	1062.36	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.42	490	1062.42	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.48	560	1062.48	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.54	630	1062.54	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.60	700	1062.60	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.66	777	1062.66	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.72	854	1062.72	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.78	931	1062.78	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.84	1,007	1062.84	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.90	1,084	1062.90	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
0.96	1,161	1062.96	1.97 oc	0.00	---	---	0.00	---	---	---	---	---	0.000
1.02	1,238	1063.02	1.97 oc	0.00 ic	---	---	0.00	---	---	---	---	---	0.001
1.08	1,315	1063.08	1.97 oc	0.01 ic	---	---	0.00	---	---	---	---	---	0.015
1.14	1,392	1063.14	1.97 oc	0.04 ic	---	---	0.00	---	---	---	---	---	0.041
1.20	1,468	1063.20	1.97 oc	0.08 ic	---	---	0.00	---	---	---	---	---	0.075
1.26	1,584	1063.26	1.97 oc	0.11 ic	---	---	0.00	---	---	---	---	---	0.110
1.32	1,699	1063.32	1.97 oc	0.13 ic	---	---	0.00	---	---	---	---	---	0.134
1.38	1,815	1063.38	1.97 oc	0.16 ic	---	---	0.00	---	---	---	---	---	0.156
1.44	1,930	1063.44	1.97 oc	0.17 ic	---	---	0.00	---	---	---	---	---	0.174
1.50	2,045	1063.50	1.97 oc	0.19 ic	---	---	0.00	---	---	---	---	---	0.191
1.56	2,161	1063.56	1.97 oc	0.21 ic	---	---	0.00	---	---	---	---	---	0.207
1.62	2,276	1063.62	1.97 oc	0.22 ic	---	---	0.00	---	---	---	---	---	0.221
1.68	2,391	1063.68	1.97 oc	0.24 ic	---	---	0.00	---	---	---	---	---	0.235
1.74	2,507	1063.74	1.97 oc	0.25 ic	---	---	0.00	---	---	---	---	---	0.248
1.80	2,622	1063.80	1.97 oc	0.26 ic	---	---	0.00	---	---	---	---	---	0.260
1.86	2,754	1063.86	1.97 oc	0.27 ic	---	---	0.00	---	---	---	---	---	0.272

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UG Tank

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.92	2,886	1063.92	1.97 oc	0.28 ic	---	---	0.00	---	---	---	---	---	0.283
1.98	3,019	1063.98	1.97 oc	0.29 ic	---	---	0.00	---	---	---	---	---	0.294
2.04	3,151	1064.04	1.97 oc	0.30 ic	---	---	0.00	---	---	---	---	---	0.304
2.10	3,283	1064.10	1.97 oc	0.31 ic	---	---	0.00	---	---	---	---	---	0.314
2.16	3,415	1064.16	1.97 oc	0.32 ic	---	---	0.00	---	---	---	---	---	0.324
2.22	3,547	1064.22	1.97 oc	0.33 ic	---	---	0.00	---	---	---	---	---	0.333
2.28	3,680	1064.28	1.97 oc	0.34 ic	---	---	0.00	---	---	---	---	---	0.343
2.34	3,812	1064.34	1.97 oc	0.35 ic	---	---	0.00	---	---	---	---	---	0.352
2.40	3,944	1064.40	1.97 oc	0.36 ic	---	---	0.00	---	---	---	---	---	0.360
2.46	4,083	1064.46	1.97 oc	0.37 ic	---	---	0.00	---	---	---	---	---	0.369
2.52	4,222	1064.52	1.97 oc	0.38 ic	---	---	0.00	---	---	---	---	---	0.377
2.58	4,361	1064.58	1.97 oc	0.39 ic	---	---	0.00	---	---	---	---	---	0.385
2.64	4,499	1064.64	1.97 oc	0.39 ic	---	---	0.00	---	---	---	---	---	0.393
2.70	4,638	1064.70	1.97 oc	0.40 ic	---	---	0.00	---	---	---	---	---	0.401
2.76	4,777	1064.76	1.97 oc	0.41 ic	---	---	0.00	---	---	---	---	---	0.409
2.82	4,916	1064.82	1.97 oc	0.42 ic	---	---	0.00	---	---	---	---	---	0.416
2.88	5,055	1064.88	1.97 oc	0.42 ic	---	---	0.00	---	---	---	---	---	0.424
2.94	5,194	1064.94	1.97 oc	0.43 ic	---	---	0.00	---	---	---	---	---	0.431
3.00	5,333	1065.00	1.97 oc	0.44 ic	---	---	0.00	---	---	---	---	---	0.438
3.06	5,472	1065.06	1.97 oc	0.45 ic	---	---	0.00	---	---	---	---	---	0.445
3.12	5,611	1065.12	1.97 oc	0.45 ic	---	---	0.00	---	---	---	---	---	0.452
3.18	5,750	1065.18	1.97 oc	0.46 ic	---	---	0.00	---	---	---	---	---	0.459
3.24	5,889	1065.24	1.97 oc	0.47 ic	---	---	0.00	---	---	---	---	---	0.465
3.30	6,028	1065.30	1.97 oc	0.47 ic	---	---	0.00	---	---	---	---	---	0.472
3.36	6,167	1065.36	1.97 oc	0.48 ic	---	---	0.00	---	---	---	---	---	0.479
3.42	6,306	1065.42	1.97 oc	0.49 ic	---	---	0.00	---	---	---	---	---	0.485
3.48	6,445	1065.48	1.97 oc	0.49 ic	---	---	0.00	---	---	---	---	---	0.491
3.54	6,584	1065.54	1.97 oc	0.50 ic	---	---	0.00	---	---	---	---	---	0.498
3.60	6,723	1065.60	1.97 oc	0.50 ic	---	---	0.00	---	---	---	---	---	0.504
3.66	6,855	1065.66	1.97 oc	0.51 ic	---	---	0.00	---	---	---	---	---	0.510
3.72	6,987	1065.72	1.97 oc	0.52 ic	---	---	0.00	---	---	---	---	---	0.516
3.78	7,119	1065.78	1.97 oc	0.52 ic	---	---	0.00	---	---	---	---	---	0.522
3.84	7,251	1065.84	1.97 oc	0.53 ic	---	---	0.00	---	---	---	---	---	0.528
3.90	7,383	1065.90	1.97 oc	0.53 ic	---	---	0.00	---	---	---	---	---	0.534
3.96	7,515	1065.96	1.97 oc	0.54 ic	---	---	0.00	---	---	---	---	---	0.540
4.02	7,647	1066.02	1.97 oc	0.55 ic	---	---	0.00	---	---	---	---	---	0.545
4.08	7,779	1066.08	1.97 oc	0.55 ic	---	---	0.00	---	---	---	---	---	0.551
4.14	7,911	1066.14	1.97 oc	0.56 ic	---	---	0.00	---	---	---	---	---	0.557
4.20	8,043	1066.20	1.97 oc	0.56 ic	---	---	0.00	---	---	---	---	---	0.562
4.26	8,159	1066.26	1.97 oc	0.57 ic	---	---	0.00	---	---	---	---	---	0.568
4.32	8,274	1066.32	1.97 oc	0.57 ic	---	---	0.00	---	---	---	---	---	0.573
4.38	8,389	1066.38	1.97 oc	0.58 ic	---	---	0.00	---	---	---	---	---	0.578
4.44	8,504	1066.44	1.97 oc	0.58 ic	---	---	0.00	---	---	---	---	---	0.584
4.50	8,620	1066.50	1.97 oc	0.59 ic	---	---	0.00	---	---	---	---	---	0.589
4.56	8,735	1066.56	1.97 oc	0.59 ic	---	---	0.00	---	---	---	---	---	0.594
4.62	8,850	1066.62	1.97 oc	0.60 ic	---	---	0.00	---	---	---	---	---	0.600
4.68	8,966	1066.68	1.97 oc	0.60 ic	---	---	0.00	---	---	---	---	---	0.605
4.74	9,081	1066.74	1.97 oc	0.61 ic	---	---	0.00	---	---	---	---	---	0.610
4.80	9,196	1066.80	1.97 oc	0.61 ic	---	---	0.00	---	---	---	---	---	0.615
4.86	9,273	1066.86	1.97 oc	0.62 ic	---	---	0.00	---	---	---	---	---	0.620
4.92	9,350	1066.92	1.97 oc	0.62 ic	---	---	0.00	---	---	---	---	---	0.625
4.98	9,427	1066.98	1.97 oc	0.63 ic	---	---	0.00	---	---	---	---	---	0.630
5.04	9,504	1067.04	1.97 oc	0.63 ic	---	---	0.00	---	---	---	---	---	0.635
5.10	9,581	1067.10	1.97 oc	0.64 ic	---	---	0.00	---	---	---	---	---	0.640
5.16	9,657	1067.16	1.97 oc	0.64 ic	---	---	0.00	---	---	---	---	---	0.644
5.22	9,734	1067.22	1.97 oc	0.65 ic	---	---	0.00	---	---	---	---	---	0.649
5.28	9,811	1067.28	1.97 oc	0.65 ic	---	---	0.00	---	---	---	---	---	0.654
5.34	9,888	1067.34	1.97 oc	0.66 ic	---	---	0.00	---	---	---	---	---	0.659
5.40	9,965	1067.40	1.97 oc	0.66 ic	---	---	0.00	---	---	---	---	---	0.663
5.46	10,035	1067.46	1.97 oc	0.67 ic	---	---	0.00	---	---	---	---	---	0.668
5.52	10,105	1067.52	1.97 oc	0.67 ic	---	---	0.00	---	---	---	---	---	0.673
5.58	10,175	1067.58	1.97 oc	0.68 ic	---	---	0.00	---	---	---	---	---	0.677
5.64	10,245	1067.64	1.97 oc	0.68 ic	---	---	0.00	---	---	---	---	---	0.682
5.70	10,315	1067.70	1.97 oc	0.69 ic	---	---	0.00	---	---	---	---	---	0.686
5.76	10,385	1067.76	1.97 oc	0.69 ic	---	---	0.00	---	---	---	---	---	0.691
5.82	10,455	1067.82	1.97 oc	0.70 ic	---	---	0.00	---	---	---	---	---	0.695
5.88	10,525	1067.88	1.97 oc	0.70 ic	---	---	0.00	---	---	---	---	---	0.700
5.94	10,595	1067.94	1.97 oc	0.70 ic	---	---	0.00	---	---	---	---	---	0.704
6.00	10,665	1068.00	1.97 oc	0.71 ic	---	---	0.00	---	---	---	---	---	0.709

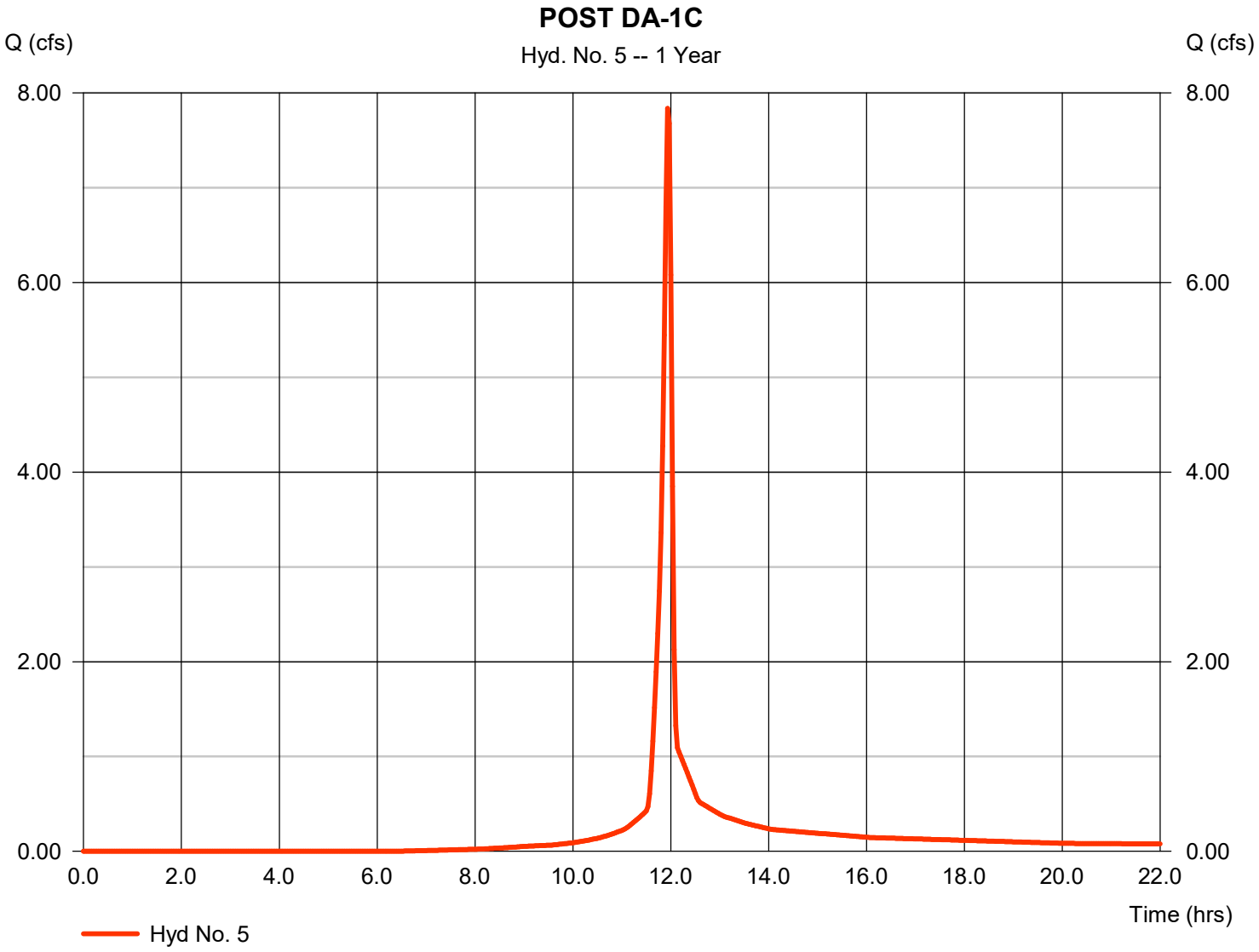
...End

Hydrograph Report

Hyd. No. 5

POST DA-1C

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.838 cfs
Storm frequency	=	1 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	16,058 cuft
Drainage area	=	3.760 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.02 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



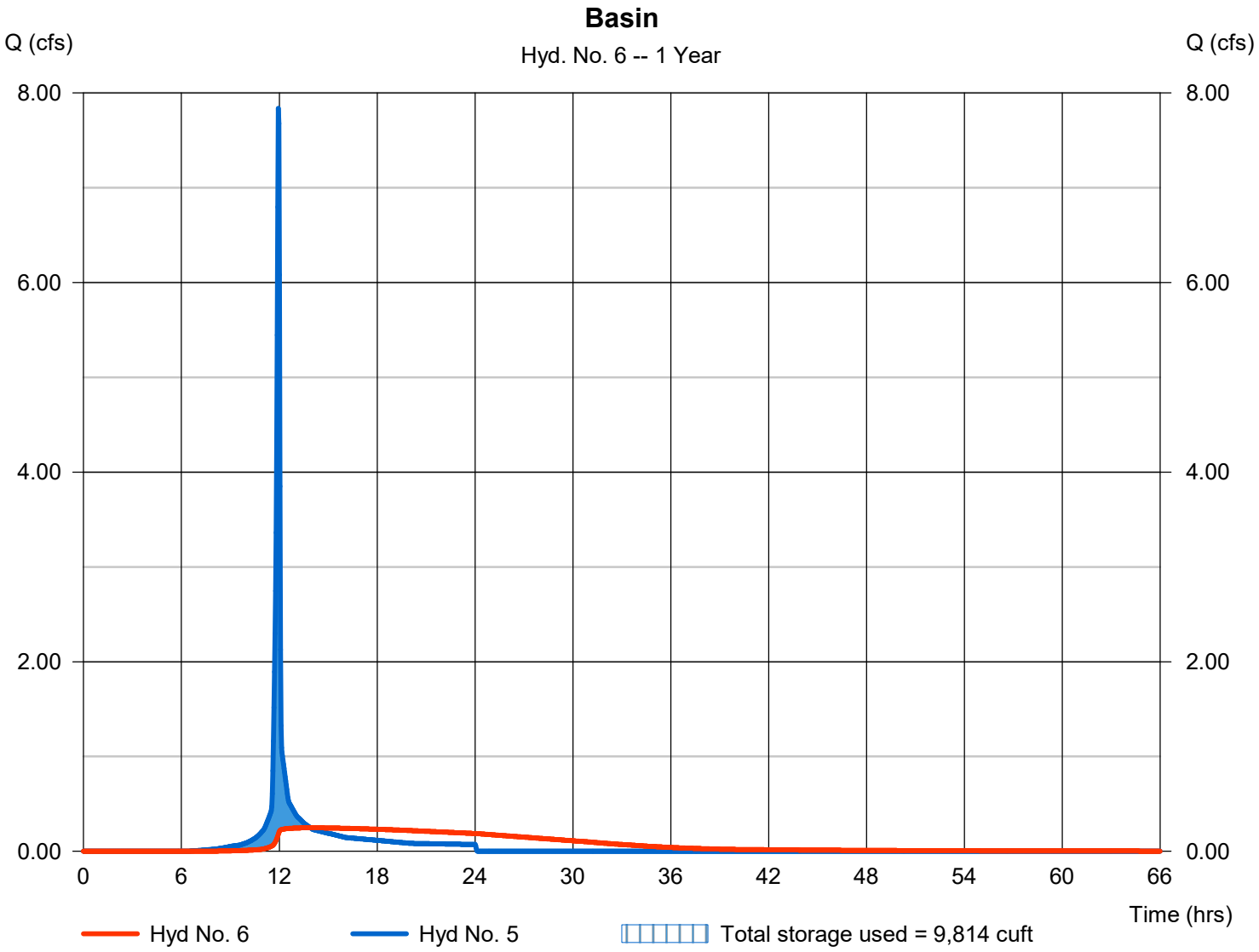
Hydrograph Report

Hyd. No. 6

Basin

Hydrograph type	=	Reservoir	Peak discharge	=	0.247 cfs
Storm frequency	=	1 yrs	Time to peak	=	13.90 hrs
Time interval	=	2 min	Hyd. volume	=	16,019 cuft
Inflow hyd. No.	=	5 - POST DA-1C	Max. Elevation	=	1077.22 ft
Reservoir name	=	Basin	Max. Storage	=	9,814 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1076.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1076.00	7,444	0	0
1.00	1077.00	8,306	7,870	7,870
2.00	1078.00	9,257	8,776	16,647
3.00	1079.00	10,295	9,770	26,417
4.00	1080.00	11,425	10,854	37,271
5.00	1081.00	12,659	12,036	49,307
6.00	1082.00	13,949	13,297	62,604

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.00	0.00	0.00
Span (in)	= 15.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1072.50	1076.00	0.00	0.00
Length (ft)	= 40.00	0.00	0.00	0.00
Slope (%)	= 2.00	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)	= 12.00	12.00	0.00	0.00
Crest El. (ft)	= 1080.00	1080.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1076.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.10	787	1076.10	10.02 ic	0.02 ic	---	---	0.00	0.00	---	---	---	---	0.020
0.20	1,574	1076.20	10.02 ic	0.06 ic	---	---	0.00	0.00	---	---	---	---	0.064
0.30	2,361	1076.30	10.02 ic	0.10 ic	---	---	0.00	0.00	---	---	---	---	0.099
0.40	3,148	1076.40	10.02 ic	0.12 ic	---	---	0.00	0.00	---	---	---	---	0.124
0.50	3,935	1076.50	10.02 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.145
0.60	4,722	1076.60	10.02 ic	0.16 ic	---	---	0.00	0.00	---	---	---	---	0.163
0.70	5,509	1076.70	10.02 ic	0.18 ic	---	---	0.00	0.00	---	---	---	---	0.179
0.80	6,296	1076.80	10.02 ic	0.19 ic	---	---	0.00	0.00	---	---	---	---	0.194
0.90	7,083	1076.90	10.02 ic	0.21 ic	---	---	0.00	0.00	---	---	---	---	0.208
1.00	7,870	1077.00	10.02 ic	0.22 ic	---	---	0.00	0.00	---	---	---	---	0.221
1.10	8,748	1077.10	10.02 ic	0.23 ic	---	---	0.00	0.00	---	---	---	---	0.233
1.20	9,626	1077.20	10.02 ic	0.25 ic	---	---	0.00	0.00	---	---	---	---	0.245
1.30	10,503	1077.30	10.02 ic	0.26 ic	---	---	0.00	0.00	---	---	---	---	0.256
1.40	11,381	1077.40	10.02 ic	0.27 ic	---	---	0.00	0.00	---	---	---	---	0.267
1.50	12,258	1077.50	10.02 ic	0.28 ic	---	---	0.00	0.00	---	---	---	---	0.277
1.60	13,136	1077.60	10.02 ic	0.29 ic	---	---	0.00	0.00	---	---	---	---	0.287
1.70	14,014	1077.70	10.02 ic	0.30 ic	---	---	0.00	0.00	---	---	---	---	0.297
1.80	14,891	1077.80	10.02 ic	0.31 ic	---	---	0.00	0.00	---	---	---	---	0.306
1.90	15,769	1077.90	10.02 ic	0.31 ic	---	---	0.00	0.00	---	---	---	---	0.315
2.00	16,647	1078.00	10.02 ic	0.32 ic	---	---	0.00	0.00	---	---	---	---	0.324
2.10	17,624	1078.10	10.02 ic	0.33 ic	---	---	0.00	0.00	---	---	---	---	0.332
2.20	18,601	1078.20	10.02 ic	0.34 ic	---	---	0.00	0.00	---	---	---	---	0.340
2.30	19,578	1078.30	10.02 ic	0.35 ic	---	---	0.00	0.00	---	---	---	---	0.349
2.40	20,555	1078.40	10.02 ic	0.36 ic	---	---	0.00	0.00	---	---	---	---	0.356
2.50	21,532	1078.50	10.02 ic	0.36 ic	---	---	0.00	0.00	---	---	---	---	0.364
2.60	22,509	1078.60	10.02 ic	0.37 ic	---	---	0.00	0.00	---	---	---	---	0.372
2.70	23,486	1078.70	10.02 ic	0.38 ic	---	---	0.00	0.00	---	---	---	---	0.379
2.80	24,463	1078.80	10.02 ic	0.39 ic	---	---	0.00	0.00	---	---	---	---	0.387
2.90	25,440	1078.90	10.02 ic	0.39 ic	---	---	0.00	0.00	---	---	---	---	0.394
3.00	26,417	1079.00	10.02 ic	0.40 ic	---	---	0.00	0.00	---	---	---	---	0.401
3.10	27,502	1079.10	10.02 ic	0.41 ic	---	---	0.00	0.00	---	---	---	---	0.408
3.20	28,588	1079.20	10.02 ic	0.41 ic	---	---	0.00	0.00	---	---	---	---	0.414
3.30	29,673	1079.30	10.02 ic	0.42 ic	---	---	0.00	0.00	---	---	---	---	0.421
3.40	30,759	1079.40	10.02 ic	0.43 ic	---	---	0.00	0.00	---	---	---	---	0.428
3.50	31,844	1079.50	10.02 ic	0.43 ic	---	---	0.00	0.00	---	---	---	---	0.434

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Basin

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.60	32,929	1079.60	10.02 ic	0.44 ic	---	---	0.00	0.00	---	---	---	---	0.441
3.70	34,015	1079.70	10.02 ic	0.45 ic	---	---	0.00	0.00	---	---	---	---	0.447
3.80	35,100	1079.80	10.02 ic	0.45 ic	---	---	0.00	0.00	---	---	---	---	0.453
3.90	36,186	1079.90	10.02 ic	0.46 ic	---	---	0.00	0.00	---	---	---	---	0.459
4.00	37,271	1080.00	10.02 ic	0.47 ic	---	---	0.00	0.00	---	---	---	---	0.465
4.10	38,475	1080.10	10.02 ic	0.47 ic	---	---	1.26	0.00	---	---	---	---	1.734
4.20	39,678	1080.20	10.02 ic	0.48 ic	---	---	3.57	0.00	---	---	---	---	4.050
4.30	40,882	1080.30	10.02 ic	0.48 ic	---	---	6.57	0.00	---	---	---	---	7.051
4.40	42,085	1080.40	10.59 ic	0.48 ic	---	---	10.11	0.00	---	---	---	---	10.59
4.50	43,289	1080.50	14.41 ic	0.28 ic	---	---	14.13	0.00	---	---	---	---	14.41
4.60	44,492	1080.60	15.83 ic	0.13 ic	---	---	15.70 s	1.26	---	---	---	---	17.09
4.70	45,696	1080.70	16.06 ic	0.10 ic	---	---	15.96 s	3.57	---	---	---	---	19.63
4.80	46,899	1080.80	16.23 ic	0.08 ic	---	---	16.15 s	6.57	---	---	---	---	22.80
4.90	48,103	1080.90	16.38 ic	0.07 ic	---	---	16.31 s	10.11	---	---	---	---	26.49
5.00	49,307	1081.00	16.51 ic	0.06 ic	---	---	16.45 s	14.13	---	---	---	---	30.64
5.10	50,636	1081.10	16.63 ic	0.05 ic	---	---	16.58 s	18.57	---	---	---	---	35.20
5.20	51,966	1081.20	16.75 ic	0.05 ic	---	---	16.69 s	23.40	---	---	---	---	40.14
5.30	53,296	1081.30	16.86 ic	0.04 ic	---	---	16.80 s	28.60	---	---	---	---	45.44
5.40	54,626	1081.40	16.97 ic	0.04 ic	---	---	16.91 s	34.12	---	---	---	---	51.07
5.50	55,955	1081.50	17.07 ic	0.04 ic	---	---	17.03 s	39.96	---	---	---	---	57.03
5.60	57,285	1081.60	17.18 ic	0.03 ic	---	---	17.11 s	46.10	---	---	---	---	63.25
5.70	58,615	1081.70	17.28 ic	0.03 ic	---	---	17.24 s	52.53	---	---	---	---	69.79
5.80	59,945	1081.80	17.39 ic	0.03 ic	---	---	17.36 s	59.23	---	---	---	---	76.62
5.90	61,274	1081.90	17.49 ic	0.03 ic	---	---	17.46 s	66.20	---	---	---	---	83.68
6.00	62,604	1082.00	17.59 ic	0.02 ic	---	---	17.52 s	73.41	---	---	---	---	90.95

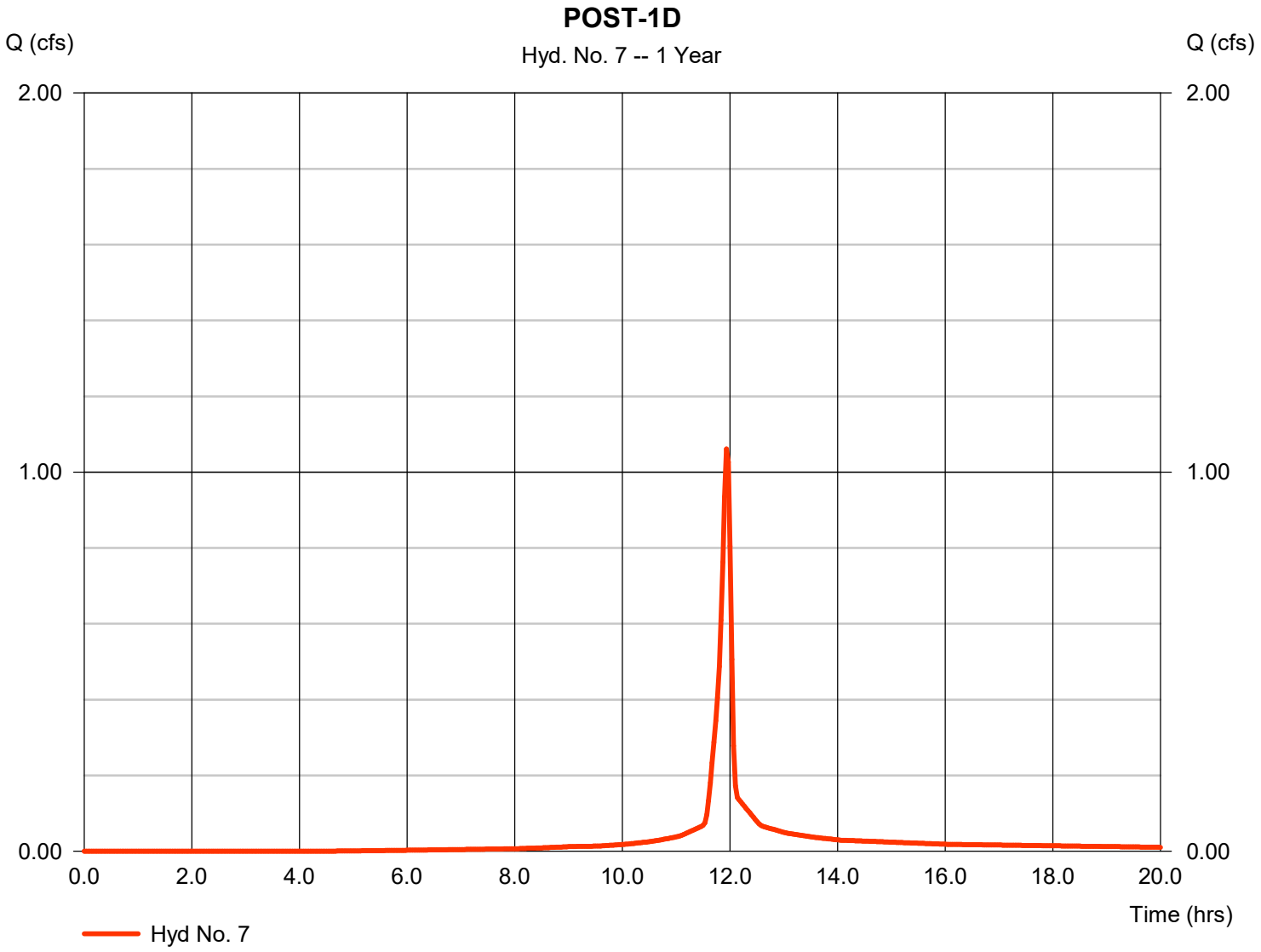
...End

Hydrograph Report

Hyd. No. 7

POST-1D

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.061 cfs
Storm frequency	=	1 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	2,249 cuft
Drainage area	=	0.440 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.02 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



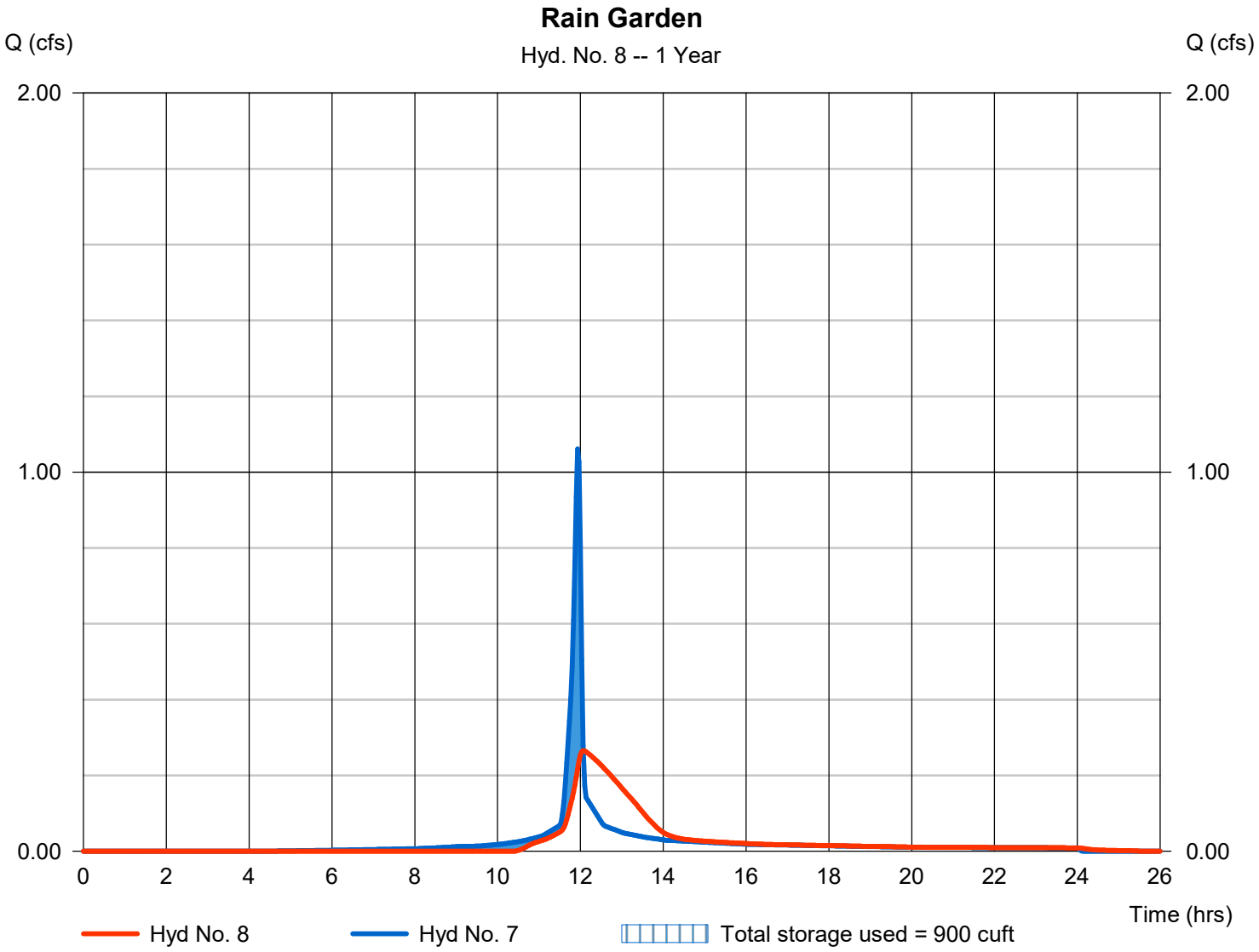
Hydrograph Report

Hyd. No. 8

Rain Garden

Hydrograph type	=	Reservoir	Peak discharge	=	0.266 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	2,090 cuft
Inflow hyd. No.	=	7 - POST-1D	Max. Elevation	=	1072.39 ft
Reservoir name	=	Rain Garden v1	Max. Storage	=	900 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 04 / 1 / 2024

Pond No. 3 - Rain Garden v1

Pond Data

UG Chambers - Invert elev. = 1071.00 ft, Rise x Span = 2.00 x 2.00 ft, Barrel Len = 35.00 ft, No. Barrels = 6, Slope = 0.00%, Headers = Yes

Encasement - Invert elev. = 1070.50 ft, Width = 3.00 ft, Height = 3.00 ft, Voids = 40.00%

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1074.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1070.50	n/a	0	0
0.30	1070.80	n/a	89	89
0.60	1071.10	n/a	97	186
0.90	1071.40	n/a	146	332
1.20	1071.70	n/a	167	499
1.50	1072.00	n/a	176	675
1.80	1072.30	n/a	176	851
2.10	1072.60	n/a	167	1,018
2.40	1072.90	n/a	146	1,164
2.70	1073.20	n/a	97	1,261
3.00	1073.50	n/a	89	1,350
3.50	1074.00	183	30	1,380
4.00	1074.50	314	123	1,503
4.50	1075.00	465	193	1,696
5.50	1076.00	794	622	2,318

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.00	6.00	0.00
Span (in)	= 15.00	3.00	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 1070.00	1071.00	1074.00	0.00
Length (ft)	= 33.50	0.00	0.00	0.00
Slope (%)	= 44.00	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	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.28	0.00	0.00	0.00
Crest El. (ft)	= 1075.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1070.50	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.03	9	1070.53	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.06	18	1070.56	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.09	27	1070.59	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.12	35	1070.62	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.15	44	1070.65	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.18	53	1070.68	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.21	62	1070.71	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.24	71	1070.74	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.27	80	1070.77	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.30	89	1070.80	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.33	98	1070.83	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.36	108	1070.86	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.39	118	1070.89	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.42	127	1070.92	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.45	137	1070.95	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.48	147	1070.98	1.13 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.51	157	1071.01	1.13 ic	0.00 ic	0.00	---	0.00	---	---	---	---	---	0.000
0.54	166	1071.04	1.13 ic	0.00 ic	0.00	---	0.00	---	---	---	---	---	0.004
0.57	176	1071.07	1.13 ic	0.01 ic	0.00	---	0.00	---	---	---	---	---	0.010
0.60	186	1071.10	1.13 ic	0.02 ic	0.00	---	0.00	---	---	---	---	---	0.020
0.63	200	1071.13	1.13 ic	0.03 ic	0.00	---	0.00	---	---	---	---	---	0.032
0.66	215	1071.16	1.13 ic	0.05 ic	0.00	---	0.00	---	---	---	---	---	0.046
0.69	230	1071.19	1.13 ic	0.06 ic	0.00	---	0.00	---	---	---	---	---	0.059
0.72	244	1071.22	1.13 ic	0.07 ic	0.00	---	0.00	---	---	---	---	---	0.073
0.75	259	1071.25	1.13 ic	0.08 ic	0.00	---	0.00	---	---	---	---	---	0.084
0.78	273	1071.28	1.13 ic	0.09 ic	0.00	---	0.00	---	---	---	---	---	0.093

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Rain Garden v1

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.81	288	1071.31	1.13 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.102
0.84	303	1071.34	1.13 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.110
0.87	317	1071.37	1.13 ic	0.12 ic	0.00	---	0.00	---	---	---	---	---	0.117
0.90	332	1071.40	1.13 ic	0.12 ic	0.00	---	0.00	---	---	---	---	---	0.124
0.93	349	1071.43	1.13 ic	0.13 ic	0.00	---	0.00	---	---	---	---	---	0.131
0.96	365	1071.46	1.13 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.137
0.99	382	1071.49	1.13 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.143
1.02	399	1071.52	1.13 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.149
1.05	415	1071.55	1.13 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.154
1.08	432	1071.58	1.13 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.159
1.11	449	1071.61	1.13 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.165
1.14	466	1071.64	1.13 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.170
1.17	482	1071.67	1.13 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.174
1.20	499	1071.70	1.13 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.179
1.23	517	1071.73	1.13 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.184
1.26	534	1071.76	1.13 ic	0.19 ic	0.00	---	0.00	---	---	---	---	---	0.188
1.29	552	1071.79	1.13 ic	0.19 ic	0.00	---	0.00	---	---	---	---	---	0.193
1.32	569	1071.82	1.13 ic	0.20 ic	0.00	---	0.00	---	---	---	---	---	0.197
1.35	587	1071.85	1.13 ic	0.20 ic	0.00	---	0.00	---	---	---	---	---	0.201
1.38	605	1071.88	1.13 ic	0.21 ic	0.00	---	0.00	---	---	---	---	---	0.205
1.41	622	1071.91	1.13 ic	0.21 ic	0.00	---	0.00	---	---	---	---	---	0.209
1.44	640	1071.94	1.13 ic	0.21 ic	0.00	---	0.00	---	---	---	---	---	0.213
1.47	657	1071.97	1.13 ic	0.22 ic	0.00	---	0.00	---	---	---	---	---	0.217
1.50	675	1072.00	1.13 ic	0.22 ic	0.00	---	0.00	---	---	---	---	---	0.221
1.53	692	1072.03	1.13 ic	0.22 ic	0.00	---	0.00	---	---	---	---	---	0.225
1.56	710	1072.06	1.13 ic	0.23 ic	0.00	---	0.00	---	---	---	---	---	0.229
1.59	728	1072.09	1.13 ic	0.23 ic	0.00	---	0.00	---	---	---	---	---	0.232
1.62	745	1072.12	1.13 ic	0.24 ic	0.00	---	0.00	---	---	---	---	---	0.236
1.65	763	1072.15	1.13 ic	0.24 ic	0.00	---	0.00	---	---	---	---	---	0.239
1.68	780	1072.18	1.13 ic	0.24 ic	0.00	---	0.00	---	---	---	---	---	0.243
1.71	798	1072.21	1.13 ic	0.25 ic	0.00	---	0.00	---	---	---	---	---	0.246
1.74	816	1072.24	1.13 ic	0.25 ic	0.00	---	0.00	---	---	---	---	---	0.250
1.77	833	1072.27	1.13 ic	0.25 ic	0.00	---	0.00	---	---	---	---	---	0.253
1.80	851	1072.30	1.13 ic	0.26 ic	0.00	---	0.00	---	---	---	---	---	0.256
1.83	867	1072.33	1.13 ic	0.26 ic	0.00	---	0.00	---	---	---	---	---	0.259
1.86	884	1072.36	1.13 ic	0.26 ic	0.00	---	0.00	---	---	---	---	---	0.263
1.89	901	1072.39	1.13 ic	0.27 ic	0.00	---	0.00	---	---	---	---	---	0.266
1.92	918	1072.42	1.13 ic	0.27 ic	0.00	---	0.00	---	---	---	---	---	0.269
1.95	934	1072.45	1.13 ic	0.27 ic	0.00	---	0.00	---	---	---	---	---	0.272
1.98	951	1072.48	1.13 ic	0.28 ic	0.00	---	0.00	---	---	---	---	---	0.275
2.01	968	1072.51	1.13 ic	0.28 ic	0.00	---	0.00	---	---	---	---	---	0.278
2.04	984	1072.54	1.13 ic	0.28 ic	0.00	---	0.00	---	---	---	---	---	0.281
2.07	1,001	1072.57	1.13 ic	0.28 ic	0.00	---	0.00	---	---	---	---	---	0.284
2.10	1,018	1072.60	1.13 ic	0.29 ic	0.00	---	0.00	---	---	---	---	---	0.287
2.13	1,032	1072.63	1.13 ic	0.29 ic	0.00	---	0.00	---	---	---	---	---	0.290
2.16	1,047	1072.66	1.13 ic	0.29 ic	0.00	---	0.00	---	---	---	---	---	0.293
2.19	1,062	1072.69	1.13 ic	0.30 ic	0.00	---	0.00	---	---	---	---	---	0.296
2.22	1,076	1072.72	1.13 ic	0.30 ic	0.00	---	0.00	---	---	---	---	---	0.298
2.25	1,091	1072.75	1.13 ic	0.30 ic	0.00	---	0.00	---	---	---	---	---	0.301
2.28	1,105	1072.78	1.13 ic	0.30 ic	0.00	---	0.00	---	---	---	---	---	0.304
2.31	1,120	1072.81	1.13 ic	0.31 ic	0.00	---	0.00	---	---	---	---	---	0.307
2.34	1,135	1072.84	1.13 ic	0.31 ic	0.00	---	0.00	---	---	---	---	---	0.309
2.37	1,149	1072.87	1.13 ic	0.31 ic	0.00	---	0.00	---	---	---	---	---	0.312
2.40	1,164	1072.90	1.13 ic	0.31 ic	0.00	---	0.00	---	---	---	---	---	0.315
2.43	1,173	1072.93	1.13 ic	0.32 ic	0.00	---	0.00	---	---	---	---	---	0.318
2.46	1,183	1072.96	1.13 ic	0.32 ic	0.00	---	0.00	---	---	---	---	---	0.320
2.49	1,193	1072.99	1.13 ic	0.32 ic	0.00	---	0.00	---	---	---	---	---	0.323
2.52	1,203	1073.02	1.13 ic	0.33 ic	0.00	---	0.00	---	---	---	---	---	0.325
2.55	1,212	1073.05	1.13 ic	0.33 ic	0.00	---	0.00	---	---	---	---	---	0.328
2.58	1,222	1073.08	1.13 ic	0.33 ic	0.00	---	0.00	---	---	---	---	---	0.330
2.61	1,232	1073.11	1.13 ic	0.33 ic	0.00	---	0.00	---	---	---	---	---	0.333
2.64	1,242	1073.14	1.13 ic	0.34 ic	0.00	---	0.00	---	---	---	---	---	0.335
2.67	1,251	1073.17	1.13 ic	0.34 ic	0.00	---	0.00	---	---	---	---	---	0.338
2.70	1,261	1073.20	1.13 ic	0.34 ic	0.00	---	0.00	---	---	---	---	---	0.340
2.73	1,270	1073.23	1.13 ic	0.34 ic	0.00	---	0.00	---	---	---	---	---	0.343
2.76	1,279	1073.26	1.13 ic	0.35 ic	0.00	---	0.00	---	---	---	---	---	0.345
2.79	1,288	1073.29	1.13 ic	0.35 ic	0.00	---	0.00	---	---	---	---	---	0.348
2.82	1,296	1073.32	1.13 ic	0.35 ic	0.00	---	0.00	---	---	---	---	---	0.350
2.85	1,305	1073.35	1.13 ic	0.35 ic	0.00	---	0.00	---	---	---	---	---	0.353
2.88	1,314	1073.38	1.13 ic	0.35 ic	0.00	---	0.00	---	---	---	---	---	0.355
2.91	1,323	1073.41	1.13 ic	0.36 ic	0.00	---	0.00	---	---	---	---	---	0.357
2.94	1,332	1073.44	1.13 ic	0.36 ic	0.00	---	0.00	---	---	---	---	---	0.360

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Rain Garden v1

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.97	1,341	1073.47	1.13 ic	0.36 ic	0.00	---	0.00	---	---	---	---	---	0.362
3.00	1,350	1073.50	1.13 ic	0.36 ic	0.00	---	0.00	---	---	---	---	---	0.364
3.05	1,353	1073.55	1.13 ic	0.37 ic	0.00	---	0.00	---	---	---	---	---	0.368
3.10	1,356	1073.60	1.13 ic	0.37 ic	0.00	---	0.00	---	---	---	---	---	0.372
3.15	1,359	1073.65	1.13 ic	0.38 ic	0.00	---	0.00	---	---	---	---	---	0.376
3.20	1,362	1073.70	1.13 ic	0.38 ic	0.00	---	0.00	---	---	---	---	---	0.379
3.25	1,365	1073.75	1.13 ic	0.38 ic	0.00	---	0.00	---	---	---	---	---	0.383
3.30	1,368	1073.80	1.13 ic	0.39 ic	0.00	---	0.00	---	---	---	---	---	0.387
3.35	1,371	1073.85	1.13 ic	0.39 ic	0.00	---	0.00	---	---	---	---	---	0.390
3.40	1,374	1073.90	1.13 ic	0.39 ic	0.00	---	0.00	---	---	---	---	---	0.394
3.45	1,377	1073.95	1.13 ic	0.40 ic	0.00	---	0.00	---	---	---	---	---	0.397
3.50	1,380	1074.00	1.13 ic	0.40 ic	0.00	---	0.00	---	---	---	---	---	0.401
3.55	1,392	1074.05	1.13 ic	0.40 ic	0.01 ic	---	0.00	---	---	---	---	---	0.412
3.60	1,405	1074.10	1.13 ic	0.41 ic	0.03 ic	---	0.00	---	---	---	---	---	0.439
3.65	1,417	1074.15	1.13 ic	0.41 ic	0.07 ic	---	0.00	---	---	---	---	---	0.477
3.70	1,429	1074.20	1.13 ic	0.41 ic	0.11 ic	---	0.00	---	---	---	---	---	0.528
3.75	1,441	1074.25	1.13 ic	0.42 ic	0.17 ic	---	0.00	---	---	---	---	---	0.585
3.80	1,454	1074.30	1.13 ic	0.42 ic	0.23 ic	---	0.00	---	---	---	---	---	0.651
3.85	1,466	1074.35	1.13 ic	0.42 ic	0.30 ic	---	0.00	---	---	---	---	---	0.723
3.90	1,478	1074.40	1.13 ic	0.43 ic	0.36 ic	---	0.00	---	---	---	---	---	0.790
3.95	1,491	1074.45	1.13 ic	0.43 ic	0.43 ic	---	0.00	---	---	---	---	---	0.858
4.00	1,503	1074.50	1.13 ic	0.43 ic	0.47 ic	---	0.00	---	---	---	---	---	0.907
4.05	1,522	1074.55	1.13 ic	0.44 ic	0.52 ic	---	0.00	---	---	---	---	---	0.955
4.10	1,542	1074.60	1.13 ic	0.44 ic	0.56 ic	---	0.00	---	---	---	---	---	1.000
4.15	1,561	1074.65	1.13 ic	0.44 ic	0.60 ic	---	0.00	---	---	---	---	---	1.042
4.20	1,580	1074.70	1.13 ic	0.45 ic	0.63 ic	---	0.00	---	---	---	---	---	1.081
4.25	1,600	1074.75	1.13 ic	0.45 ic	0.67 ic	---	0.00	---	---	---	---	---	1.118
4.30	1,619	1074.80	1.16 ic	0.45 ic	0.70 ic	---	0.00	---	---	---	---	---	1.154
4.35	1,638	1074.85	1.20 ic	0.46 ic	0.73 ic	---	0.00	---	---	---	---	---	1.188
4.40	1,658	1074.90	1.25 ic	0.46 ic	0.76 ic	---	0.00	---	---	---	---	---	1.221
4.45	1,677	1074.95	1.25 ic	0.46 ic	0.79 ic	---	0.00	---	---	---	---	---	1.253
4.50	1,696	1075.00	1.29 ic	0.47 ic	0.82 ic	---	0.00	---	---	---	---	---	1.284
4.60	1,759	1075.10	2.02 ic	0.47 ic	0.87 ic	---	0.66	---	---	---	---	---	2.004
4.70	1,821	1075.20	3.27 ic	0.48 ic	0.92 ic	---	1.87	---	---	---	---	---	3.268
4.80	1,883	1075.30	4.88 ic	0.47 ic	0.97 ic	---	3.44	---	---	---	---	---	4.878
4.90	1,945	1075.40	6.75 ic	0.44 ic	1.01 ic	---	5.29	---	---	---	---	---	6.745
5.00	2,007	1075.50	8.83 ic	0.38 ic	1.06 ic	---	7.39	---	---	---	---	---	8.834
5.10	2,070	1075.60	11.10 ic	0.28 ic	1.10 ic	---	9.72	---	---	---	---	---	11.10
5.20	2,132	1075.70	12.58 ic	0.17 ic	0.69 ic	---	11.71 s	---	---	---	---	---	12.58
5.30	2,194	1075.80	12.96 ic	0.14 ic	0.57 ic	---	12.25 s	---	---	---	---	---	12.96
5.40	2,256	1075.90	13.23 ic	0.12 ic	0.49 ic	---	12.62 s	---	---	---	---	---	13.23
5.50	2,318	1076.00	13.44 ic	0.11 ic	0.42 ic	---	12.91 s	---	---	---	---	---	13.44

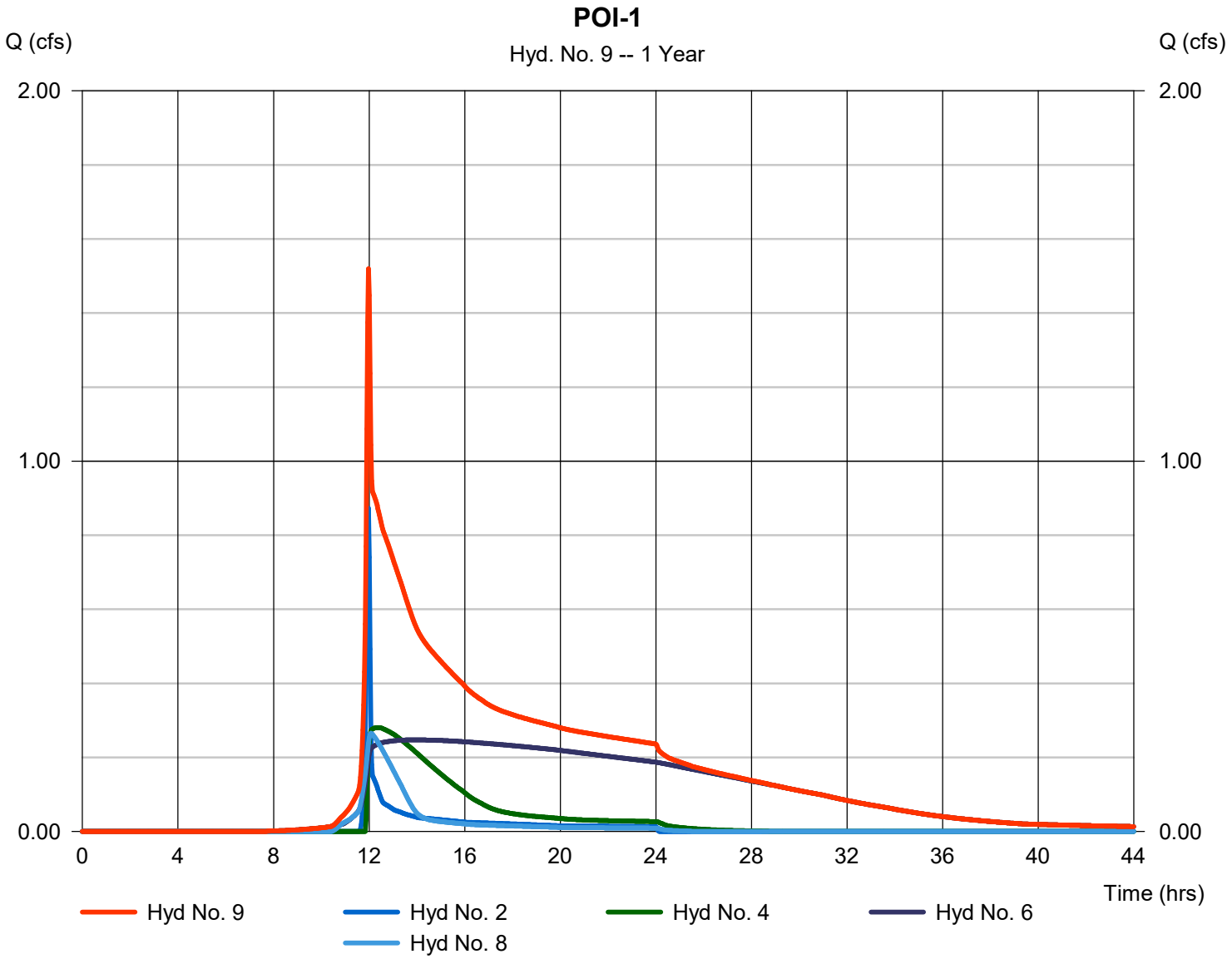
...End

Hydrograph Report

Hyd. No. 9

POI-1

Hydrograph type	= Combine	Peak discharge	= 1.519 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 24,310 cuft
Inflow hyds.	= 2, 4, 6, 8	Contrib. drain. area	= 1.160 ac

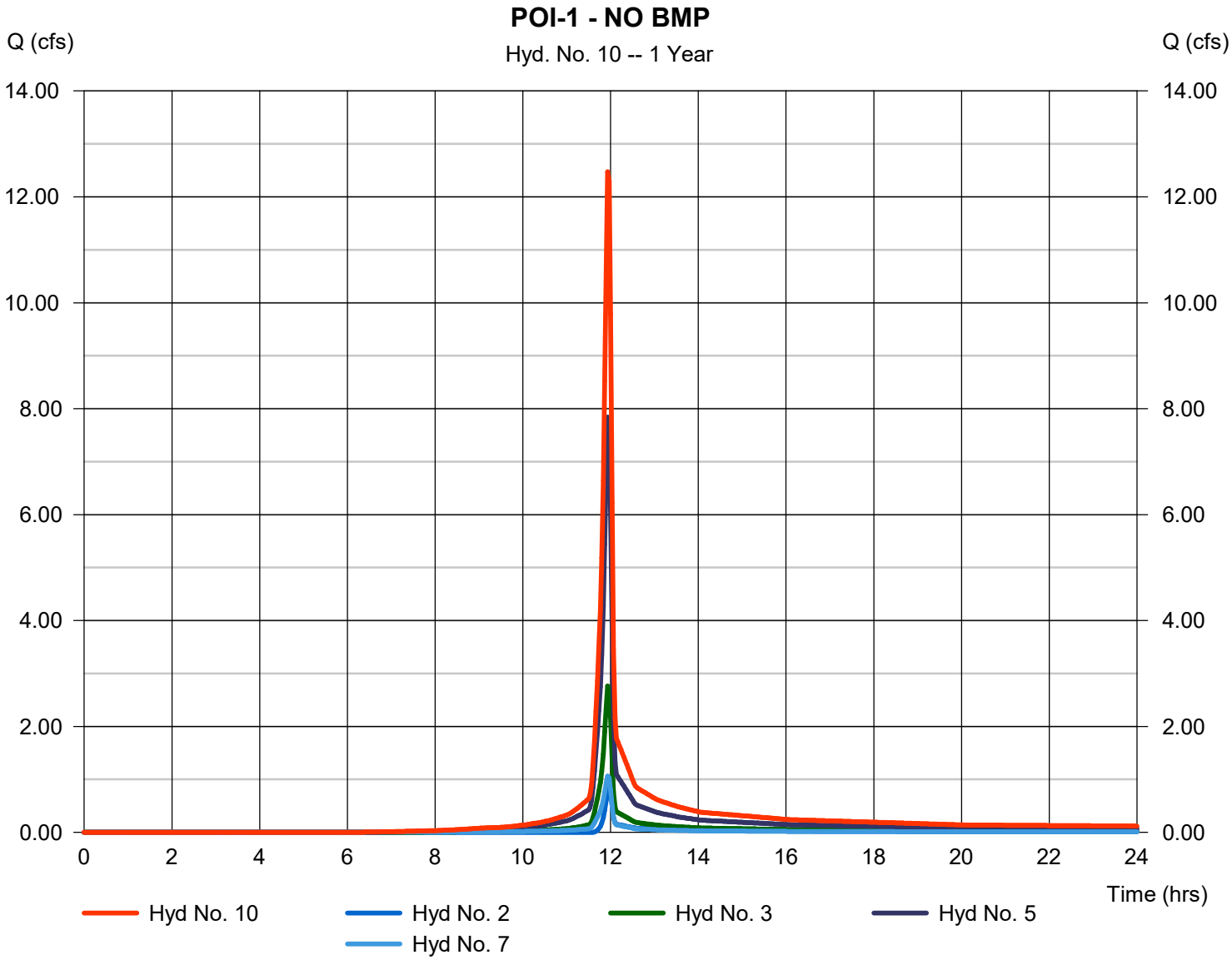


Hydrograph Report

Hyd. No. 10

POI-1 - NO BMP

Hydrograph type	= Combine	Peak discharge	= 12.47 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 25,746 cuft
Inflow hyds.	= 2, 3, 5, 7	Contrib. drain. area	= 6.760 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

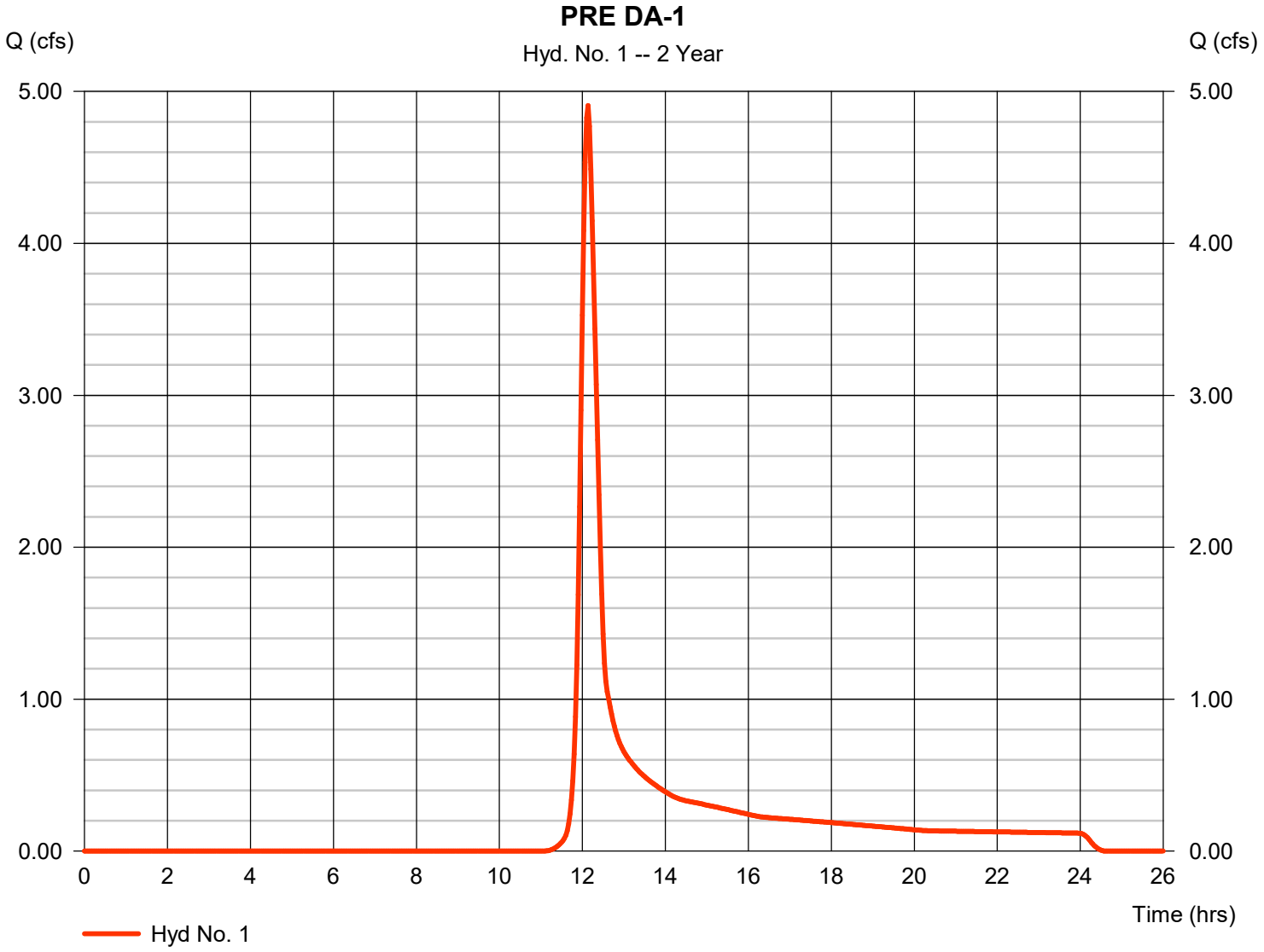
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.907	2	728	18,211	------	------	------	PRE DA-1
2	SCS Runoff	1.338	2	718	2,702	------	------	------	POST DA-1A
3	SCS Runoff	3.546	2	716	7,283	------	------	------	POST DA-1B
4	Reservoir	0.350	2	742	6,045	3	1064.33	3,787	UG TANK
5	SCS Runoff	9.950	2	716	20,601	------	------	------	POST DA-1C
6	Reservoir	0.285	2	844	20,562	5	1077.58	12,939	Basin
7	SCS Runoff	1.308	2	716	2,809	------	------	------	POST-1D
8	Reservoir	0.304	2	724	2,651	7	1072.78	1,105	Rain Garden
9	Combine	2.126	2	718	31,961	2, 4, 6, 8	------	------	POI-1
10	Combine	16.08	2	716	33,396	2, 3, 5, 7,	------	------	POI-1 - NO BMP

Hydrograph Report

Hyd. No. 1

PRE DA-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.907 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	18,211 cuft
Drainage area	=	6.750 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.60 min
Total precip.	=	2.41 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

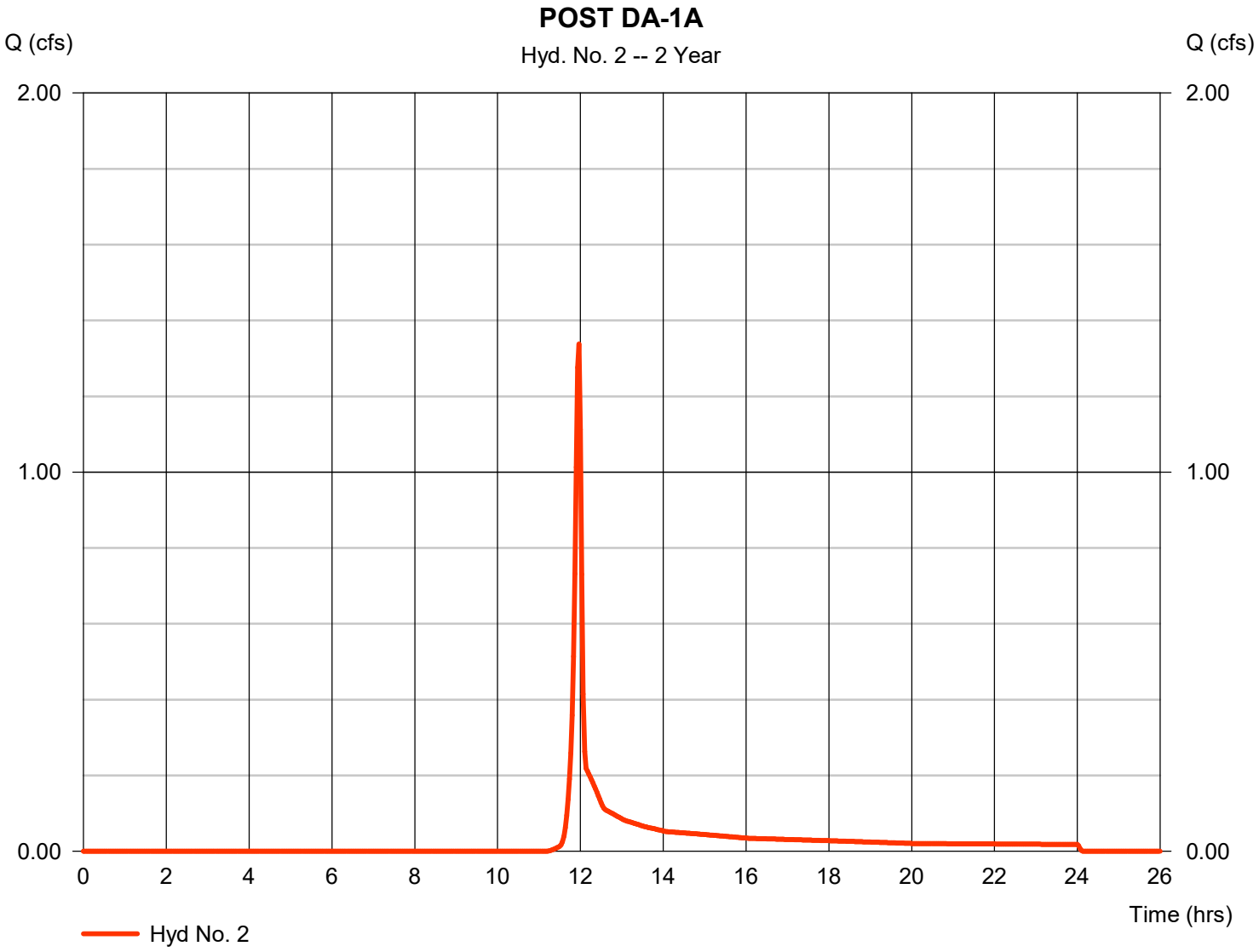


Hydrograph Report

Hyd. No. 2

POST DA-1A

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.338 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	2,702 cuft
Drainage area	=	1.160 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.41 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

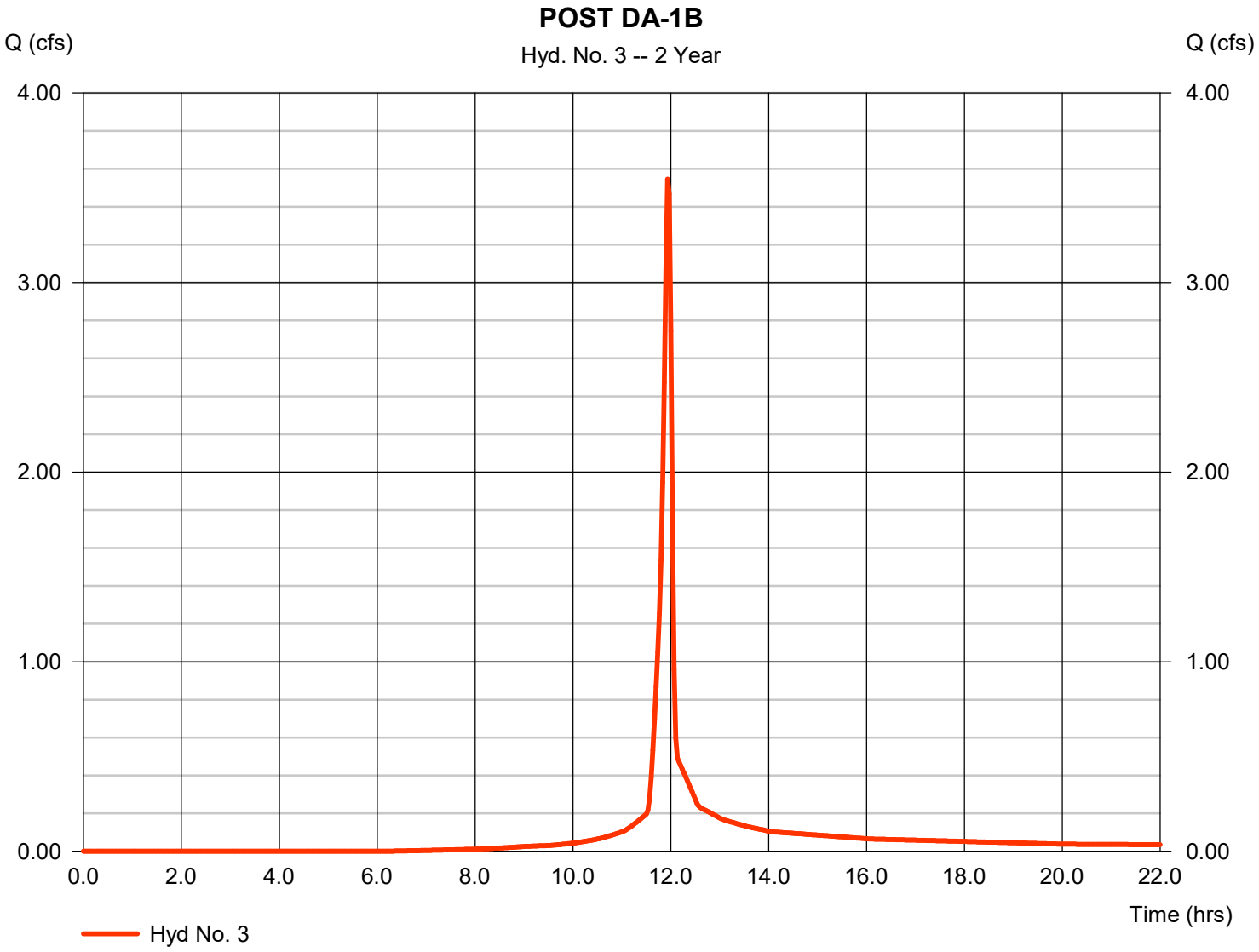


Hydrograph Report

Hyd. No. 3

POST DA-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 3.546 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 7,283 cuft
Drainage area	= 1.400 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.41 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



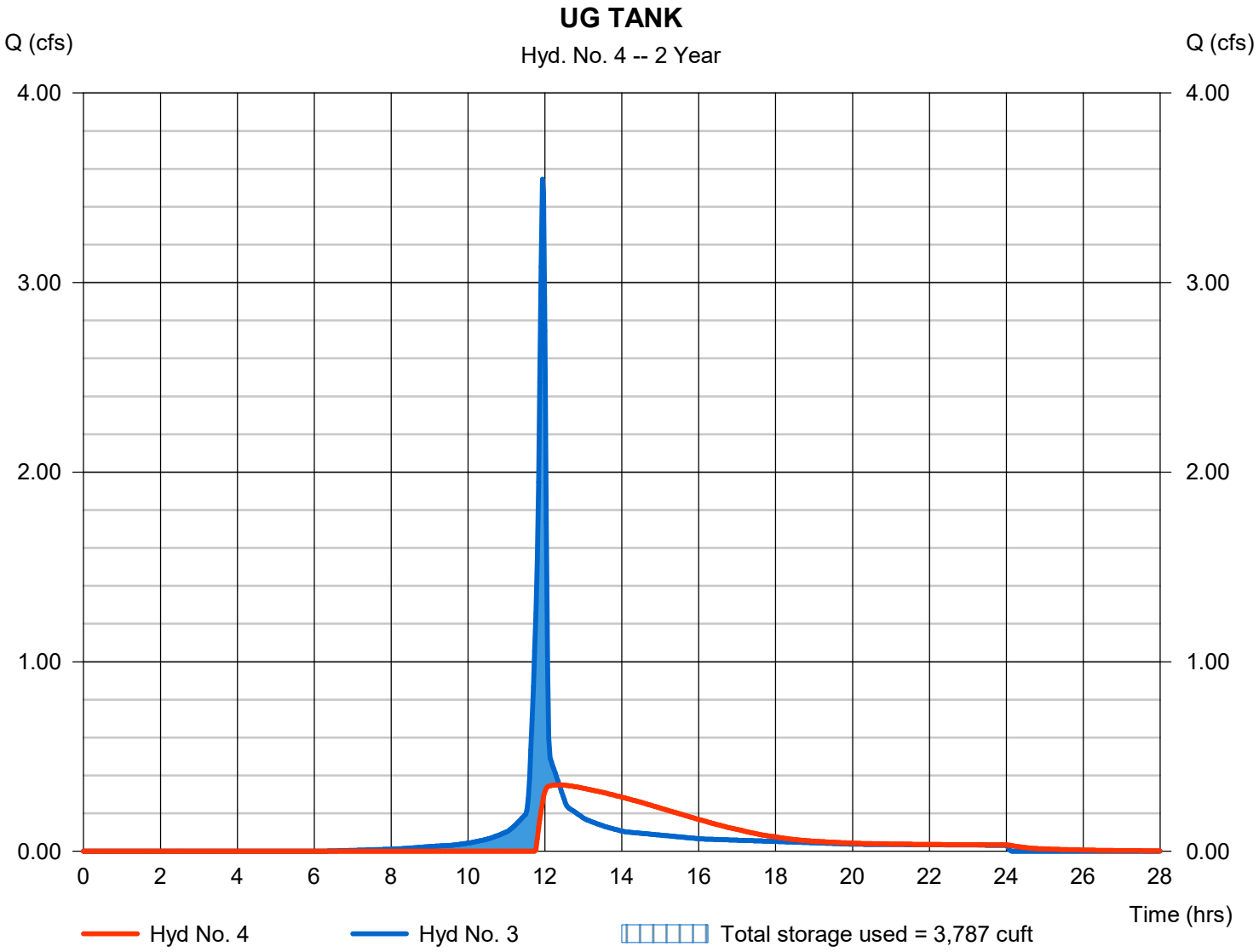
Hydrograph Report

Hyd. No. 4

UG TANK

Hydrograph type	=	Reservoir	Peak discharge	=	0.350 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.37 hrs
Time interval	=	2 min	Hyd. volume	=	6,045 cuft
Inflow hyd. No.	=	3 - POST DA-1B	Max. Elevation	=	1064.33 ft
Reservoir name	=	UG Tank	Max. Storage	=	3,787 cuft

Storage Indication method used.

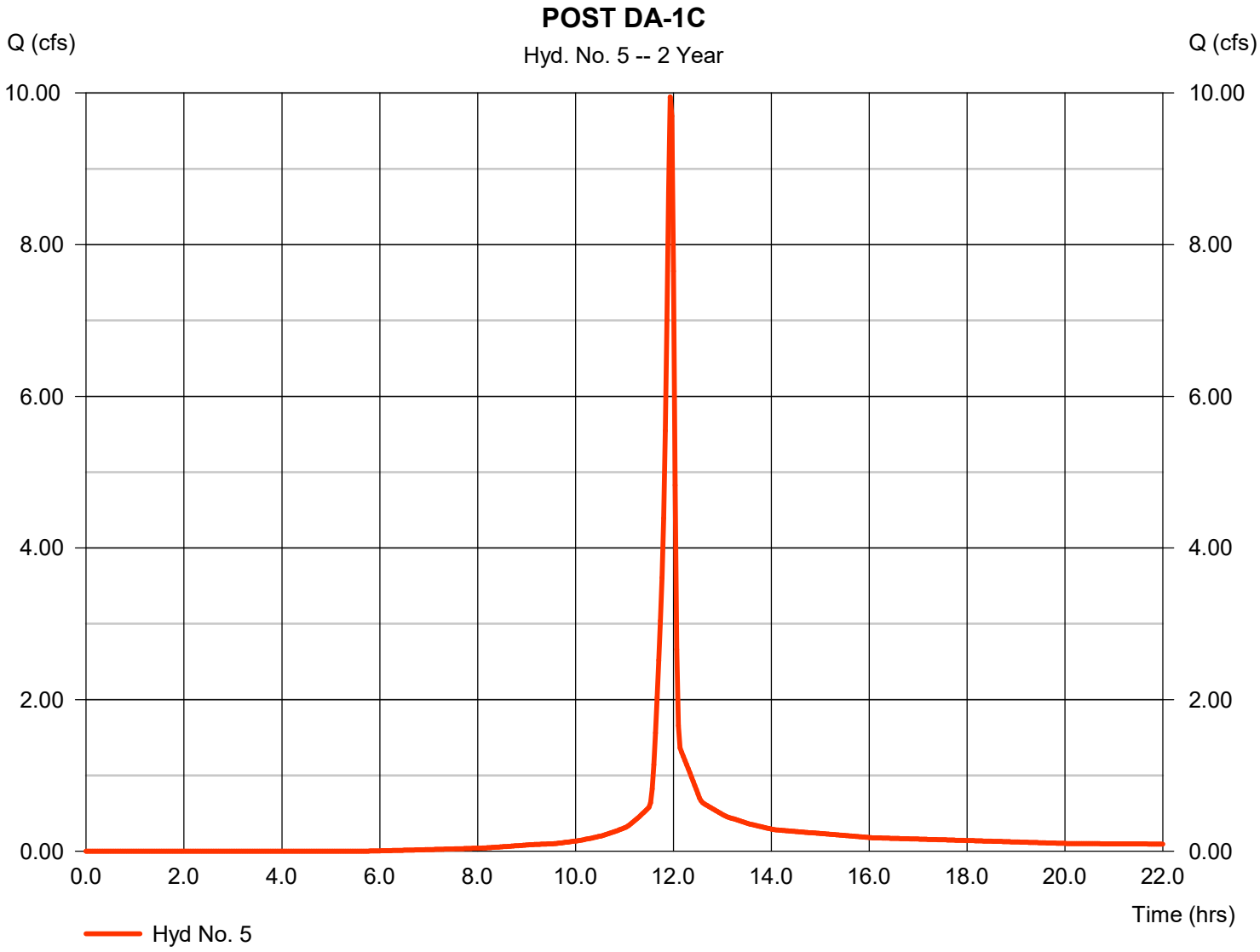


Hydrograph Report

Hyd. No. 5

POST DA-1C

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.950 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	20,601 cuft
Drainage area	=	3.760 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.41 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



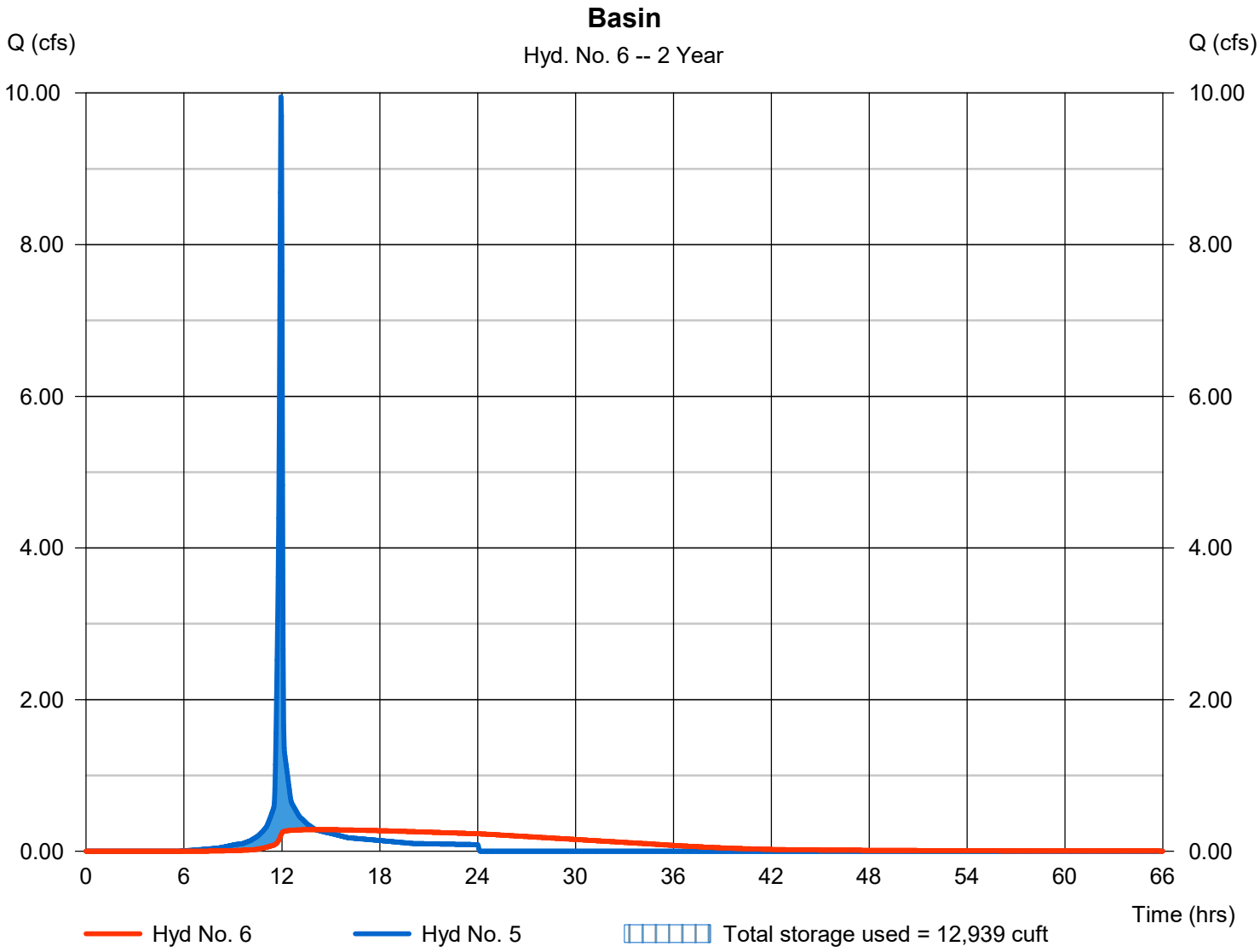
Hydrograph Report

Hyd. No. 6

Basin

Hydrograph type	=	Reservoir	Peak discharge	=	0.285 cfs
Storm frequency	=	2 yrs	Time to peak	=	14.07 hrs
Time interval	=	2 min	Hyd. volume	=	20,562 cuft
Inflow hyd. No.	=	5 - POST DA-1C	Max. Elevation	=	1077.58 ft
Reservoir name	=	Basin	Max. Storage	=	12,939 cuft

Storage Indication method used.

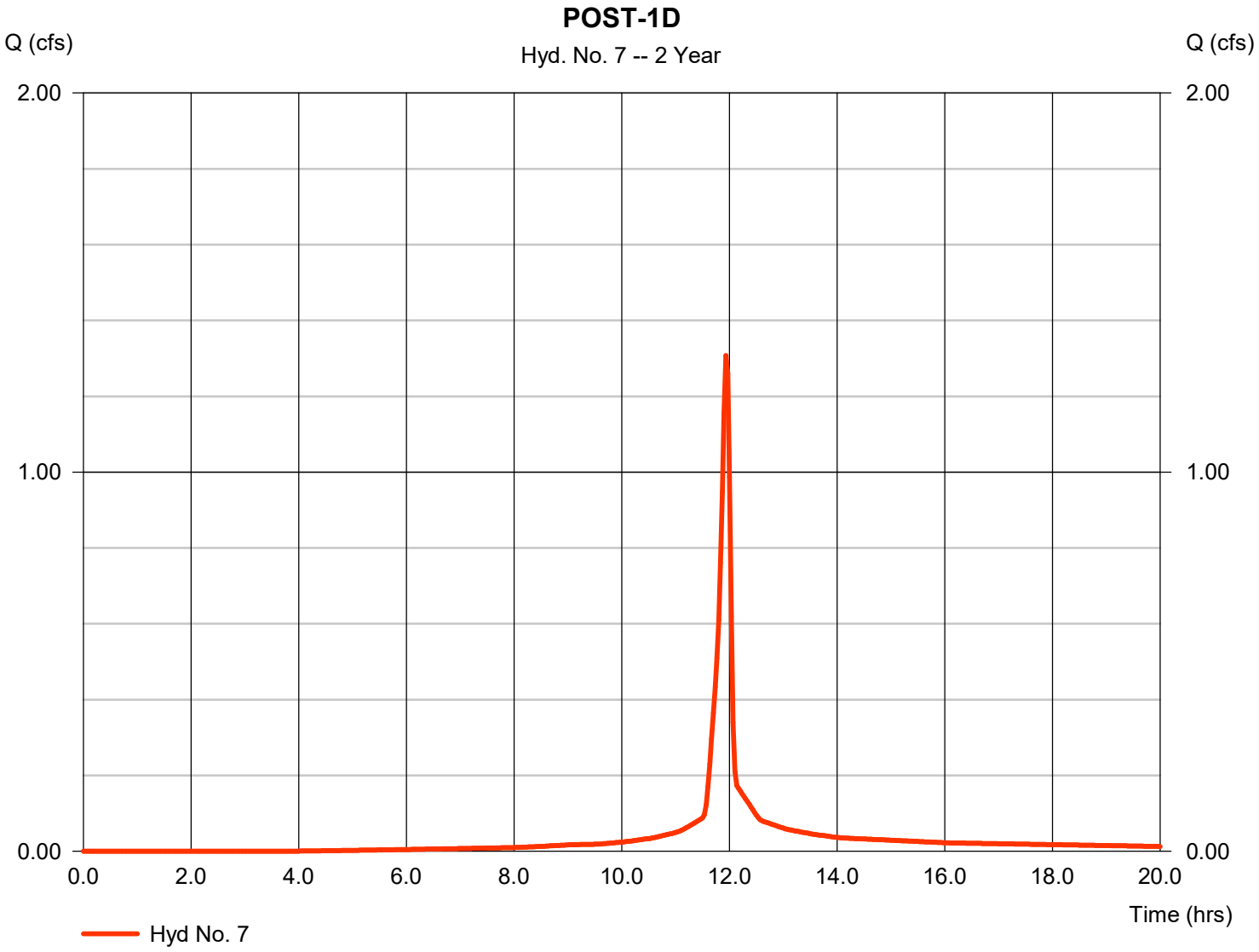


Hydrograph Report

Hyd. No. 7

POST-1D

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.308 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	2,809 cuft
Drainage area	=	0.440 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.41 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



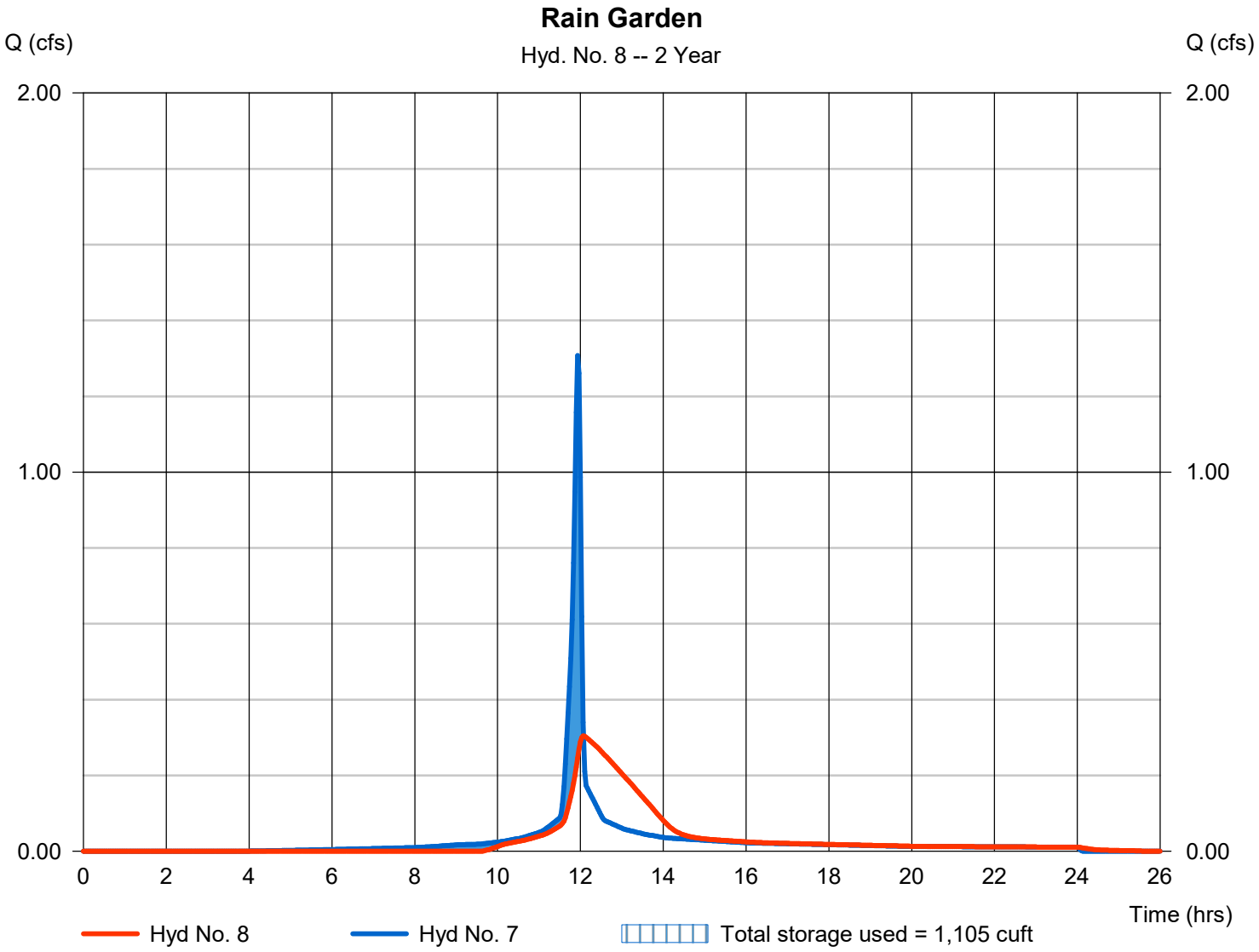
Hydrograph Report

Hyd. No. 8

Rain Garden

Hydrograph type	=	Reservoir	Peak discharge	=	0.304 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	2,651 cuft
Inflow hyd. No.	=	7 - POST-1D	Max. Elevation	=	1072.78 ft
Reservoir name	=	Rain Garden v1	Max. Storage	=	1,105 cuft

Storage Indication method used.

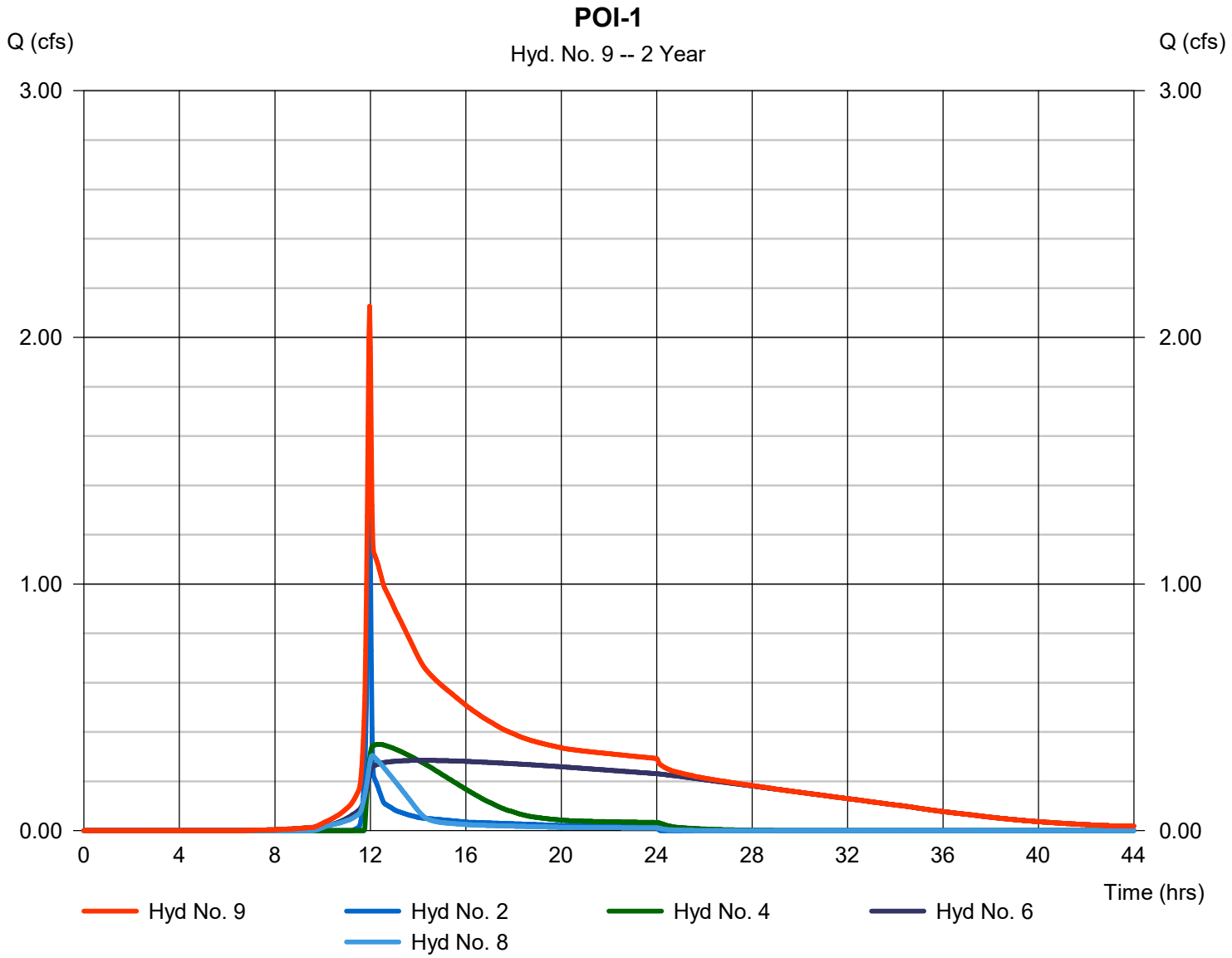


Hydrograph Report

Hyd. No. 9

POI-1

Hydrograph type	= Combine	Peak discharge	= 2.126 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 31,961 cuft
Inflow hyds.	= 2, 4, 6, 8	Contrib. drain. area	= 1.160 ac

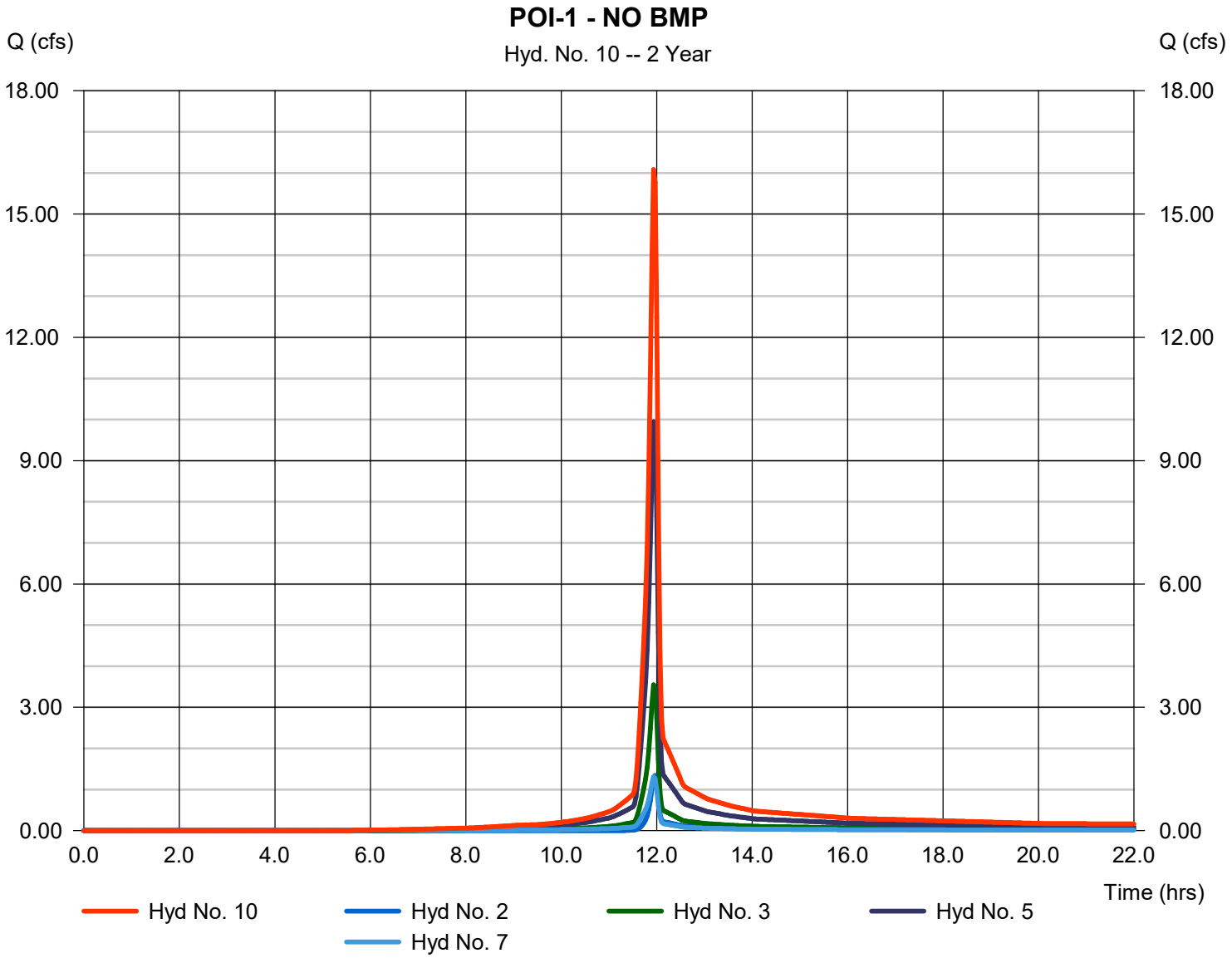


Hydrograph Report

Hyd. No. 10

POI-1 - NO BMP

Hydrograph type	= Combine	Peak discharge	= 16.08 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 33,396 cuft
Inflow hyds.	= 2, 3, 5, 7	Contrib. drain. area	= 6.760 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

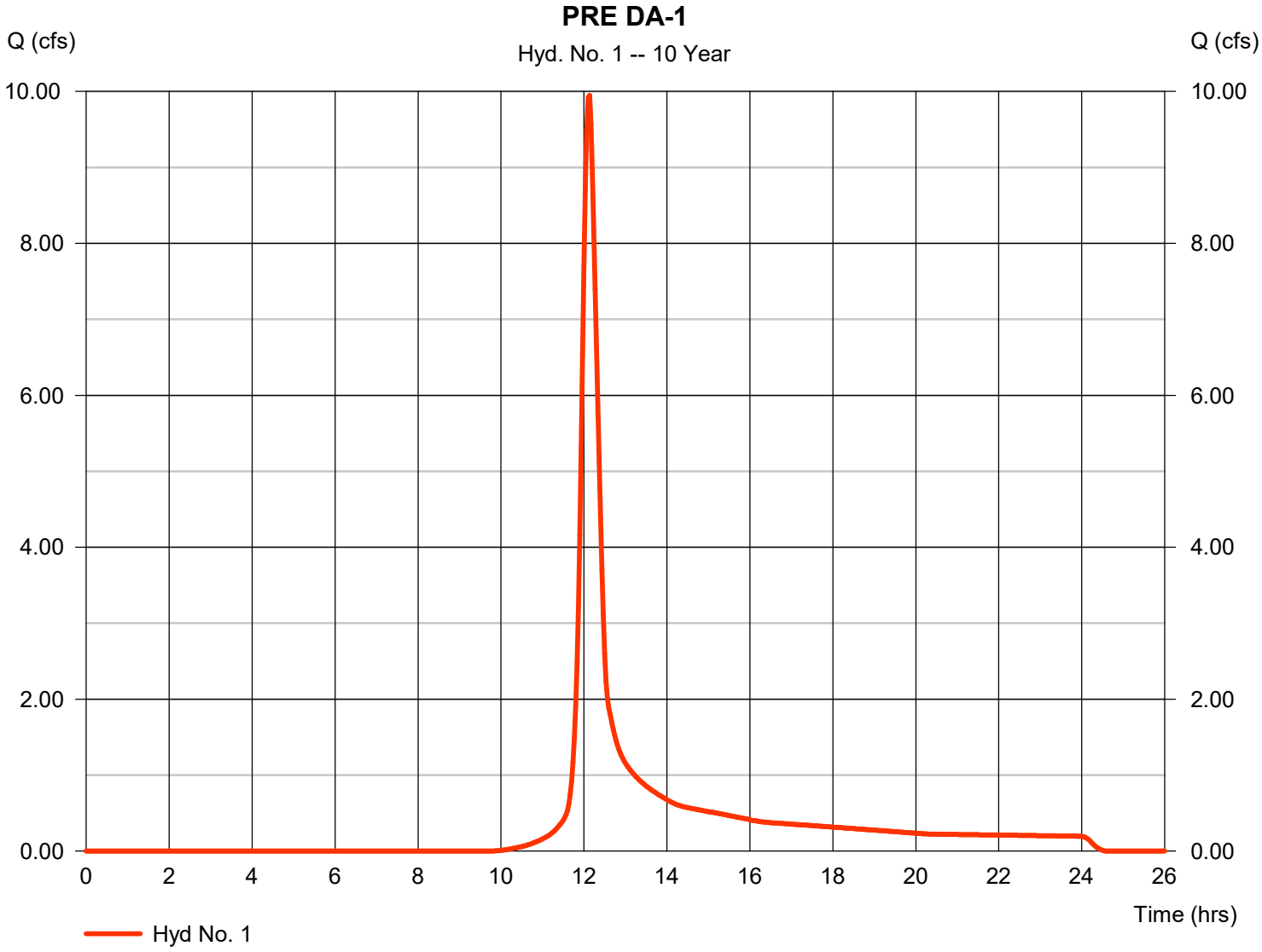
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	9.949	2	728	35,086	------	------	------	PRE DA-1
2	SCS Runoff	2.647	2	718	5,298	------	------	------	POST DA-1A
3	SCS Runoff	5.505	2	716	11,566	------	------	------	POST DA-1B
4	Reservoir	0.482	2	746	10,328	3	1065.39	6,235	UG TANK
5	SCS Runoff	15.21	2	716	32,272	------	------	------	POST DA-1C
6	Reservoir	0.362	2	886	32,232	5	1078.47	21,194	Basin
7	SCS Runoff	1.915	2	716	4,225	------	------	------	POST-1D
8	Reservoir	0.930	2	722	4,066	7	1074.52	1,512	Rain Garden
9	Combine	3.722	2	718	51,924	2, 4, 6, 8	------	------	POI-1
10	Combine	25.24	2	716	53,360	2, 3, 5, 7,	------	------	POI-1 - NO BMP

Hydrograph Report

Hyd. No. 1

PRE DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 9.949 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 35,086 cuft
Drainage area	= 6.750 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.60 min
Total precip.	= 3.38 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

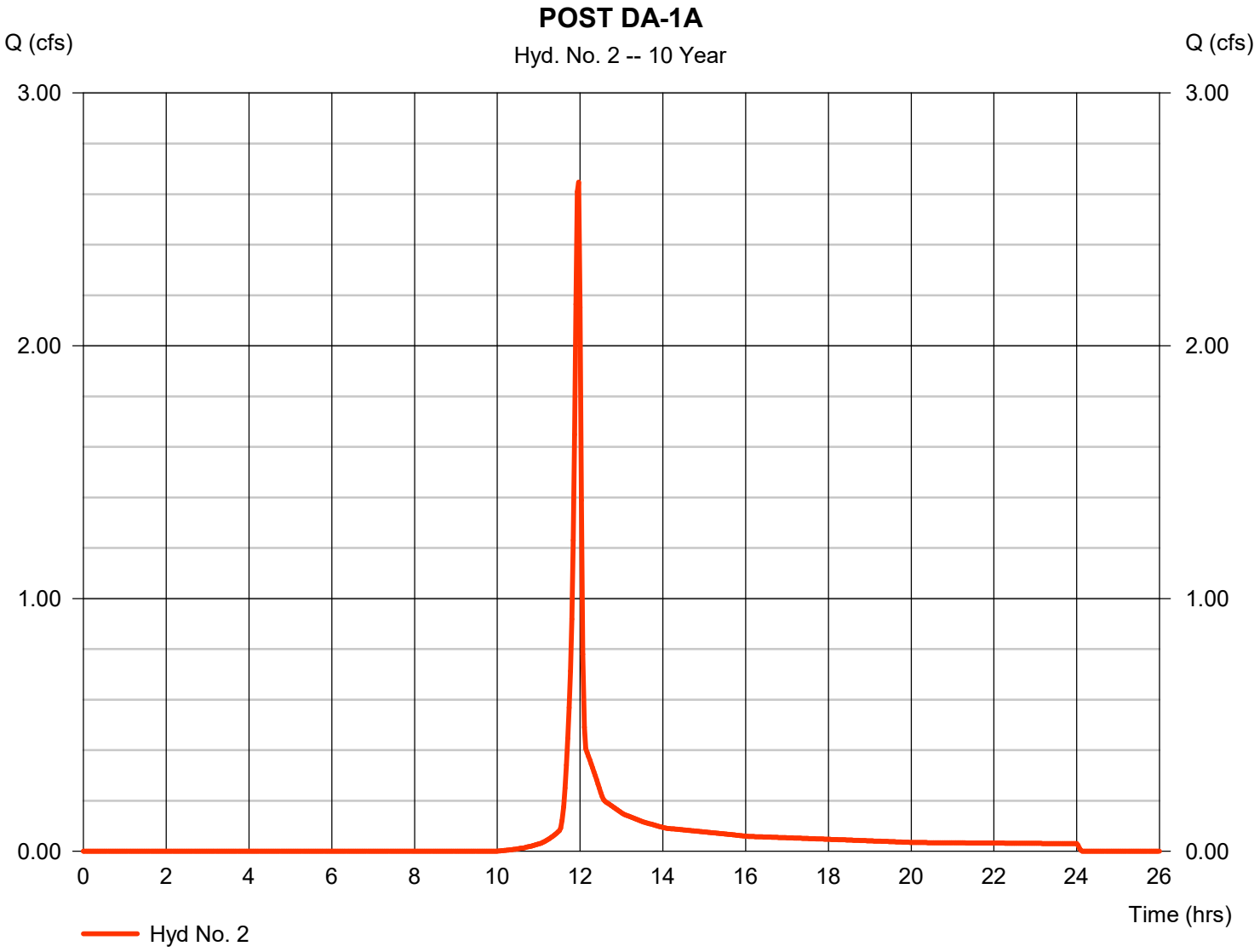


Hydrograph Report

Hyd. No. 2

POST DA-1A

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.647 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	5,298 cuft
Drainage area	=	1.160 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.38 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

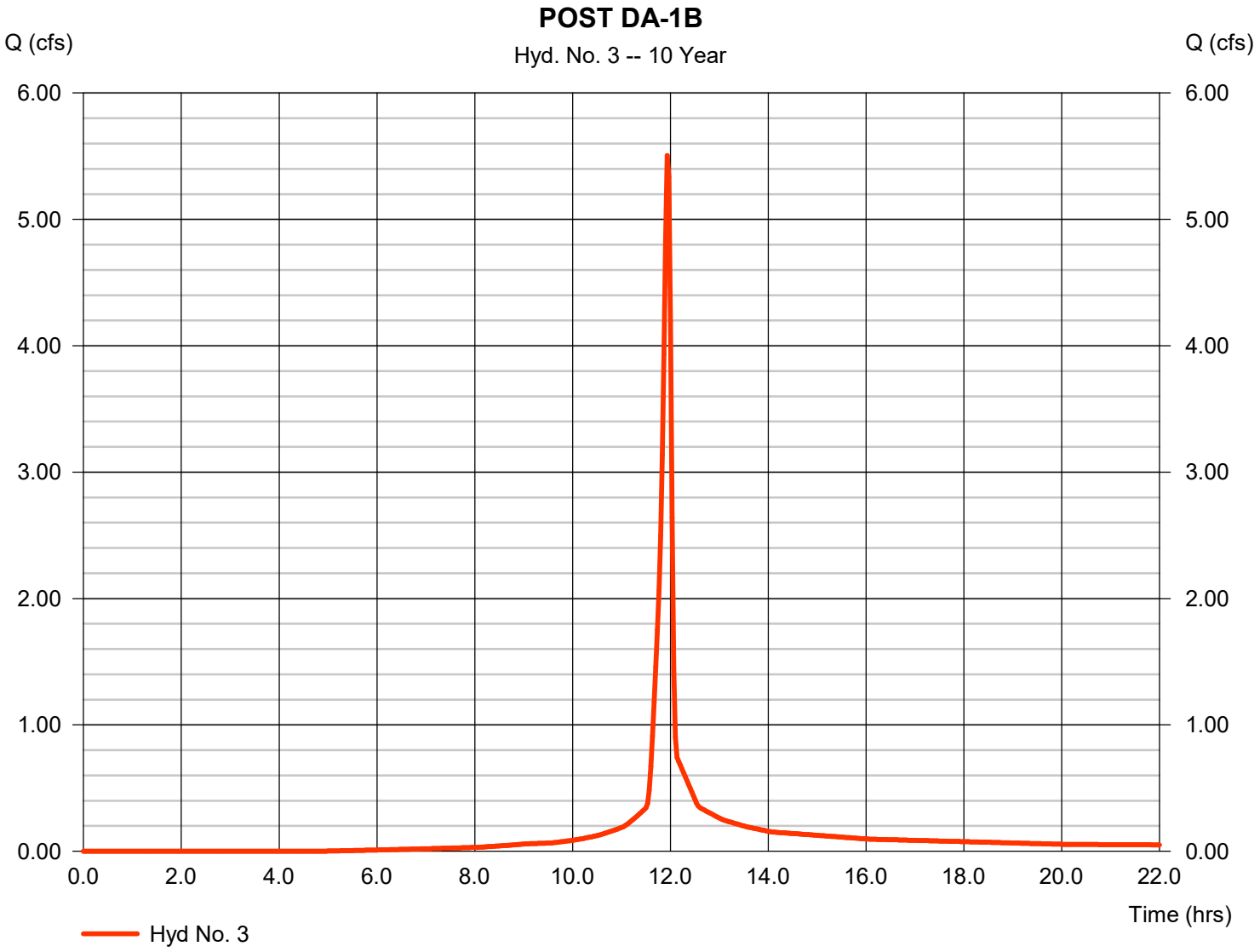


Hydrograph Report

Hyd. No. 3

POST DA-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 5.505 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 11,566 cuft
Drainage area	= 1.400 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.38 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



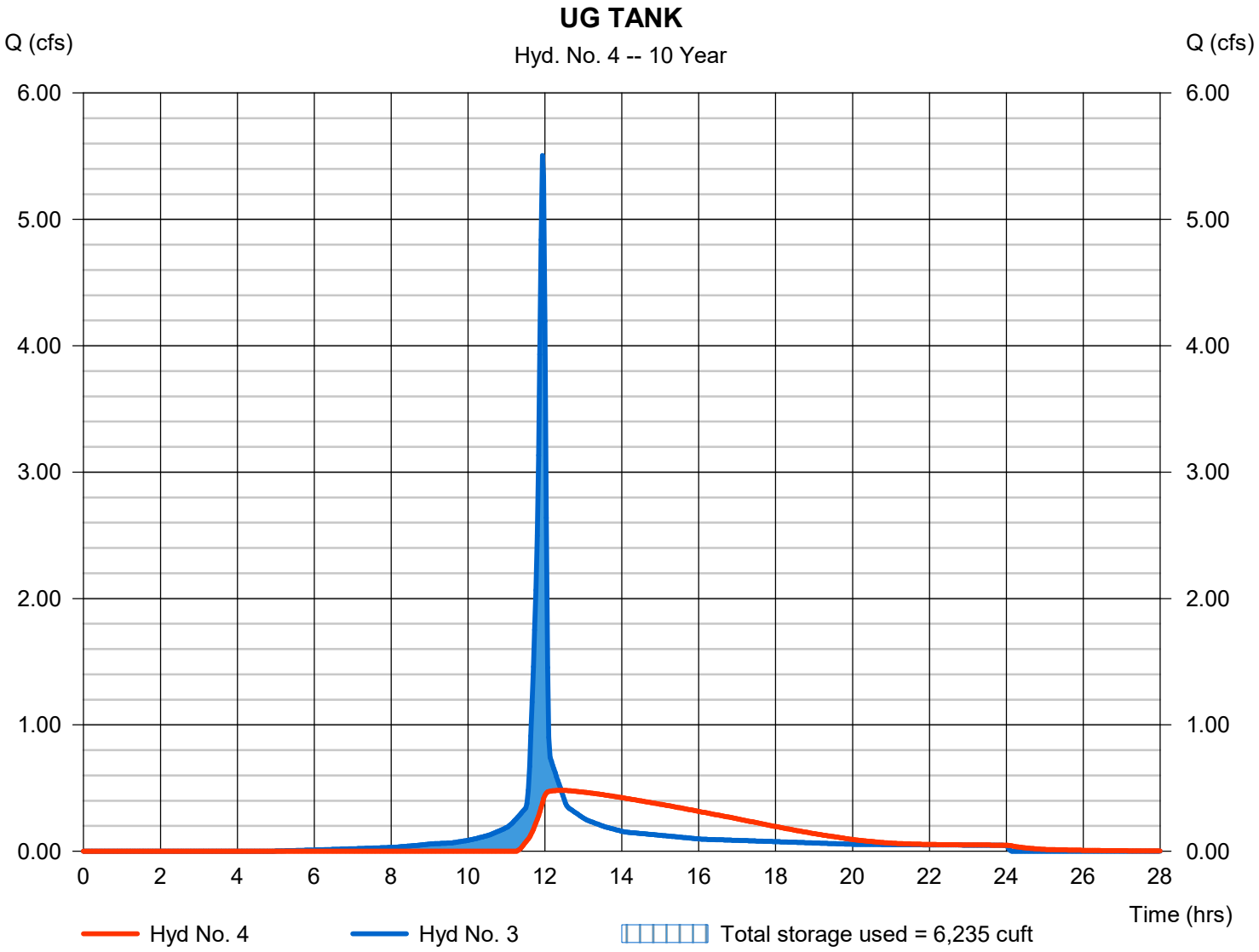
Hydrograph Report

Hyd. No. 4

UG TANK

Hydrograph type	=	Reservoir	Peak discharge	=	0.482 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.43 hrs
Time interval	=	2 min	Hyd. volume	=	10,328 cuft
Inflow hyd. No.	=	3 - POST DA-1B	Max. Elevation	=	1065.39 ft
Reservoir name	=	UG Tank	Max. Storage	=	6,235 cuft

Storage Indication method used.

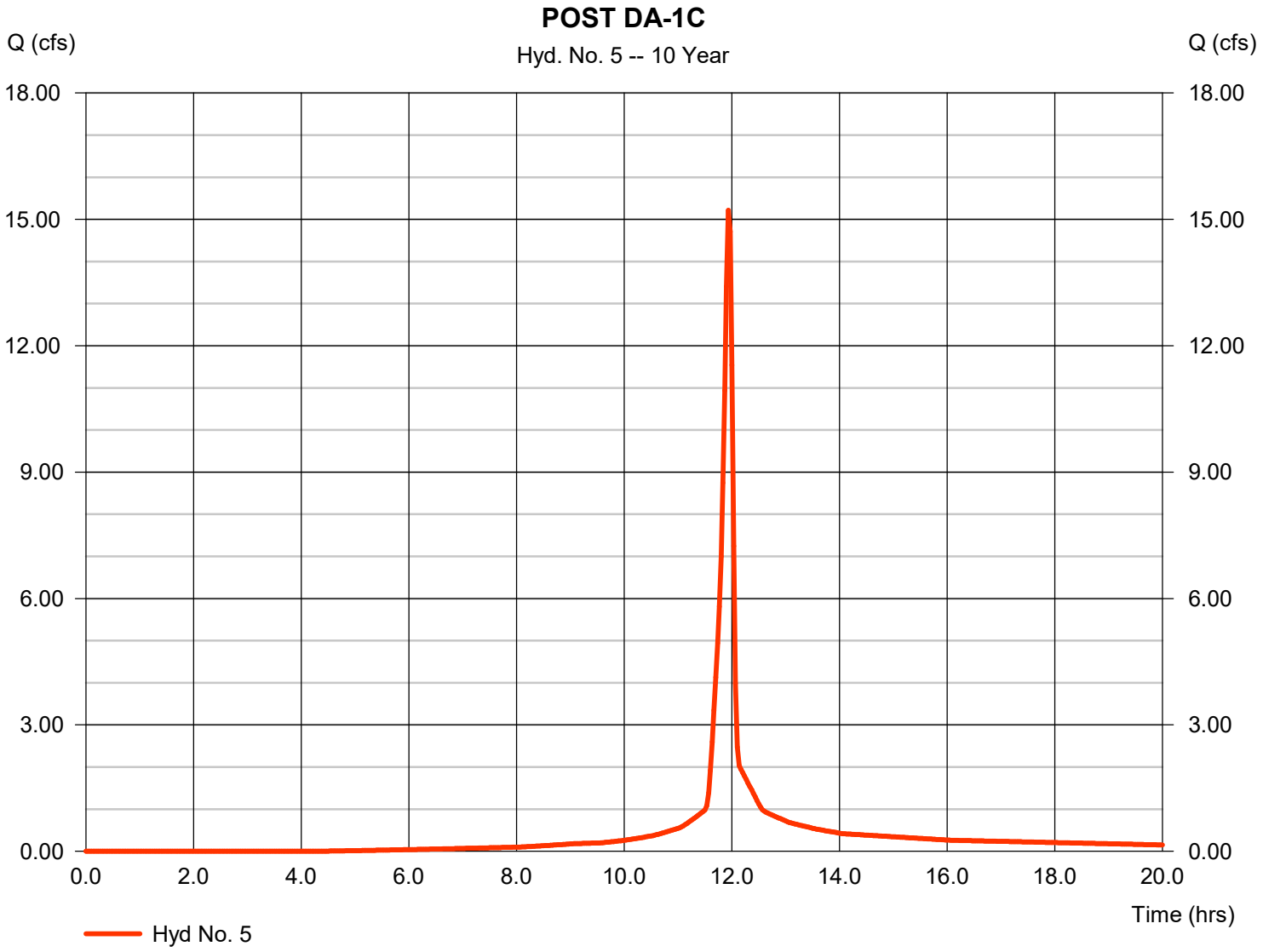


Hydrograph Report

Hyd. No. 5

POST DA-1C

Hydrograph type	=	SCS Runoff	Peak discharge	=	15.21 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	32,272 cuft
Drainage area	=	3.760 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.38 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



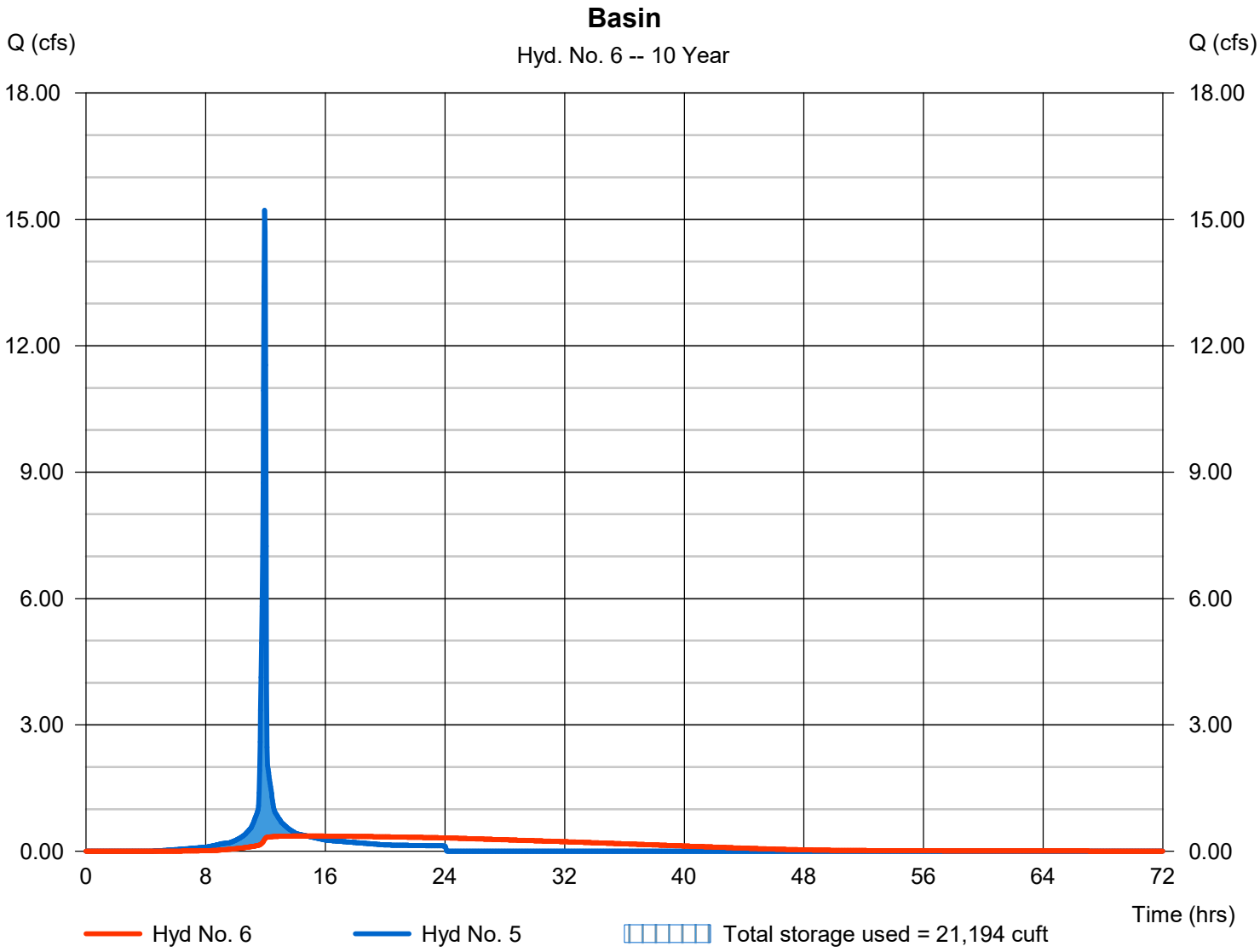
Hydrograph Report

Hyd. No. 6

Basin

Hydrograph type	=	Reservoir	Peak discharge	=	0.362 cfs
Storm frequency	=	10 yrs	Time to peak	=	14.77 hrs
Time interval	=	2 min	Hyd. volume	=	32,232 cuft
Inflow hyd. No.	=	5 - POST DA-1C	Max. Elevation	=	1078.47 ft
Reservoir name	=	Basin	Max. Storage	=	21,194 cuft

Storage Indication method used.

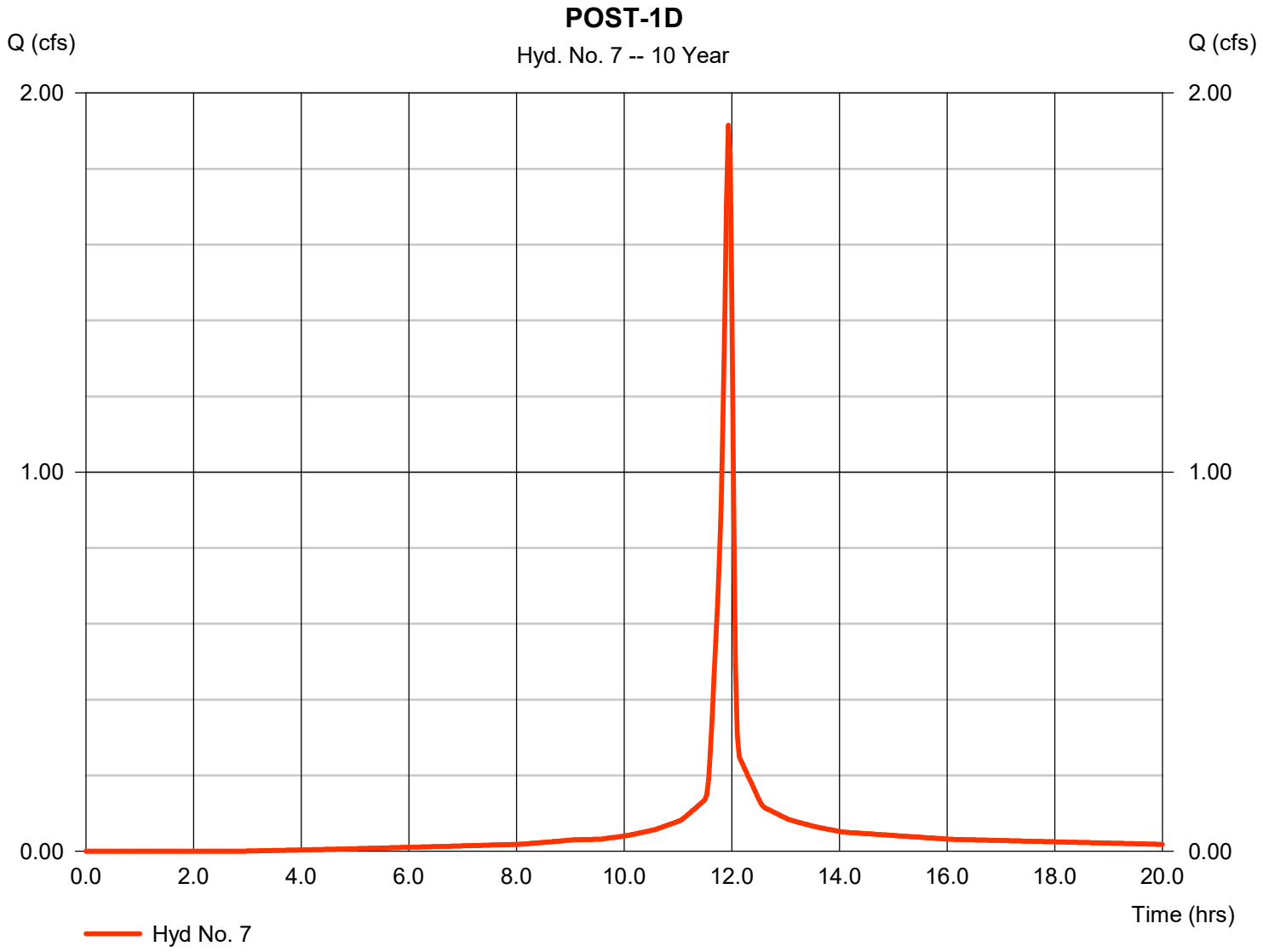


Hydrograph Report

Hyd. No. 7

POST-1D

Hydrograph type	= SCS Runoff	Peak discharge	= 1.915 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 4,225 cuft
Drainage area	= 0.440 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.38 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



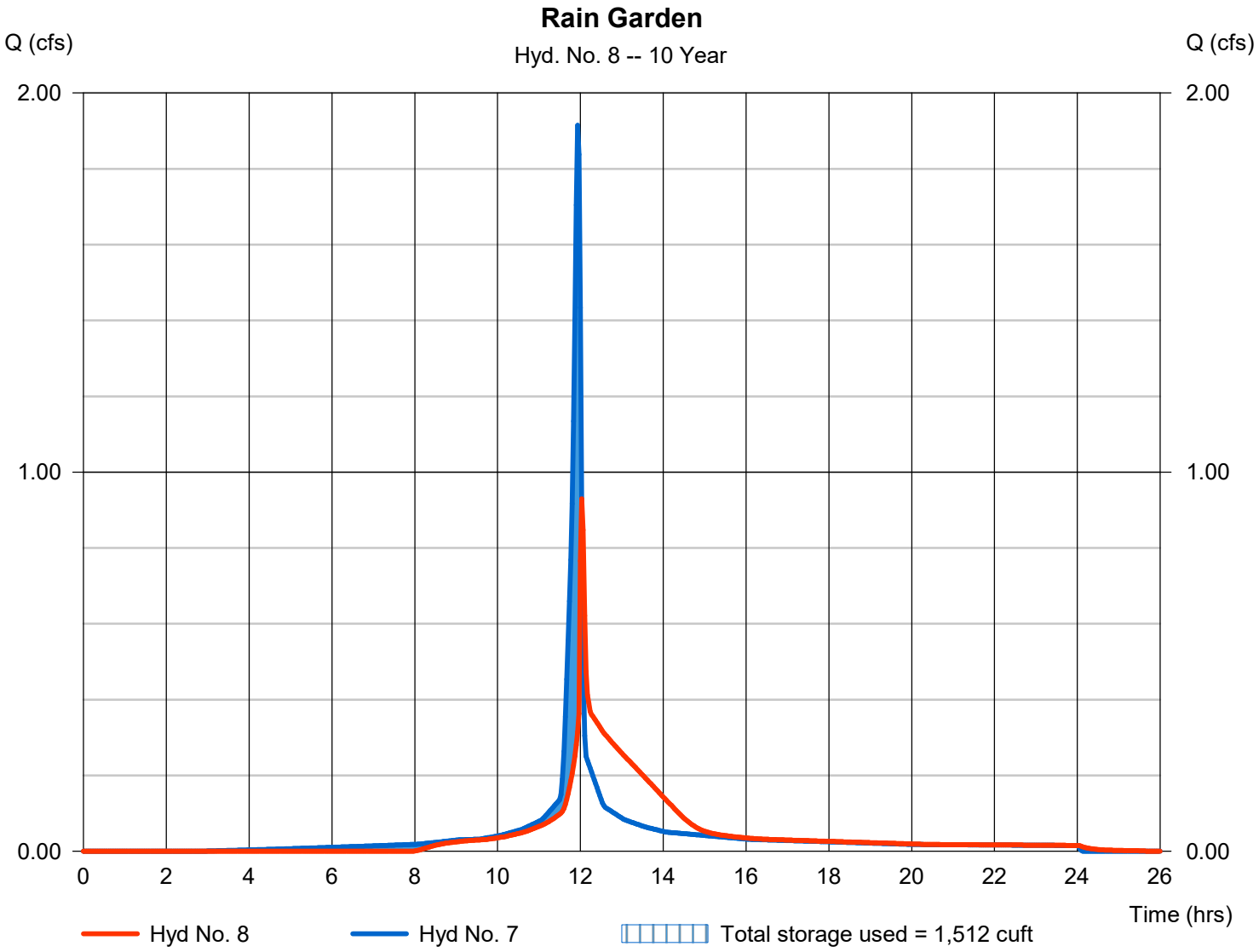
Hydrograph Report

Hyd. No. 8

Rain Garden

Hydrograph type	=	Reservoir	Peak discharge	=	0.930 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	4,066 cuft
Inflow hyd. No.	=	7 - POST-1D	Max. Elevation	=	1074.52 ft
Reservoir name	=	Rain Garden v1	Max. Storage	=	1,512 cuft

Storage Indication method used.

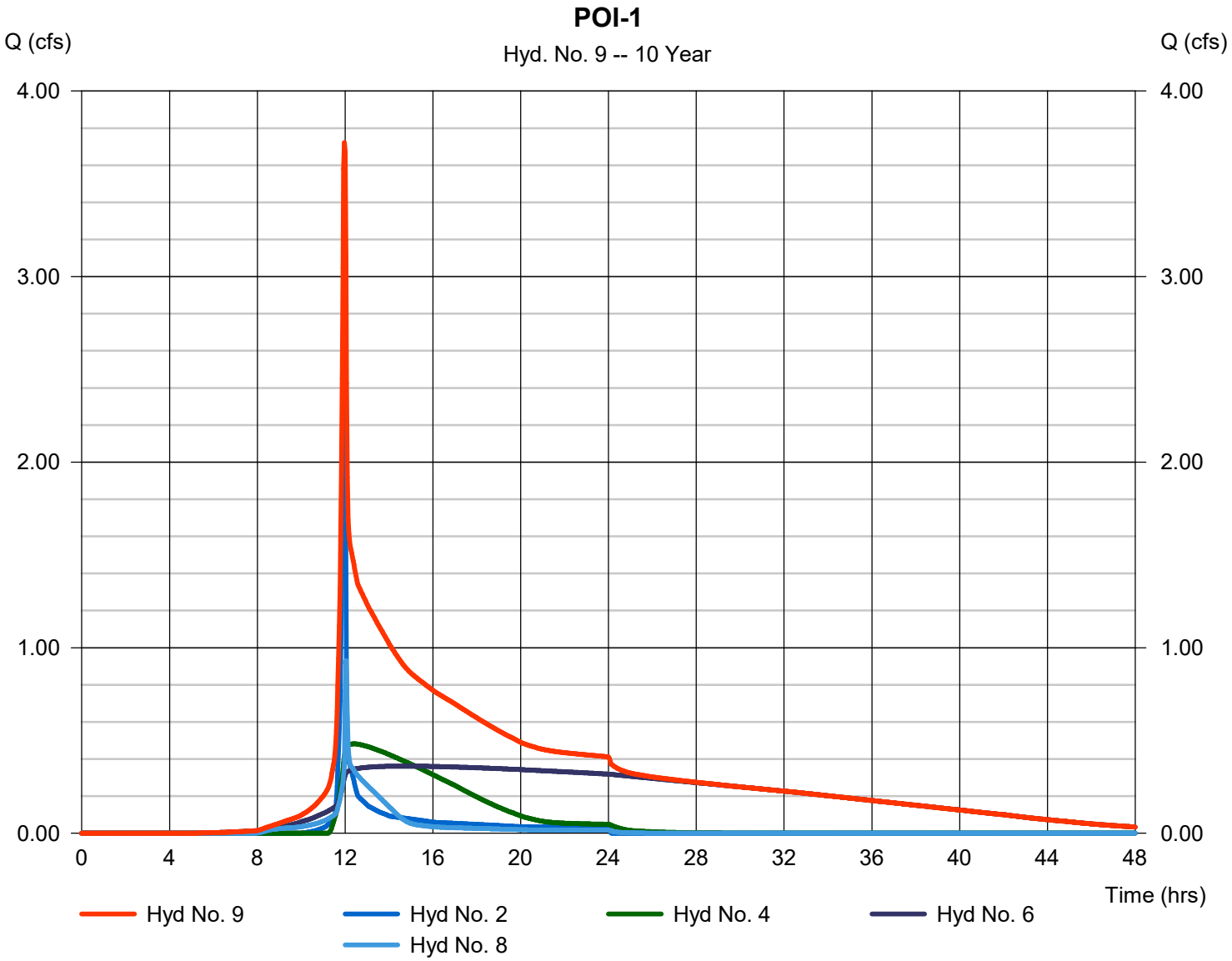


Hydrograph Report

Hyd. No. 9

POI-1

Hydrograph type	= Combine	Peak discharge	= 3.722 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 51,924 cuft
Inflow hyds.	= 2, 4, 6, 8	Contrib. drain. area	= 1.160 ac

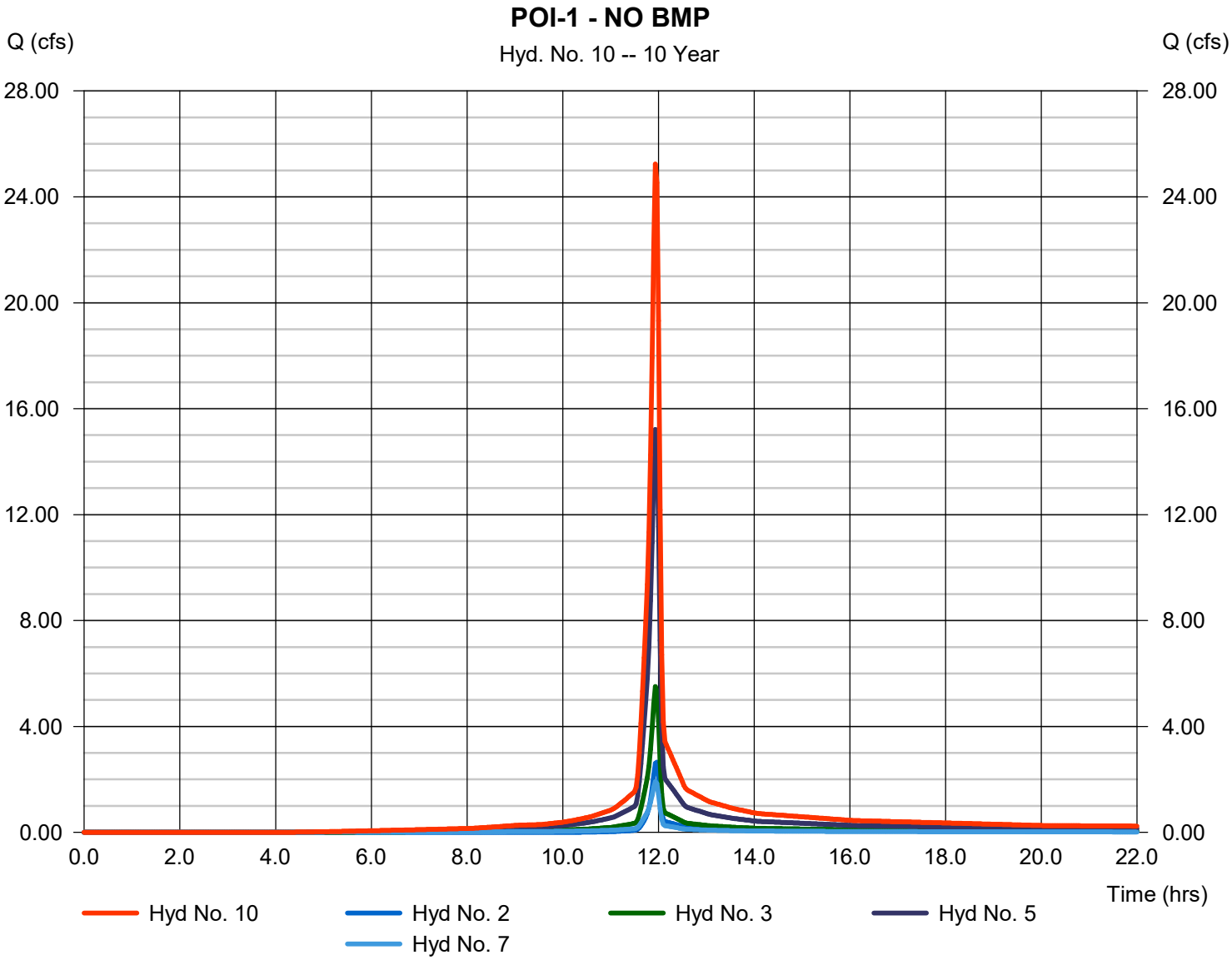


Hydrograph Report

Hyd. No. 10

POI-1 - NO BMP

Hydrograph type	= Combine	Peak discharge	= 25.24 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 53,360 cuft
Inflow hyds.	= 2, 3, 5, 7	Contrib. drain. area	= 6.760 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

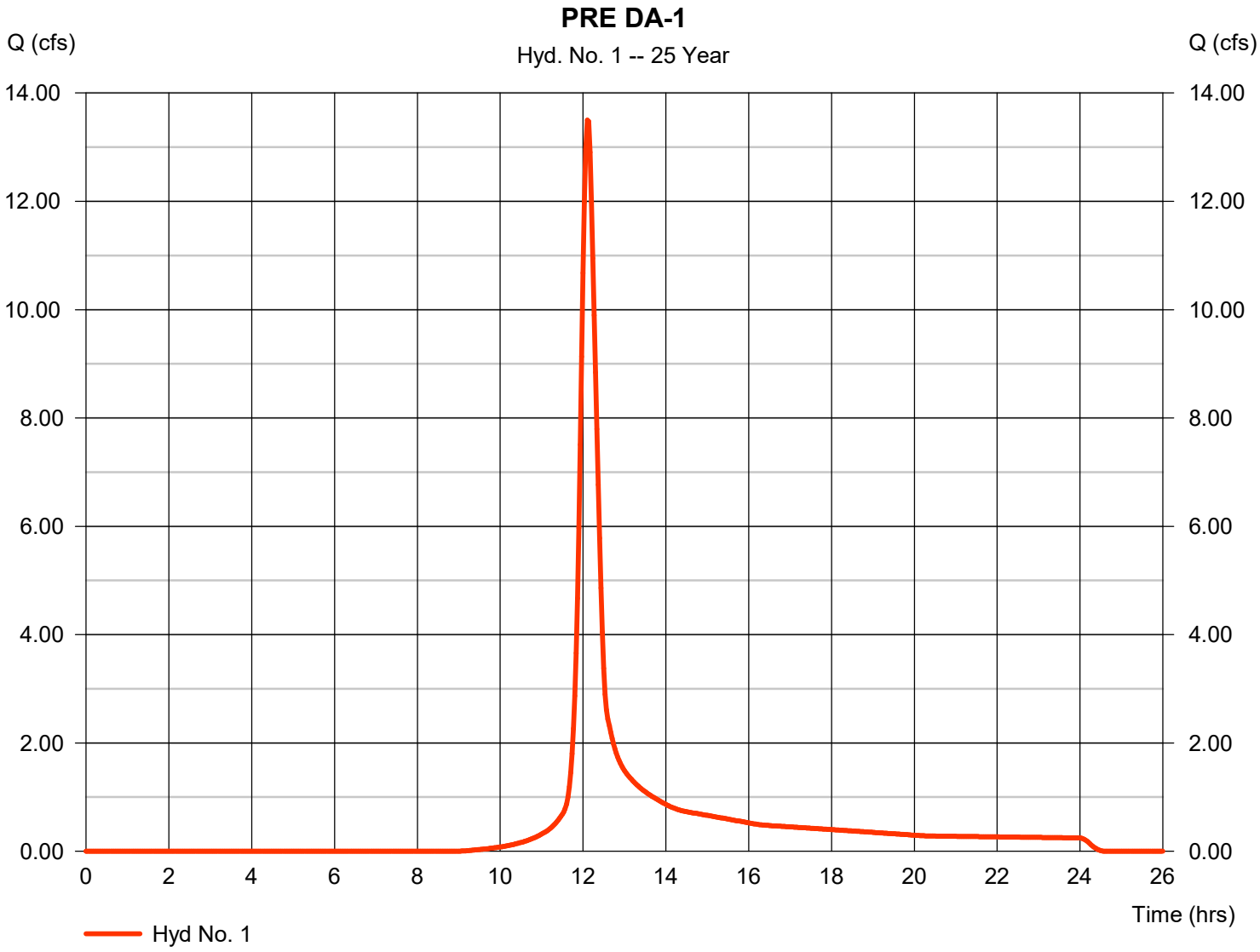
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	13.50	2	726	47,060	------	------	------	PRE DA-1
2	SCS Runoff	3.554	2	718	7,153	------	------	------	POST DA-1A
3	SCS Runoff	6.756	2	716	14,376	------	------	------	POST DA-1B
4	Reservoir	0.551	2	748	13,138	3	1066.08	7,771	UG TANK
5	SCS Runoff	18.56	2	716	39,891	------	------	------	POST DA-1C
6	Reservoir	0.403	2	906	39,852	5	1079.03	26,739	Basin
7	SCS Runoff	2.300	2	716	5,138	------	------	------	POST-1D
8	Reservoir	1.272	2	722	4,979	7	1074.98	1,689	Rain Garden
9	Combine	5.435	2	718	65,122	2, 4, 6, 8	------	------	POI-1
10	Combine	31.16	2	716	66,558	2, 3, 5, 7,	------	------	POI-1 - NO BMP

Hydrograph Report

Hyd. No. 1

PRE DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 13.50 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 47,060 cuft
Drainage area	= 6.750 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.60 min
Total precip.	= 4.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

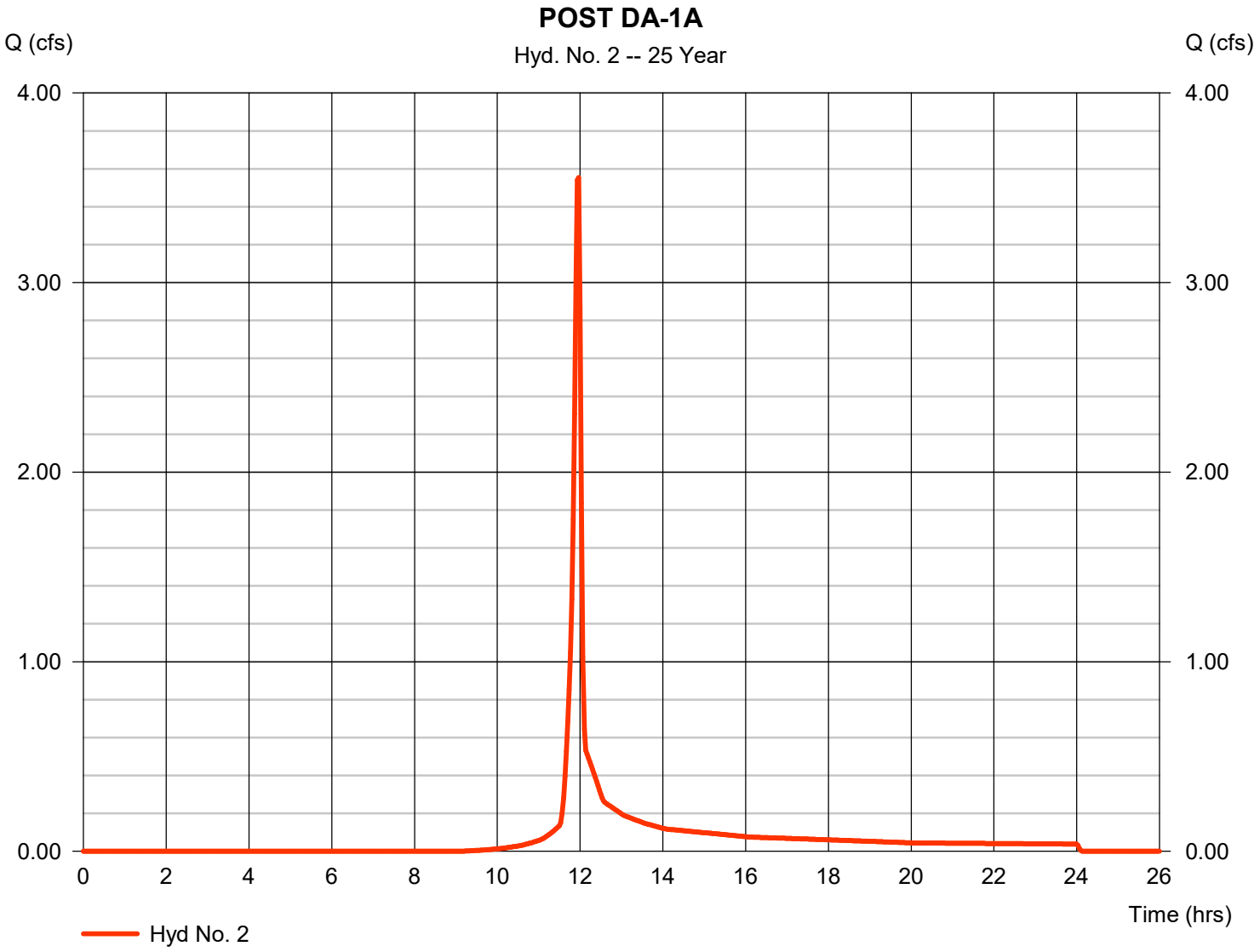


Hydrograph Report

Hyd. No. 2

POST DA-1A

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.554 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	7,153 cuft
Drainage area	=	1.160 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

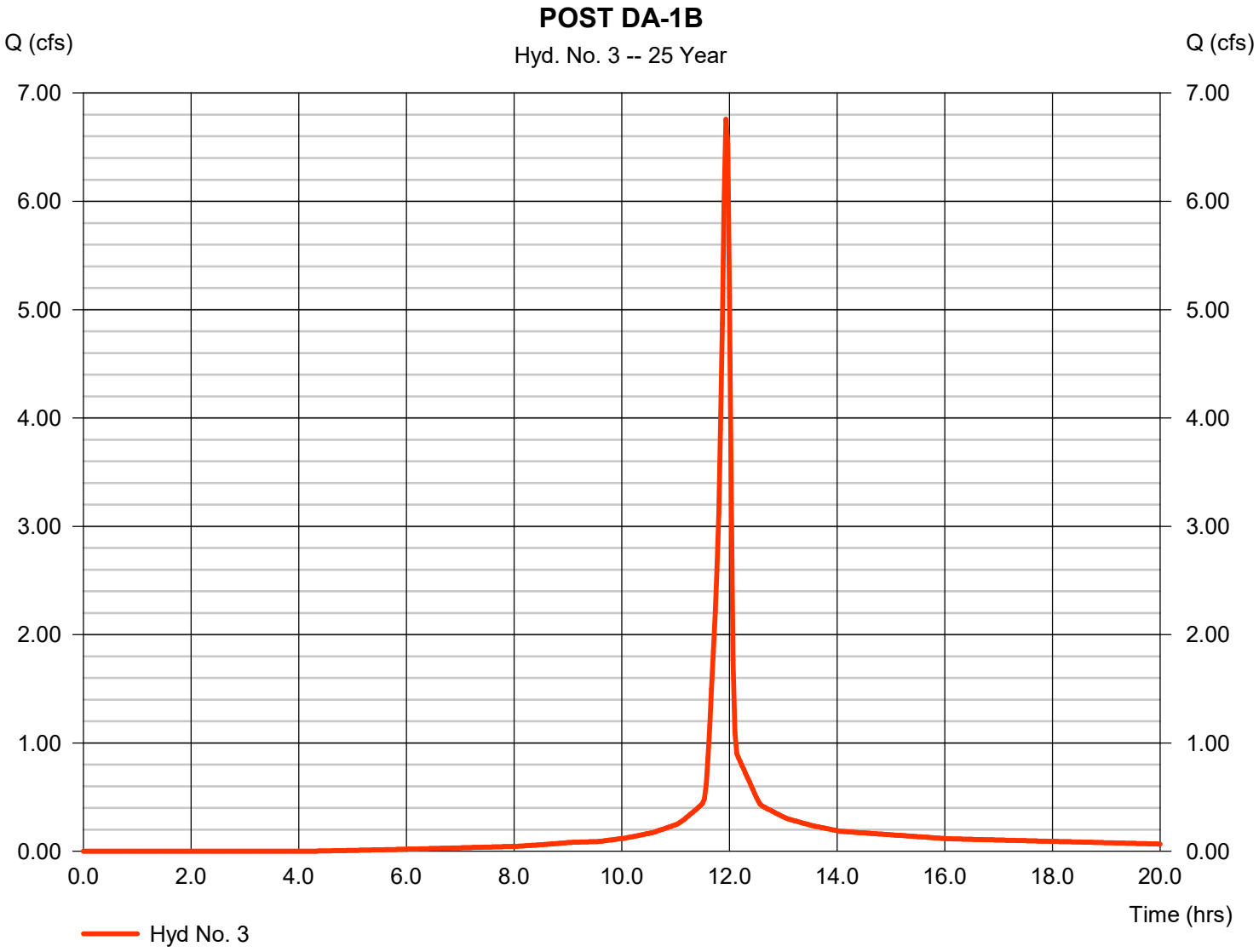


Hydrograph Report

Hyd. No. 3

POST DA-1B

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.756 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	14,376 cuft
Drainage area	=	1.400 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



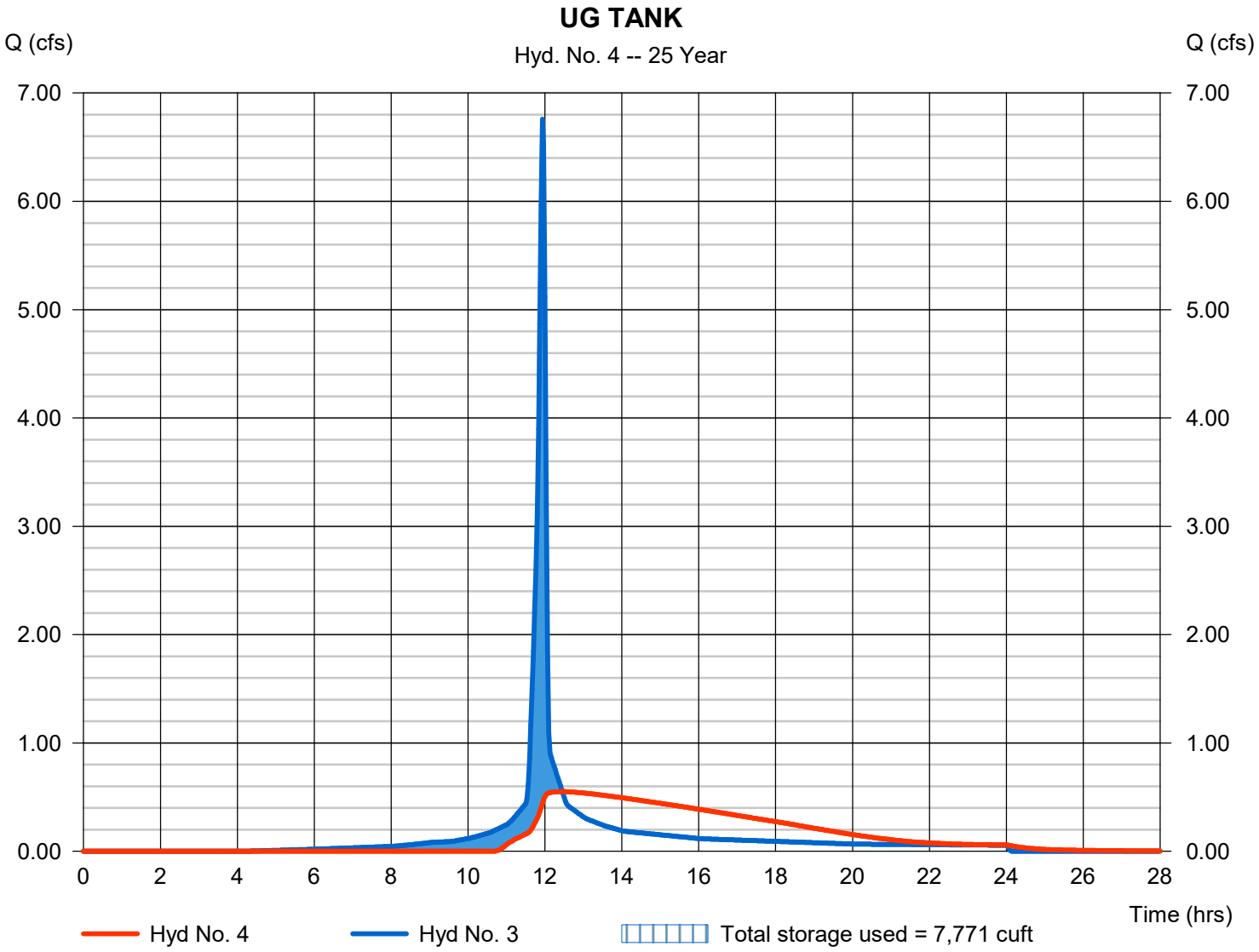
Hydrograph Report

Hyd. No. 4

UG TANK

Hydrograph type	=	Reservoir	Peak discharge	=	0.551 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.47 hrs
Time interval	=	2 min	Hyd. volume	=	13,138 cuft
Inflow hyd. No.	=	3 - POST DA-1B	Max. Elevation	=	1066.08 ft
Reservoir name	=	UG Tank	Max. Storage	=	7,771 cuft

Storage Indication method used.

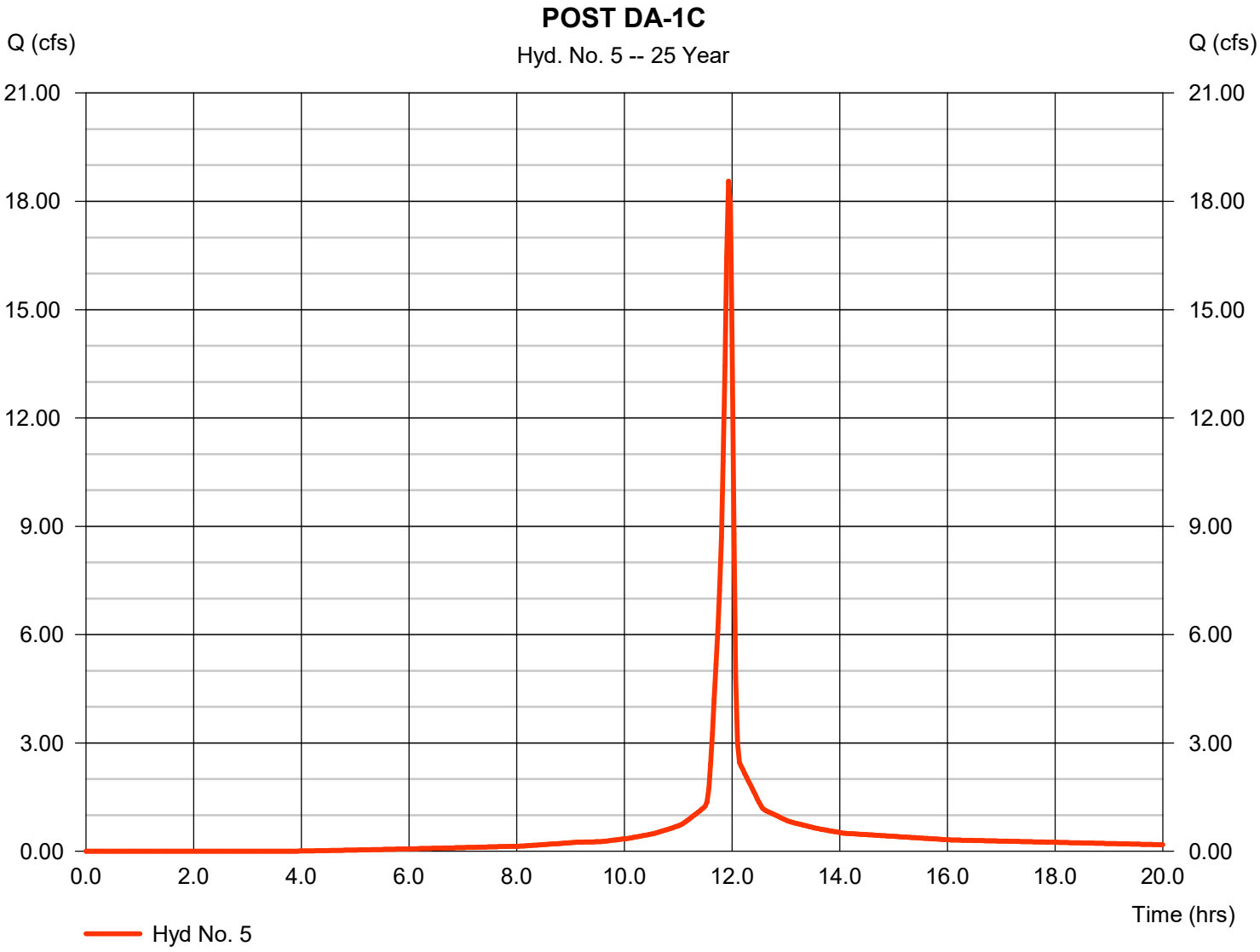


Hydrograph Report

Hyd. No. 5

POST DA-1C

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.56 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	39,891 cuft
Drainage area	=	3.760 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



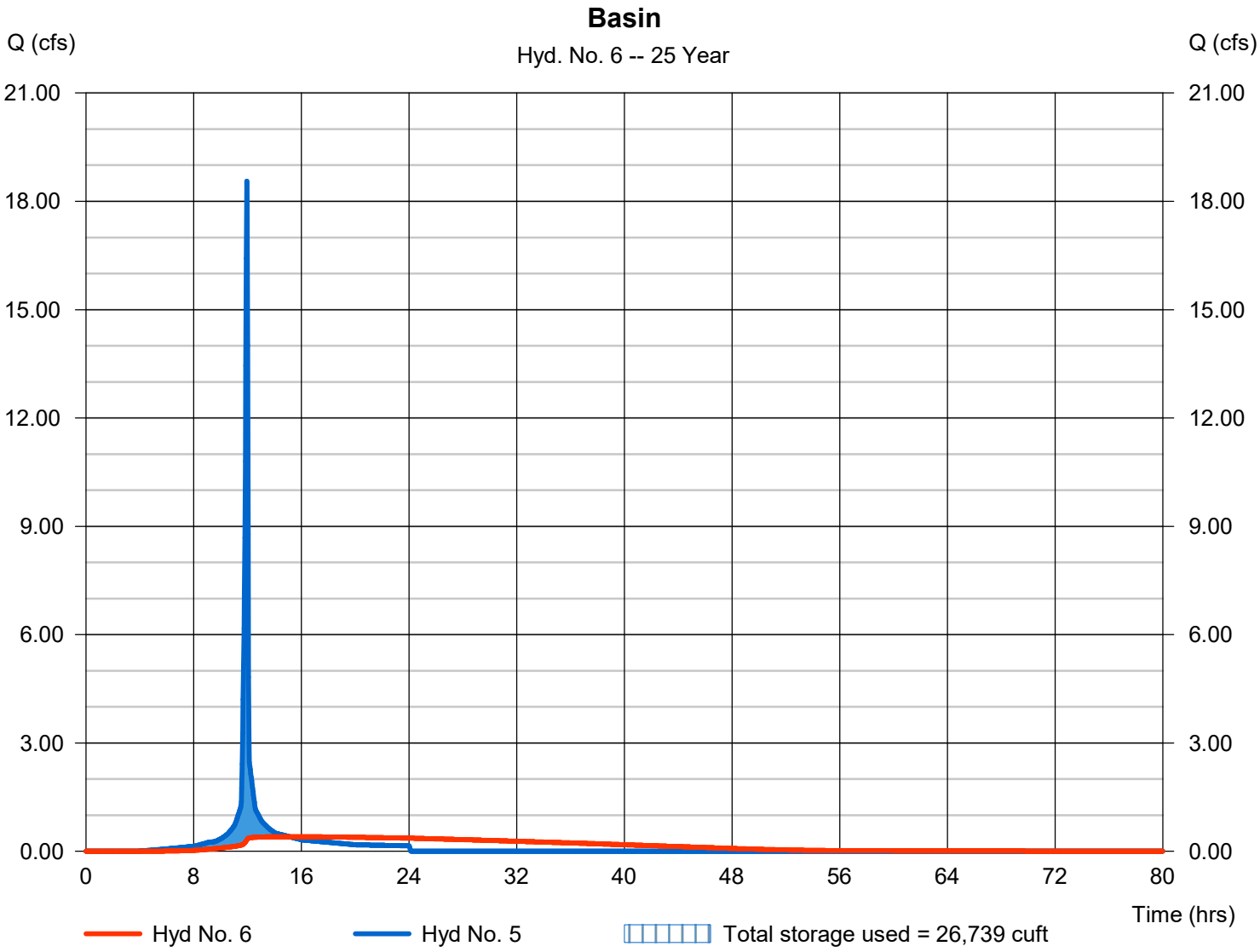
Hydrograph Report

Hyd. No. 6

Basin

Hydrograph type	=	Reservoir	Peak discharge	=	0.403 cfs
Storm frequency	=	25 yrs	Time to peak	=	15.10 hrs
Time interval	=	2 min	Hyd. volume	=	39,852 cuft
Inflow hyd. No.	=	5 - POST DA-1C	Max. Elevation	=	1079.03 ft
Reservoir name	=	Basin	Max. Storage	=	26,739 cuft

Storage Indication method used.

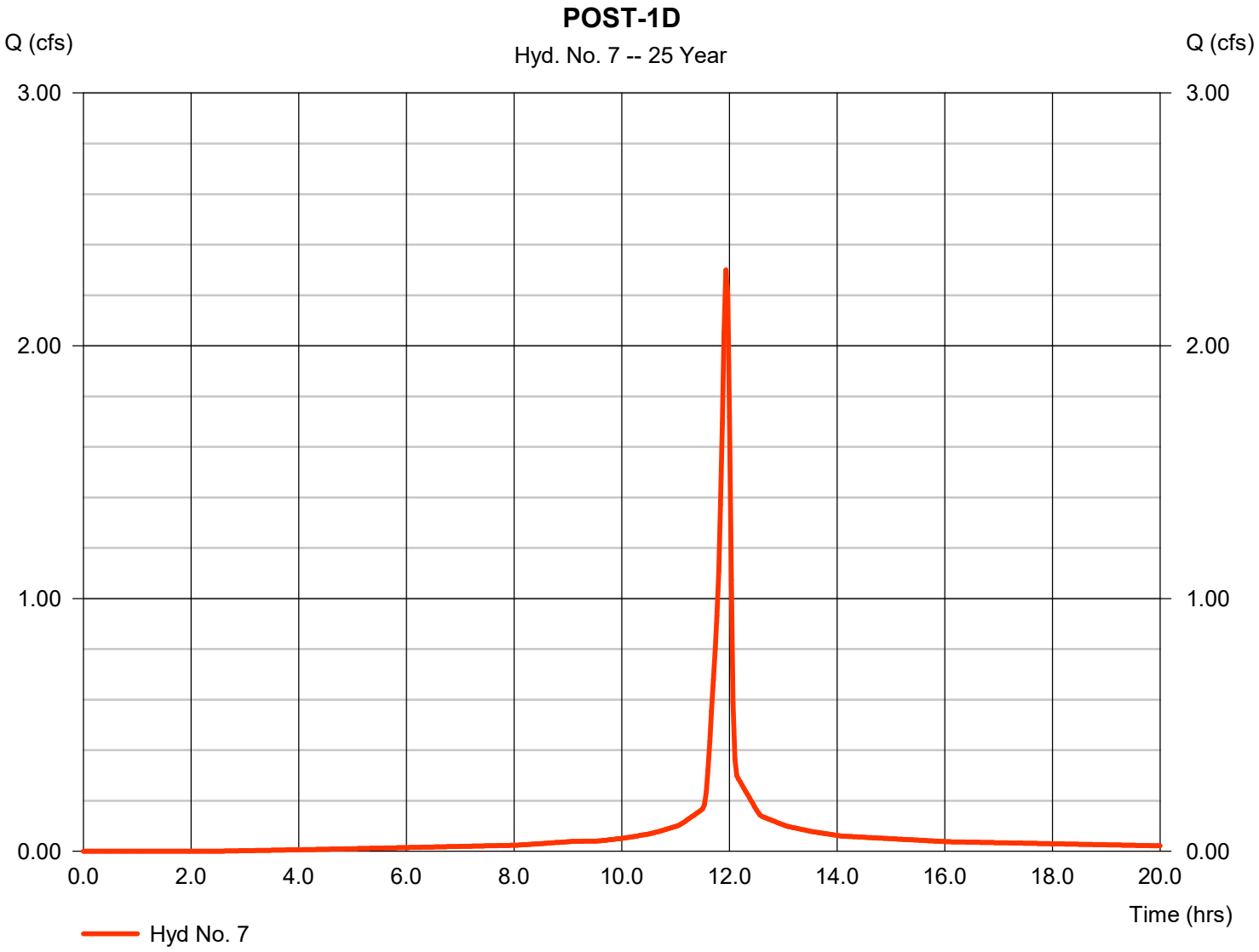


Hydrograph Report

Hyd. No. 7

POST-1D

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.300 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	5,138 cuft
Drainage area	=	0.440 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



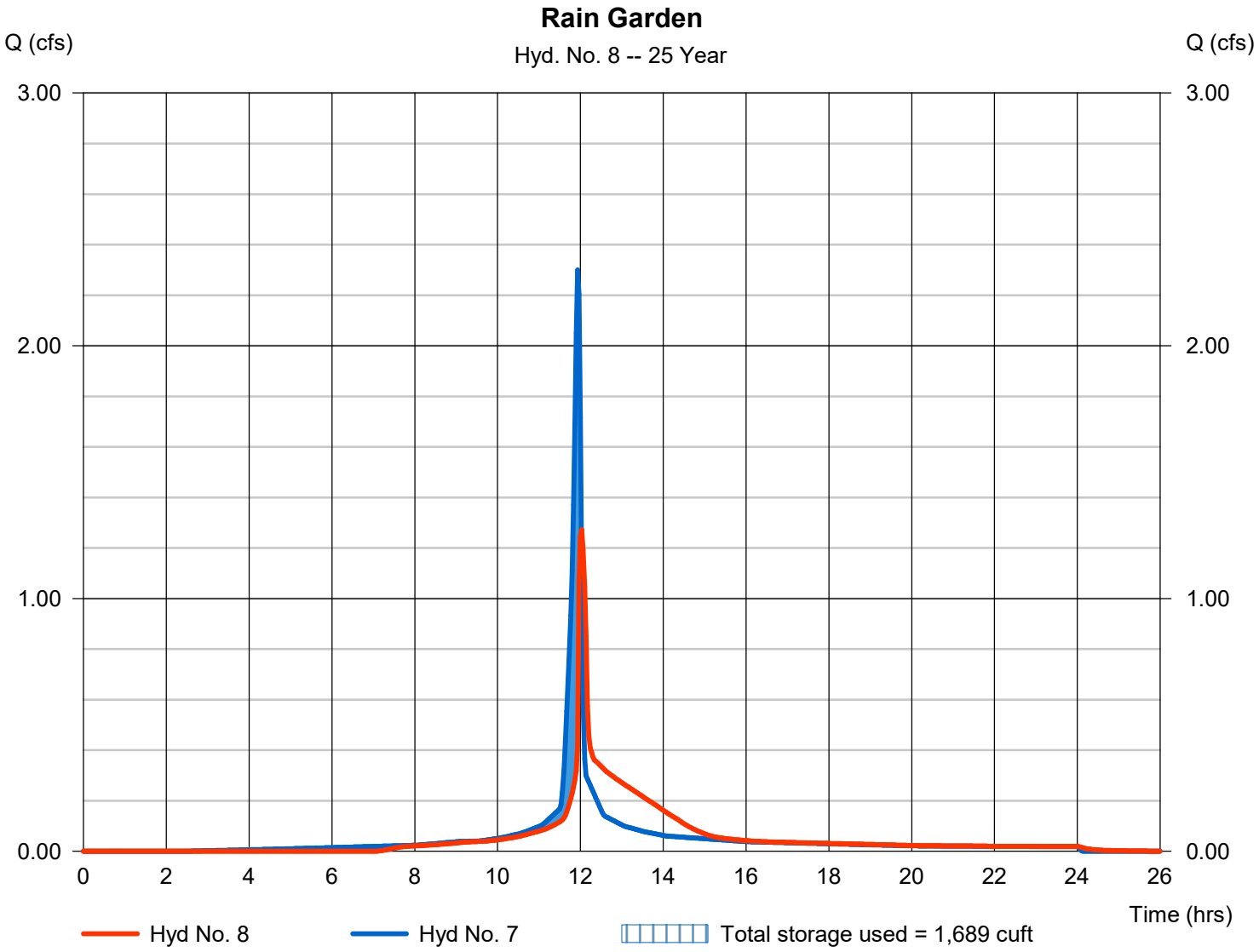
Hydrograph Report

Hyd. No. 8

Rain Garden

Hydrograph type	=	Reservoir	Peak discharge	=	1.272 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	4,979 cuft
Inflow hyd. No.	=	7 - POST-1D	Max. Elevation	=	1074.98 ft
Reservoir name	=	Rain Garden v1	Max. Storage	=	1,689 cuft

Storage Indication method used.

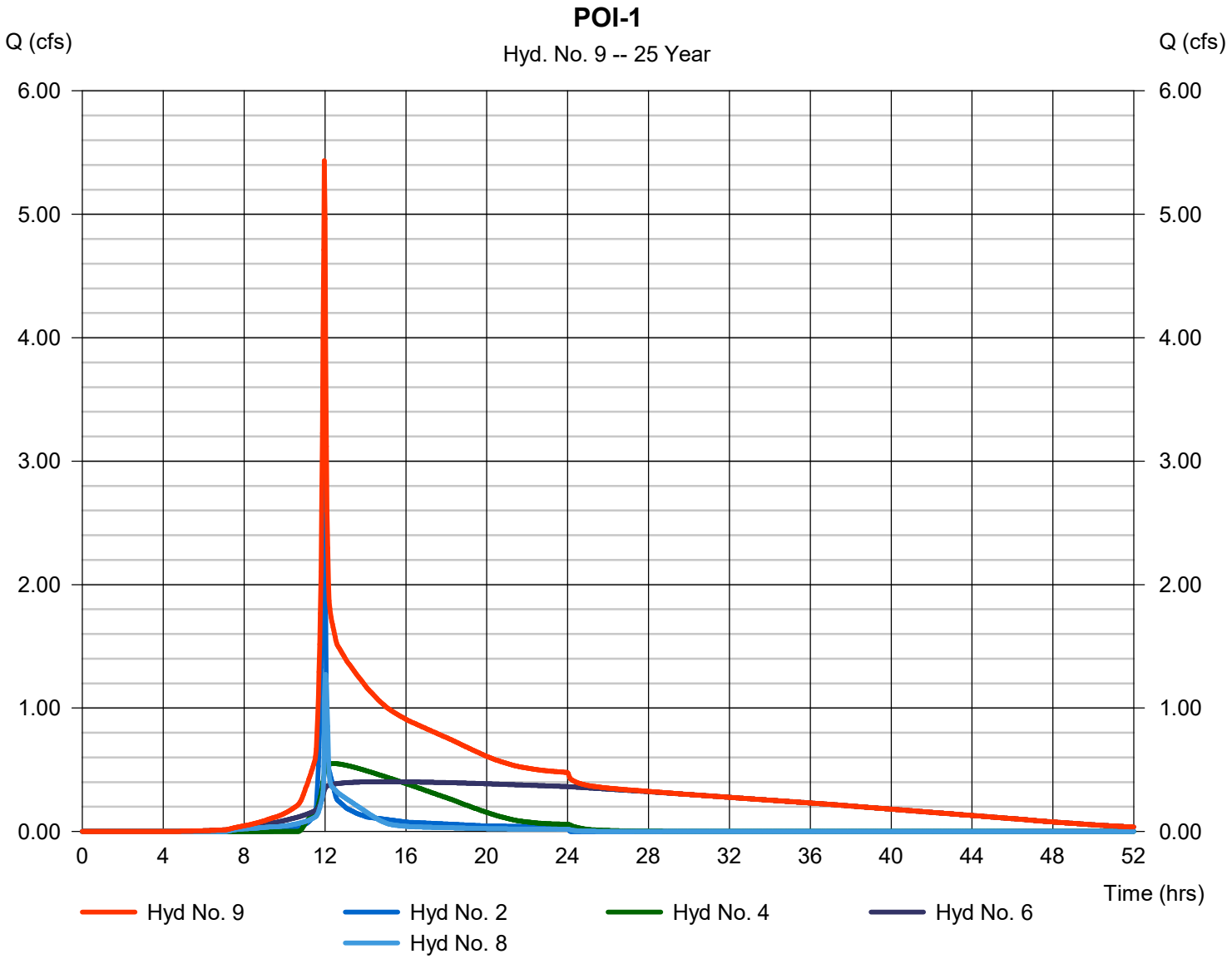


Hydrograph Report

Hyd. No. 9

POI-1

Hydrograph type	=	Combine	Peak discharge	=	5.435 cfs
Storm frequency	=	25 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	65,122 cuft
Inflow hyds.	=	2, 4, 6, 8	Contrib. drain. area	=	1.160 ac

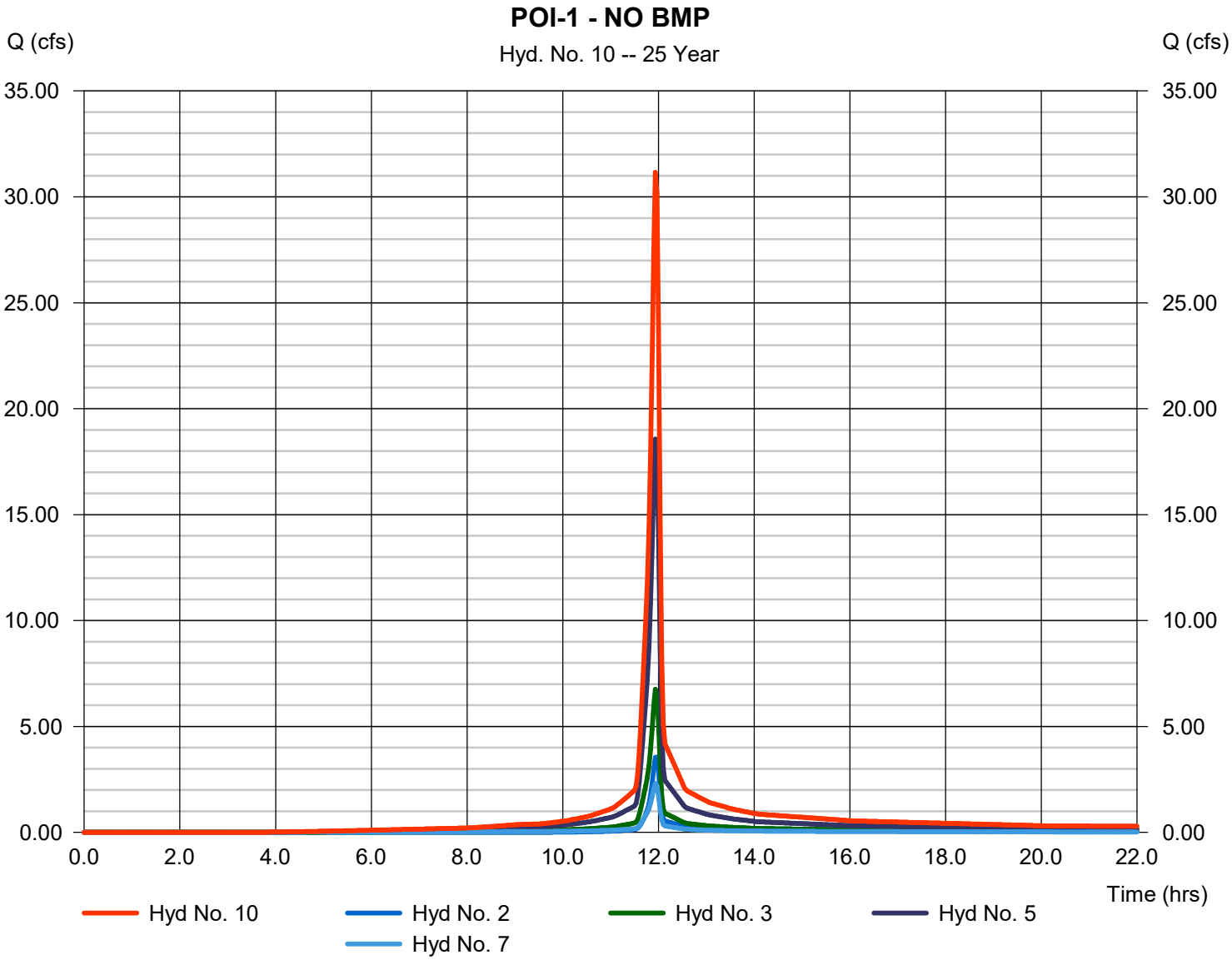


Hydrograph Report

Hyd. No. 10

POI-1 - NO BMP

Hydrograph type	= Combine	Peak discharge	= 31.16 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 66,558 cuft
Inflow hyds.	= 2, 3, 5, 7	Contrib. drain. area	= 6.760 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

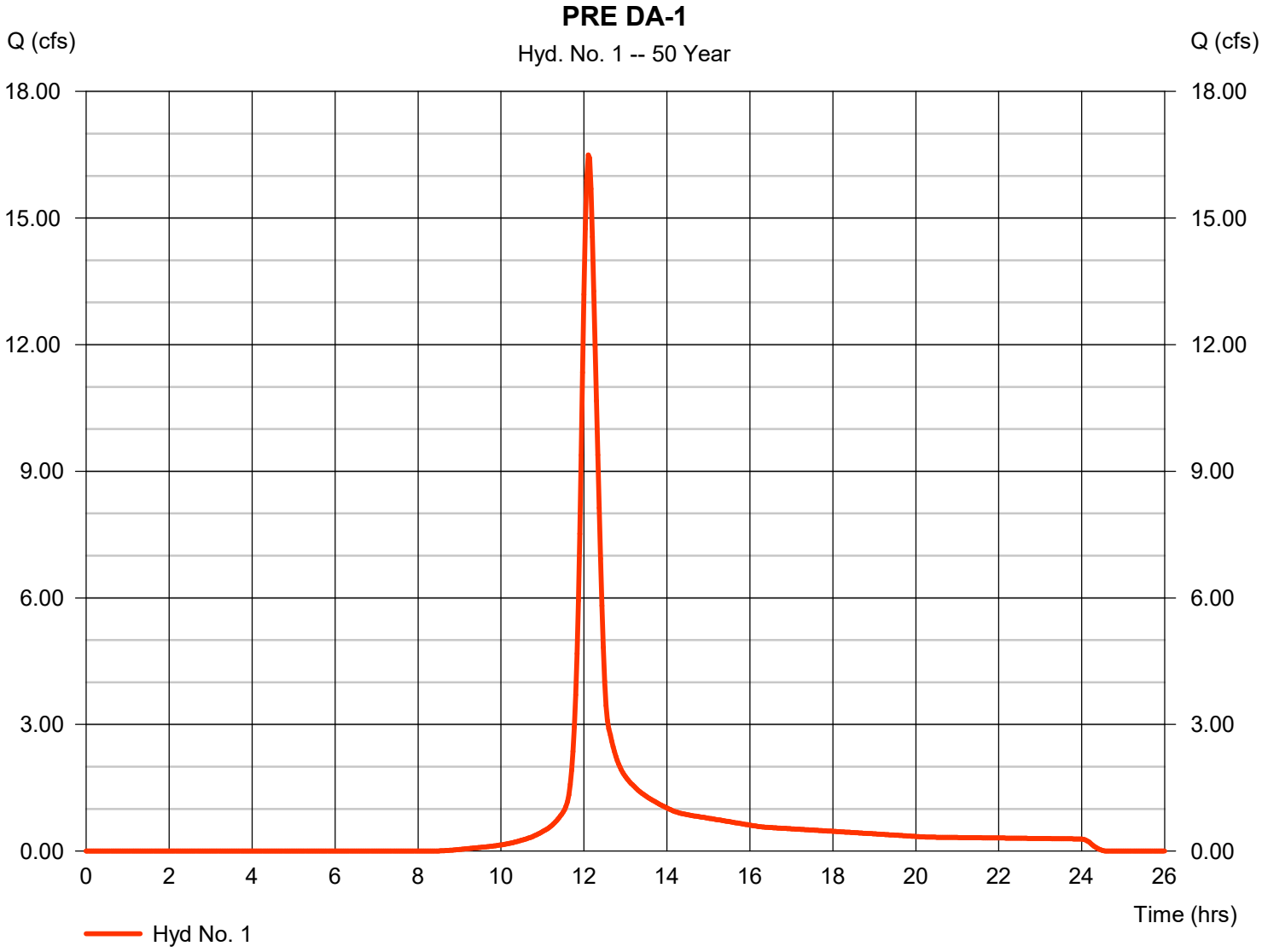
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	16.50	2	726	57,183	------	------	------	PRE DA-1
2	SCS Runoff	4.322	2	716	8,727	------	------	------	POST DA-1A
3	SCS Runoff	7.761	2	716	16,666	------	------	------	POST DA-1B
4	Reservoir	0.606	2	748	15,428	3	1066.70	8,996	UG TANK
5	SCS Runoff	21.25	2	716	46,091	------	------	------	POST DA-1C
6	Reservoir	0.431	2	922	46,052	5	1079.45	31,337	Basin
7	SCS Runoff	2.608	2	716	5,877	------	------	------	POST-1D
8	Reservoir	2.112	2	720	5,718	7	1075.11	1,764	Rain Garden
9	Combine	6.648	2	718	75,925	2, 4, 6, 8	------	------	POI-1
10	Combine	35.94	2	716	77,360	2, 3, 5, 7,	------	------	POI-1 - NO BMP

Hydrograph Report

Hyd. No. 1

PRE DA-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.50 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	57,183 cuft
Drainage area	=	6.750 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.60 min
Total precip.	=	4.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

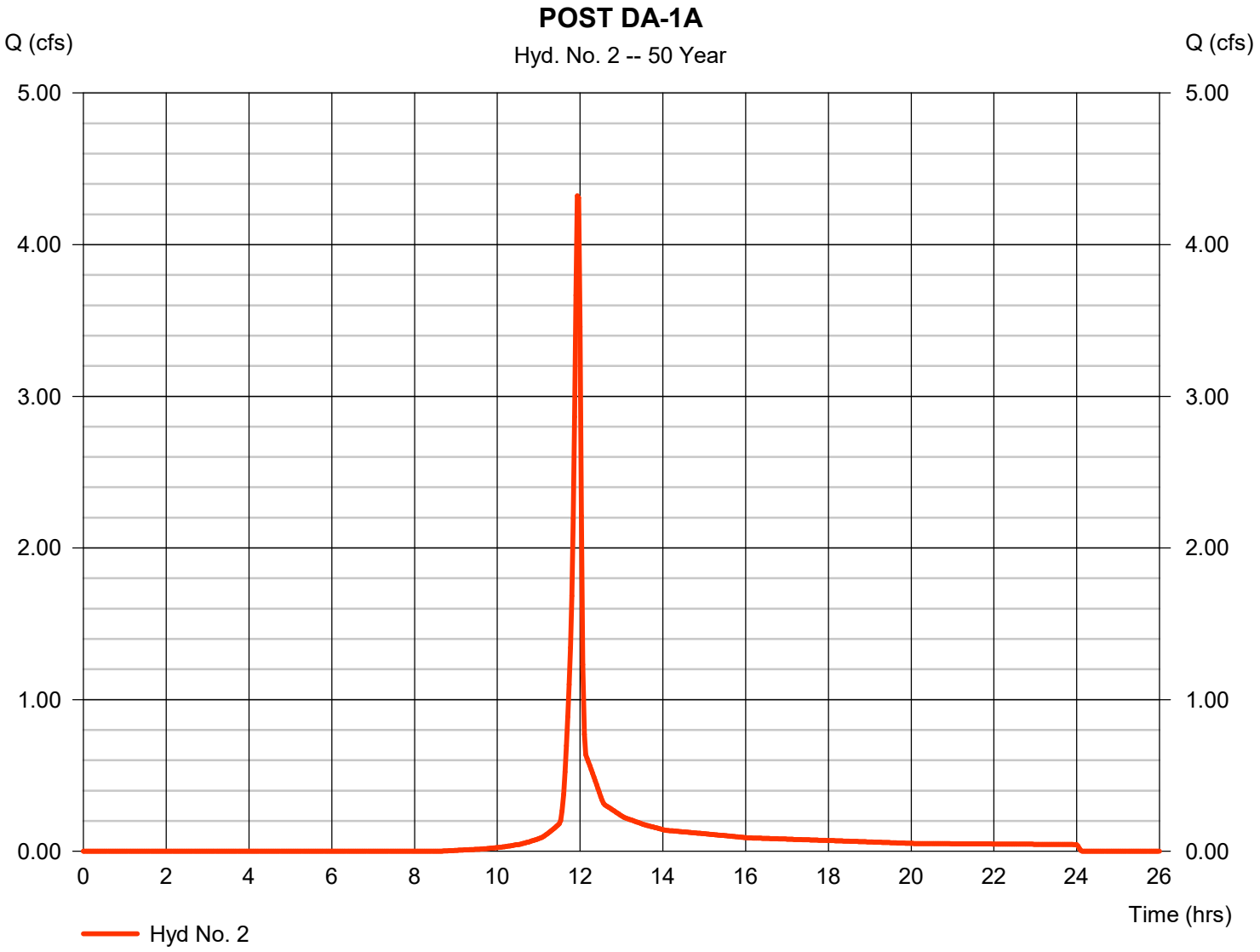


Hydrograph Report

Hyd. No. 2

POST DA-1A

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.322 cfs
Storm frequency	=	50 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	8,727 cuft
Drainage area	=	1.160 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

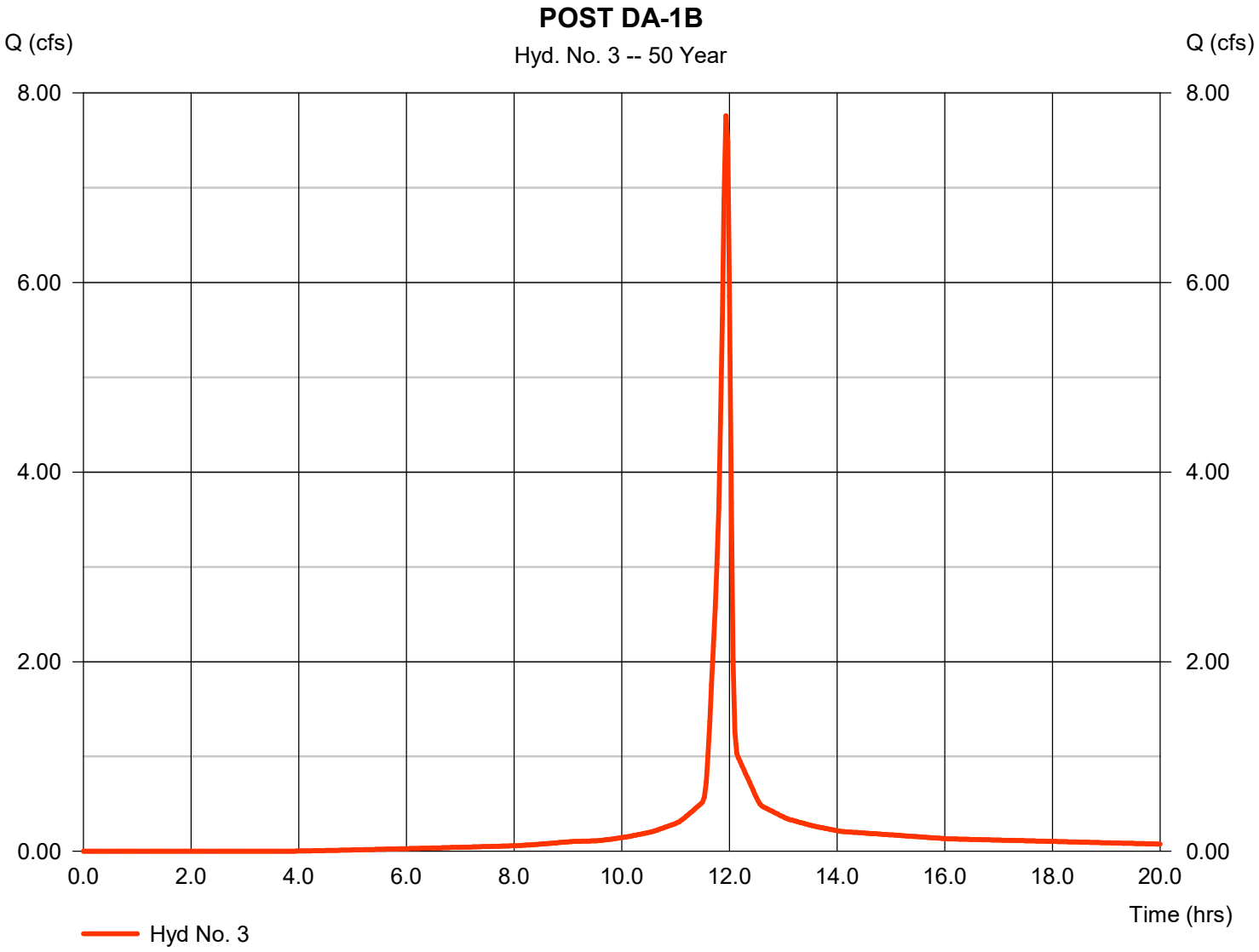


Hydrograph Report

Hyd. No. 3

POST DA-1B

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.761 cfs
Storm frequency	=	50 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	16,666 cuft
Drainage area	=	1.400 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



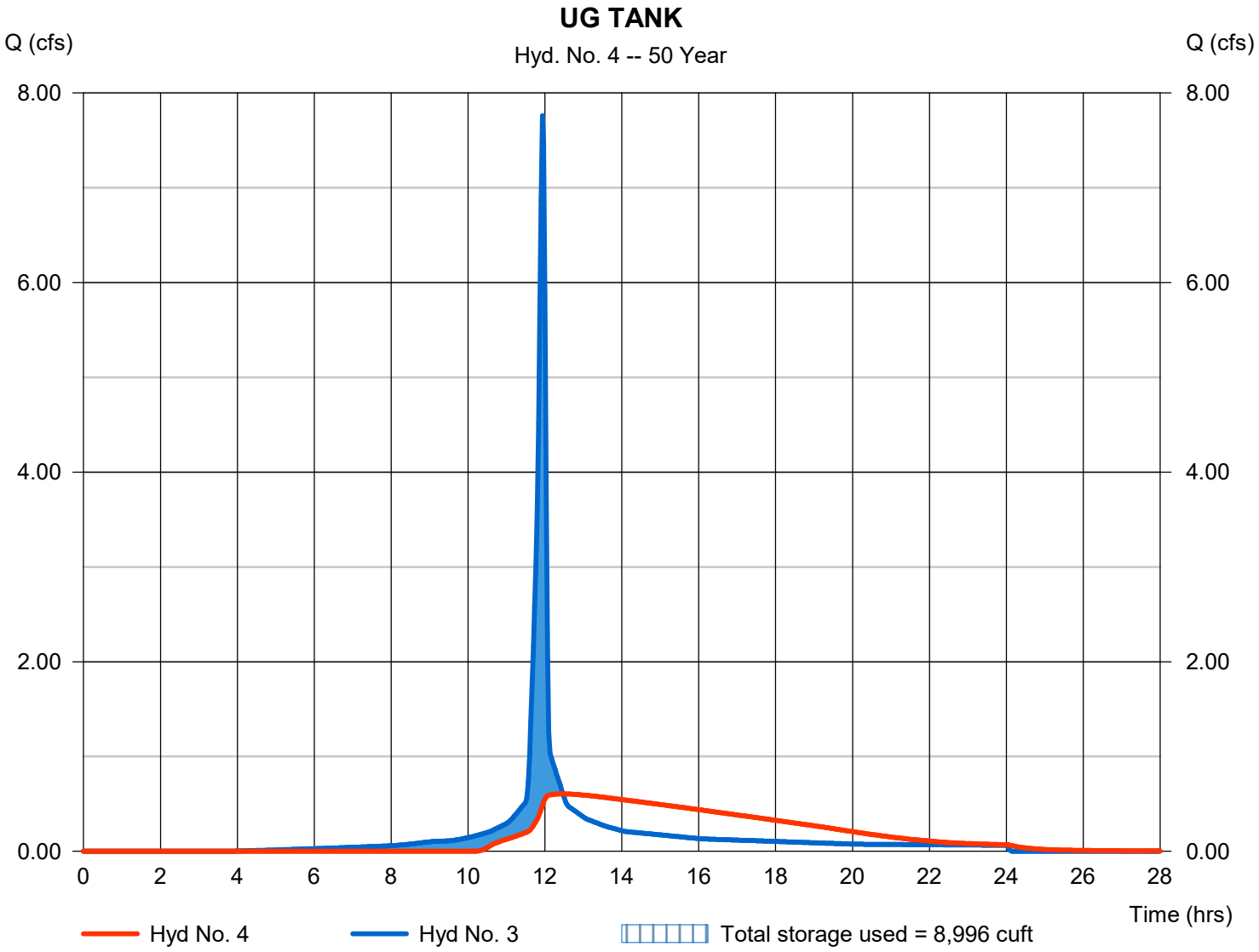
Hydrograph Report

Hyd. No. 4

UG TANK

Hydrograph type	=	Reservoir	Peak discharge	=	0.606 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.47 hrs
Time interval	=	2 min	Hyd. volume	=	15,428 cuft
Inflow hyd. No.	=	3 - POST DA-1B	Max. Elevation	=	1066.70 ft
Reservoir name	=	UG Tank	Max. Storage	=	8,996 cuft

Storage Indication method used.

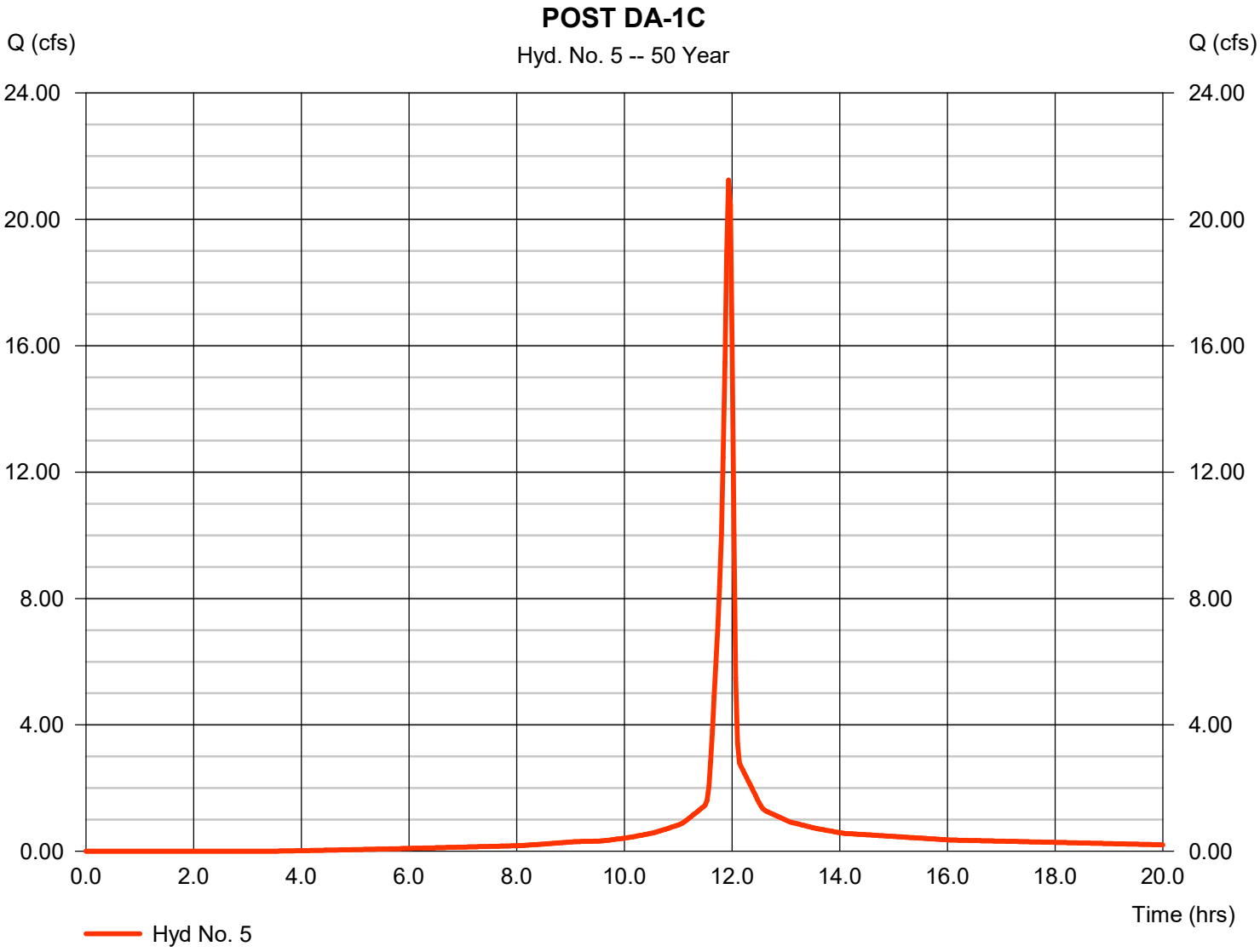


Hydrograph Report

Hyd. No. 5

POST DA-1C

Hydrograph type	=	SCS Runoff	Peak discharge	=	21.25 cfs
Storm frequency	=	50 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	46,091 cuft
Drainage area	=	3.760 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



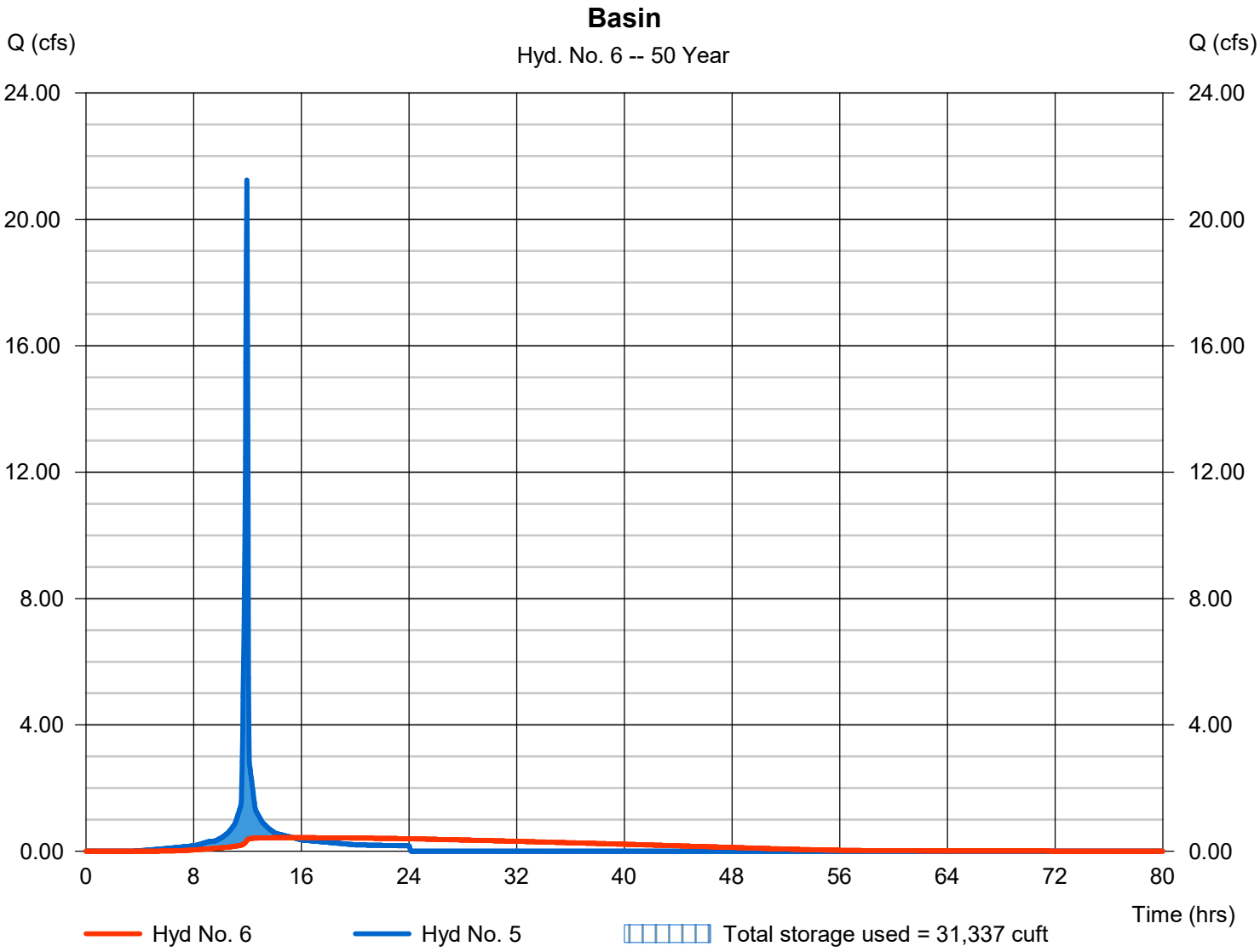
Hydrograph Report

Hyd. No. 6

Basin

Hydrograph type	=	Reservoir	Peak discharge	=	0.431 cfs
Storm frequency	=	50 yrs	Time to peak	=	15.37 hrs
Time interval	=	2 min	Hyd. volume	=	46,052 cuft
Inflow hyd. No.	=	5 - POST DA-1C	Max. Elevation	=	1079.45 ft
Reservoir name	=	Basin	Max. Storage	=	31,337 cuft

Storage Indication method used.

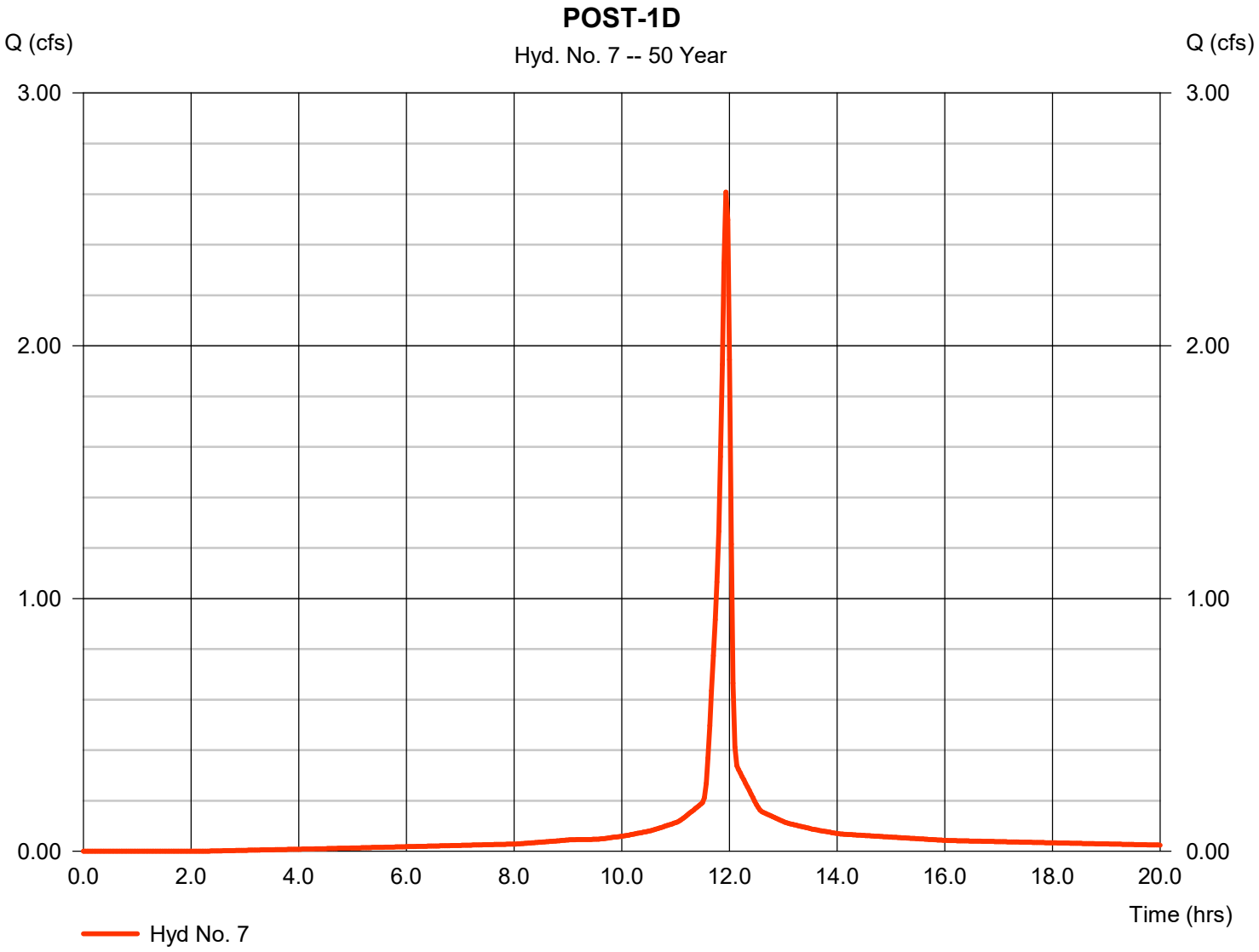


Hydrograph Report

Hyd. No. 7

POST-1D

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.608 cfs
Storm frequency	=	50 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	5,877 cuft
Drainage area	=	0.440 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



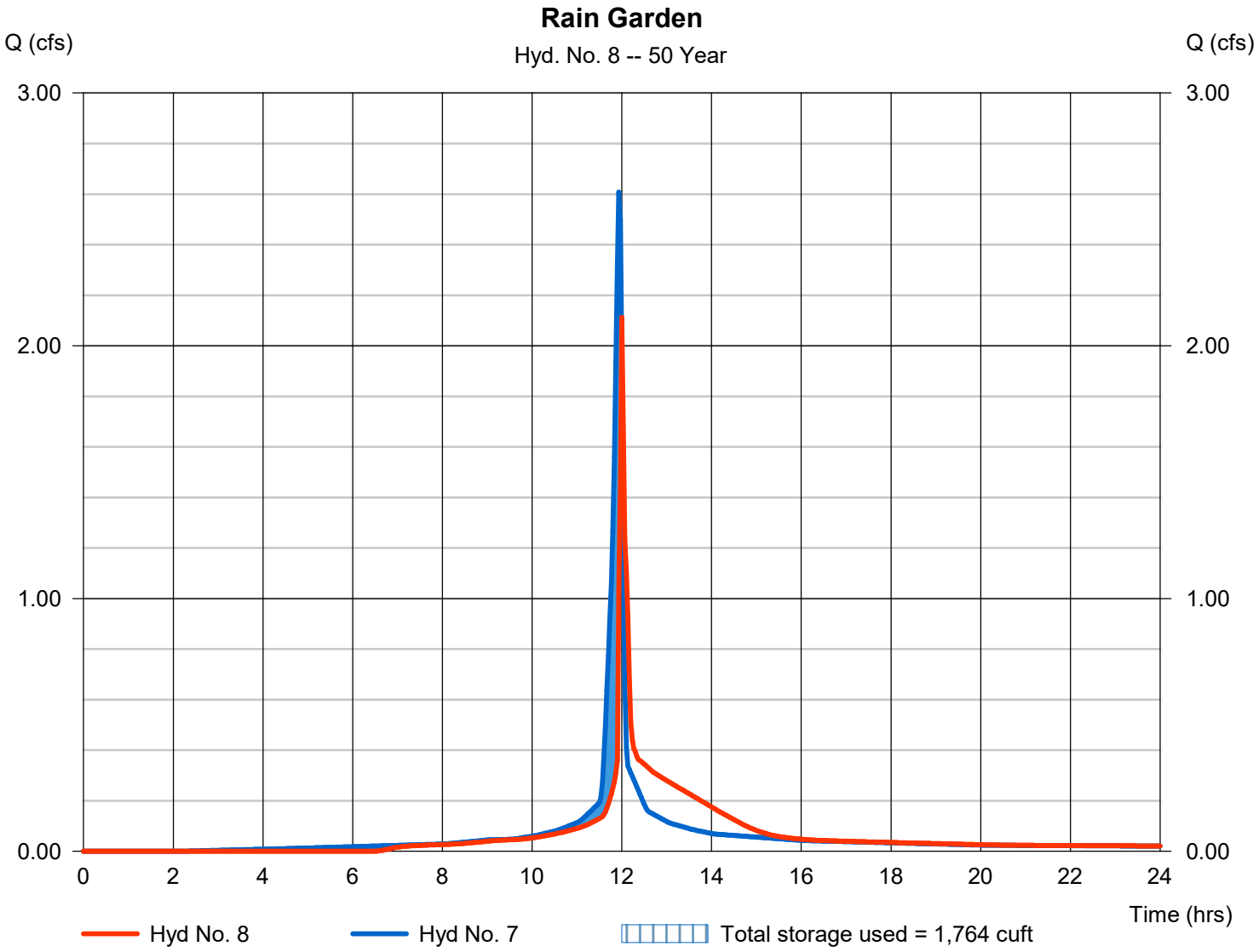
Hydrograph Report

Hyd. No. 8

Rain Garden

Hydrograph type	=	Reservoir	Peak discharge	=	2.112 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	5,718 cuft
Inflow hyd. No.	=	7 - POST-1D	Max. Elevation	=	1075.11 ft
Reservoir name	=	Rain Garden v1	Max. Storage	=	1,764 cuft

Storage Indication method used.

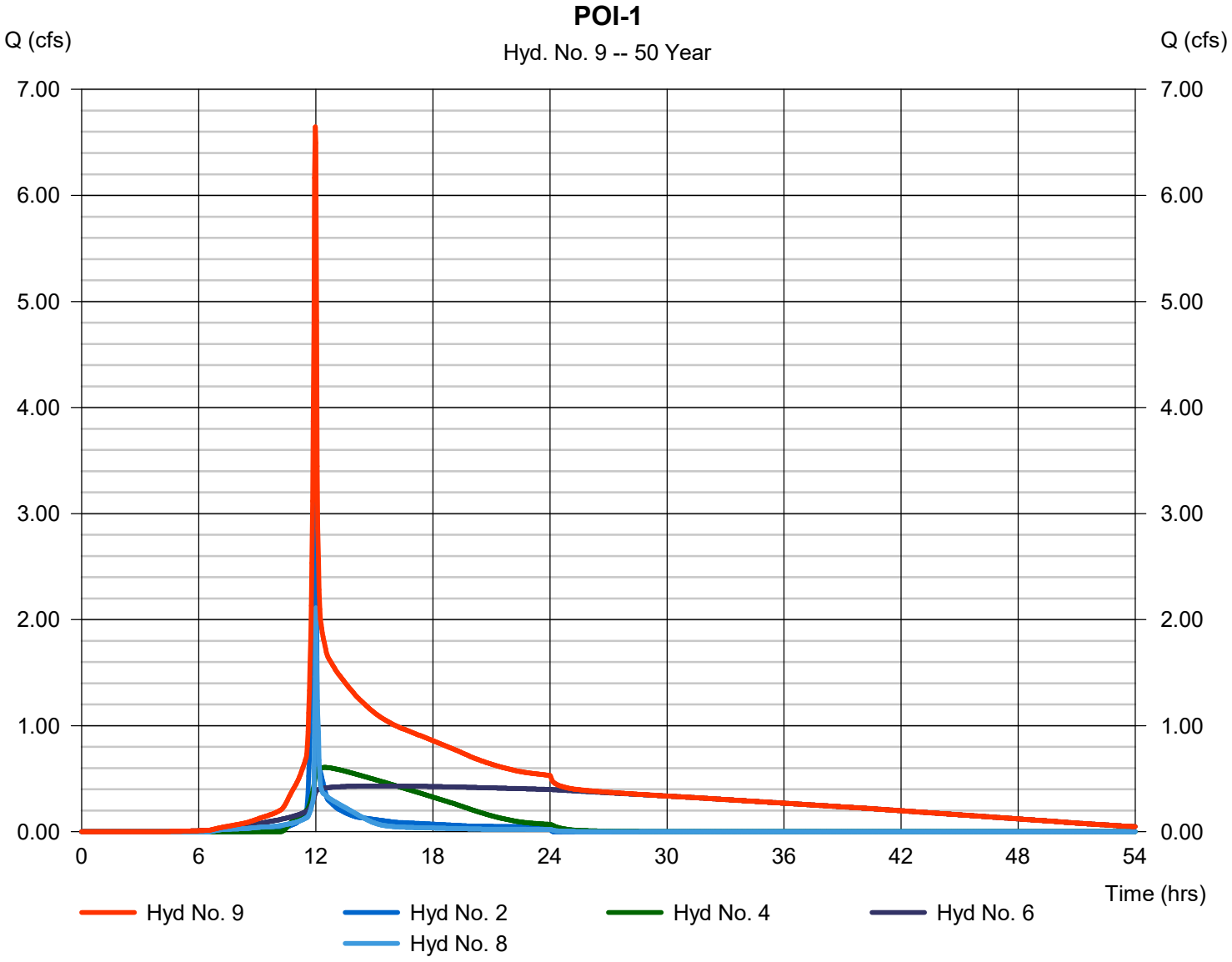


Hydrograph Report

Hyd. No. 9

POI-1

Hydrograph type	= Combine	Peak discharge	= 6.648 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 75,925 cuft
Inflow hyds.	= 2, 4, 6, 8	Contrib. drain. area	= 1.160 ac

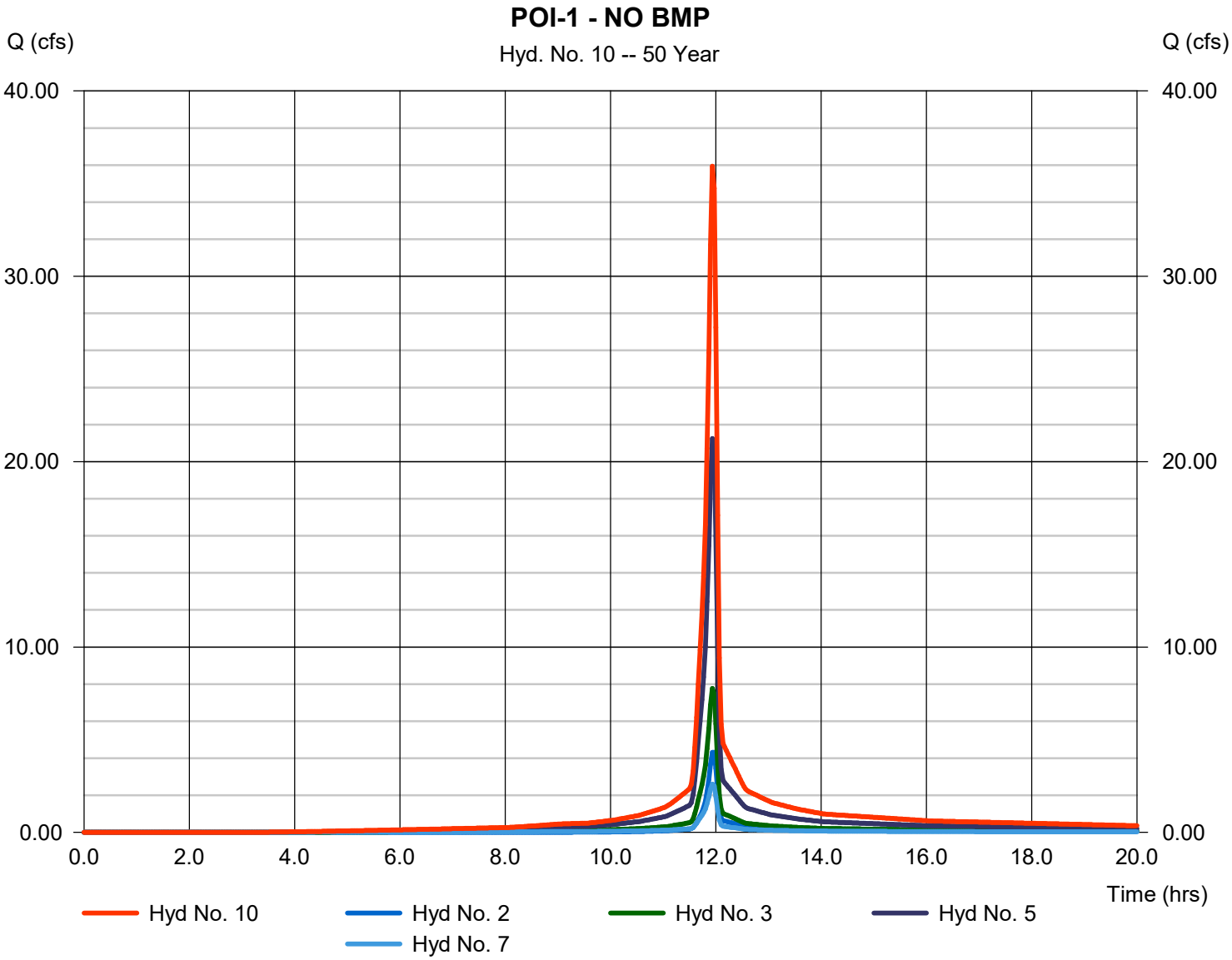


Hydrograph Report

Hyd. No. 10

POI-1 - NO BMP

Hydrograph type	=	Combine	Peak discharge	=	35.94 cfs
Storm frequency	=	50 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	77,360 cuft
Inflow hyds.	=	2, 3, 5, 7	Contrib. drain. area	=	6.760 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

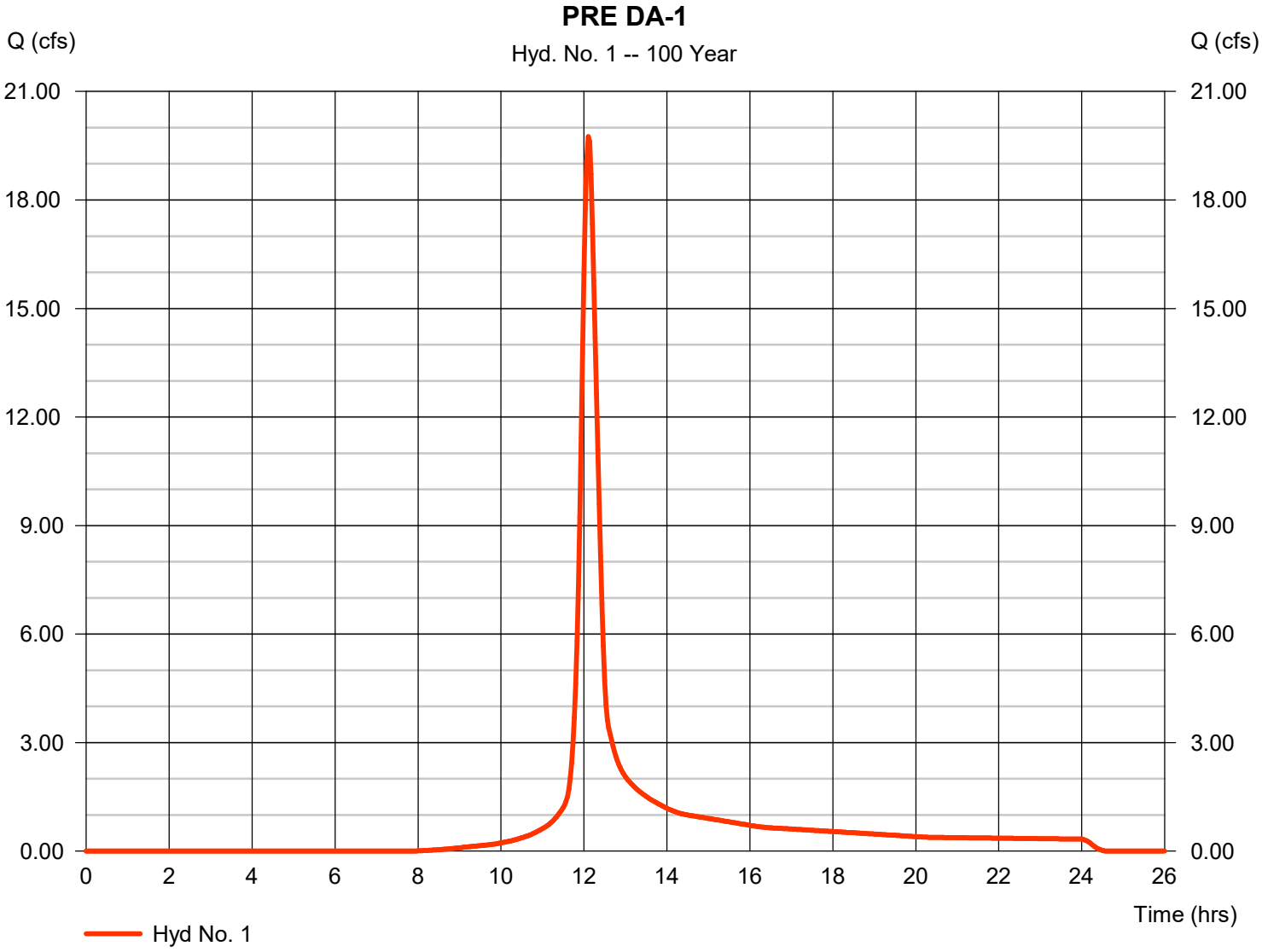
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	19.75	2	726	68,265	------	------	------	PRE DA-1
2	SCS Runoff	5.168	2	716	10,454	------	------	------	POST DA-1A
3	SCS Runoff	8.822	2	716	19,111	------	------	------	POST DA-1B
4	Reservoir	0.683	2	748	17,873	3	1067.66	10,263	UG TANK
5	SCS Runoff	24.08	2	716	52,700	------	------	------	POST DA-1C
6	Reservoir	0.460	2	934	52,661	5	1079.91	36,297	Basin
7	SCS Runoff	2.934	2	716	6,662	------	------	------	POST-1D
8	Reservoir	2.774	2	718	6,503	7	1075.16	1,796	Rain Garden
9	Combine	8.845	2	718	87,491	2, 4, 6, 8	------	------	POI-1
10	Combine	41.01	2	716	88,927	2, 3, 5, 7,	------	------	POI-1 - NO BMP

Hydrograph Report

Hyd. No. 1

PRE DA-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.75 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	68,265 cuft
Drainage area	=	6.750 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.60 min
Total precip.	=	5.03 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

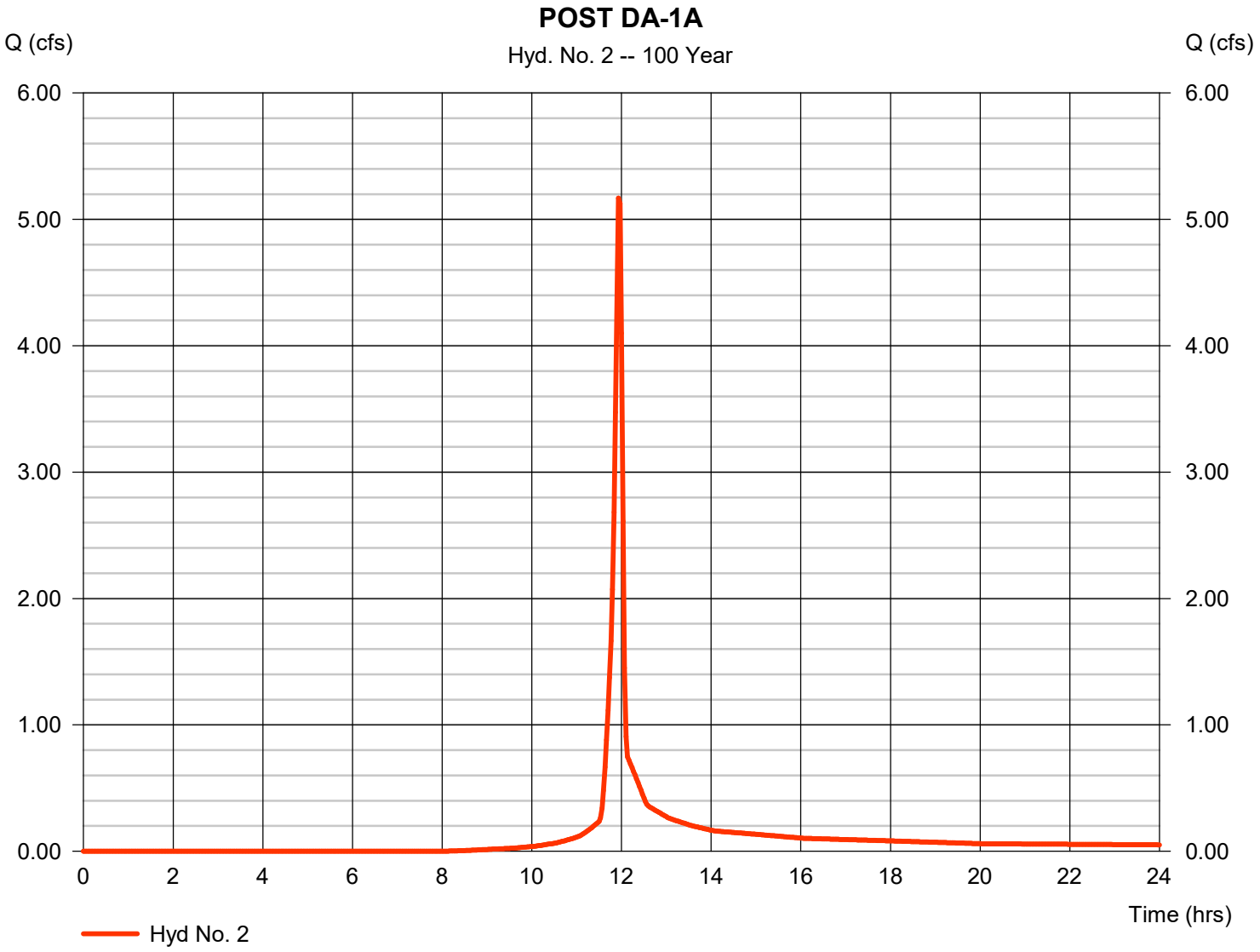


Hydrograph Report

Hyd. No. 2

POST DA-1A

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.168 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	10,454 cuft
Drainage area	=	1.160 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.03 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

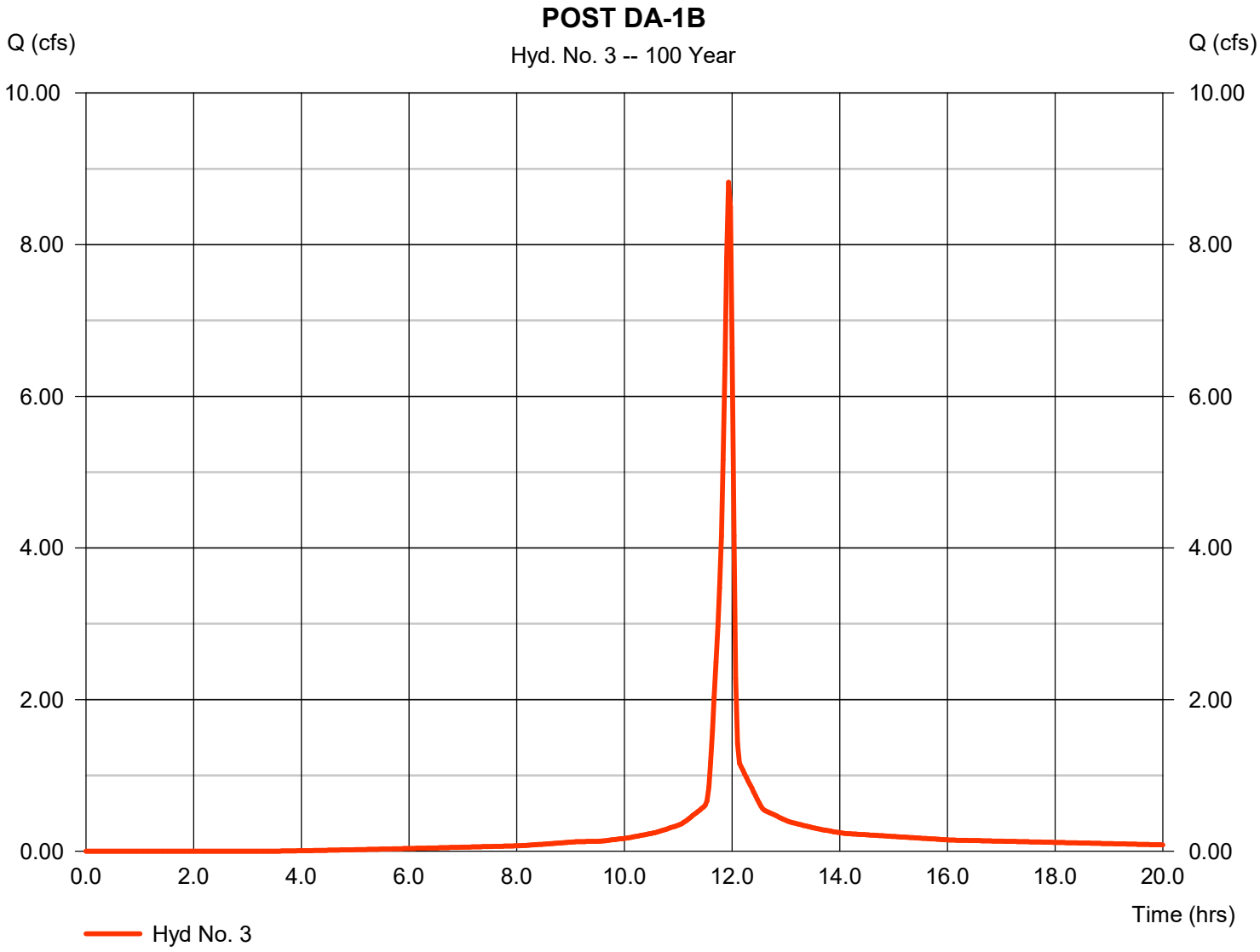


Hydrograph Report

Hyd. No. 3

POST DA-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 8.822 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 19,111 cuft
Drainage area	= 1.400 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.03 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



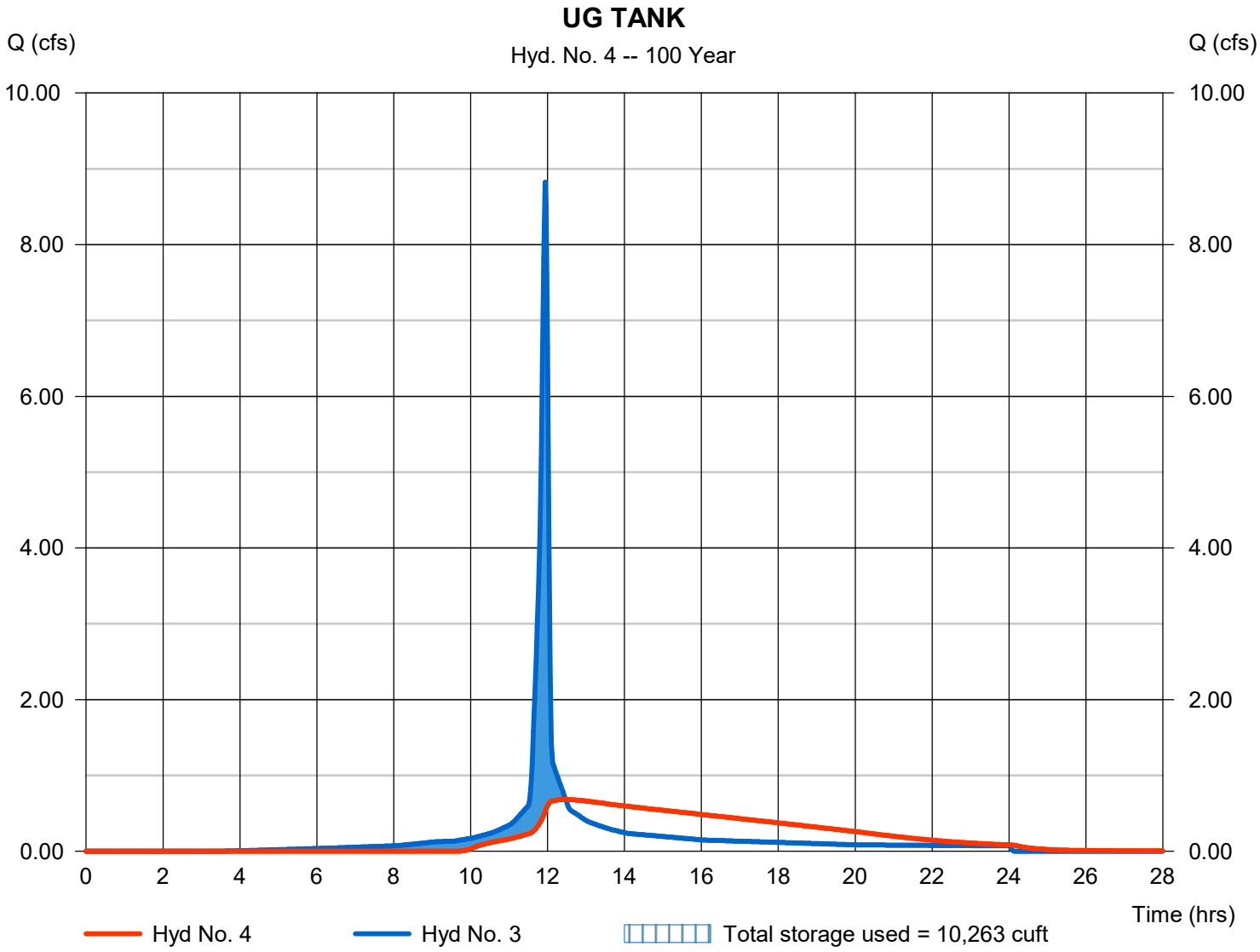
Hydrograph Report

Hyd. No. 4

UG TANK

Hydrograph type	=	Reservoir	Peak discharge	=	0.683 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.47 hrs
Time interval	=	2 min	Hyd. volume	=	17,873 cuft
Inflow hyd. No.	=	3 - POST DA-1B	Max. Elevation	=	1067.66 ft
Reservoir name	=	UG Tank	Max. Storage	=	10,263 cuft

Storage Indication method used.

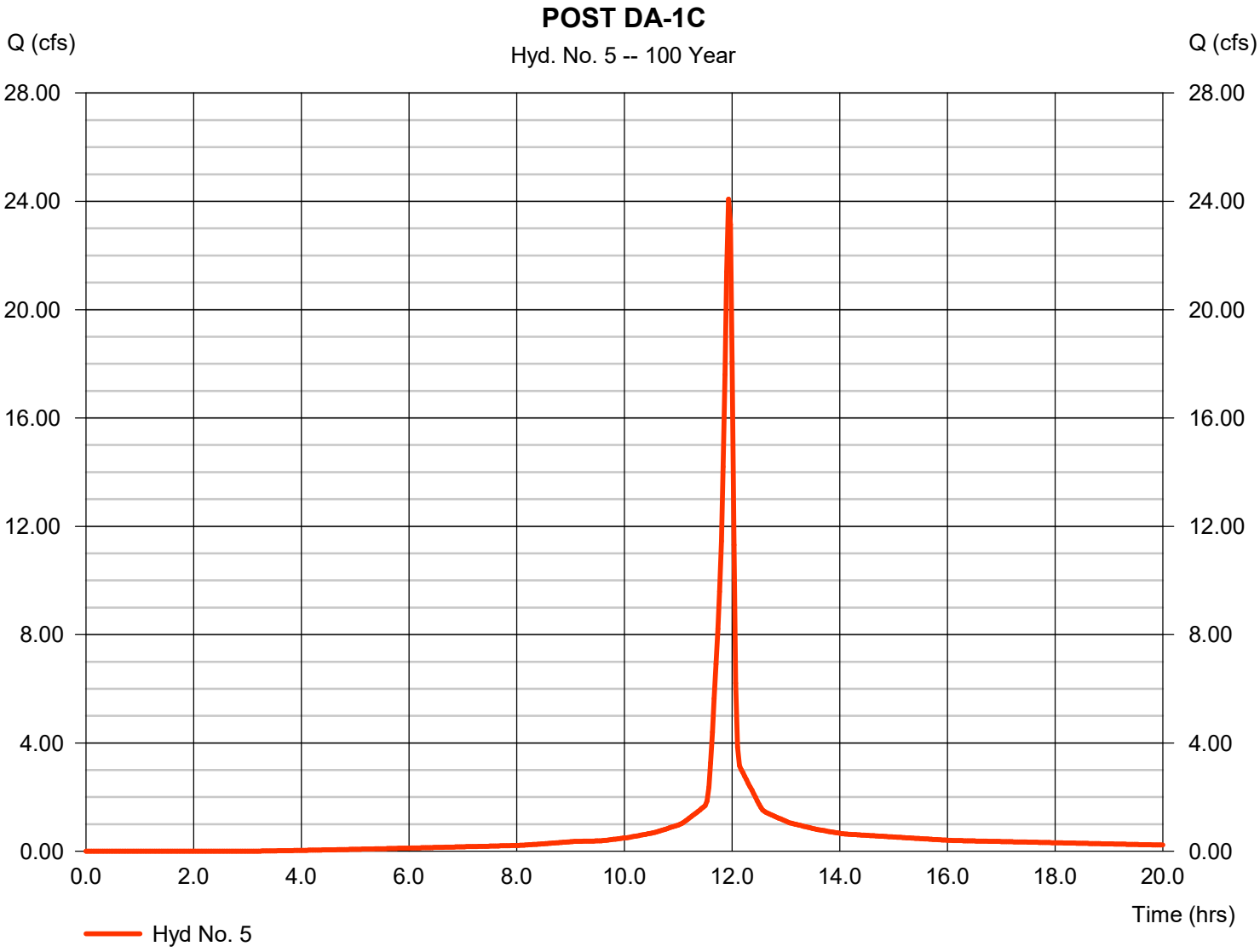


Hydrograph Report

Hyd. No. 5

POST DA-1C

Hydrograph type	= SCS Runoff	Peak discharge	= 24.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 52,700 cuft
Drainage area	= 3.760 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.03 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



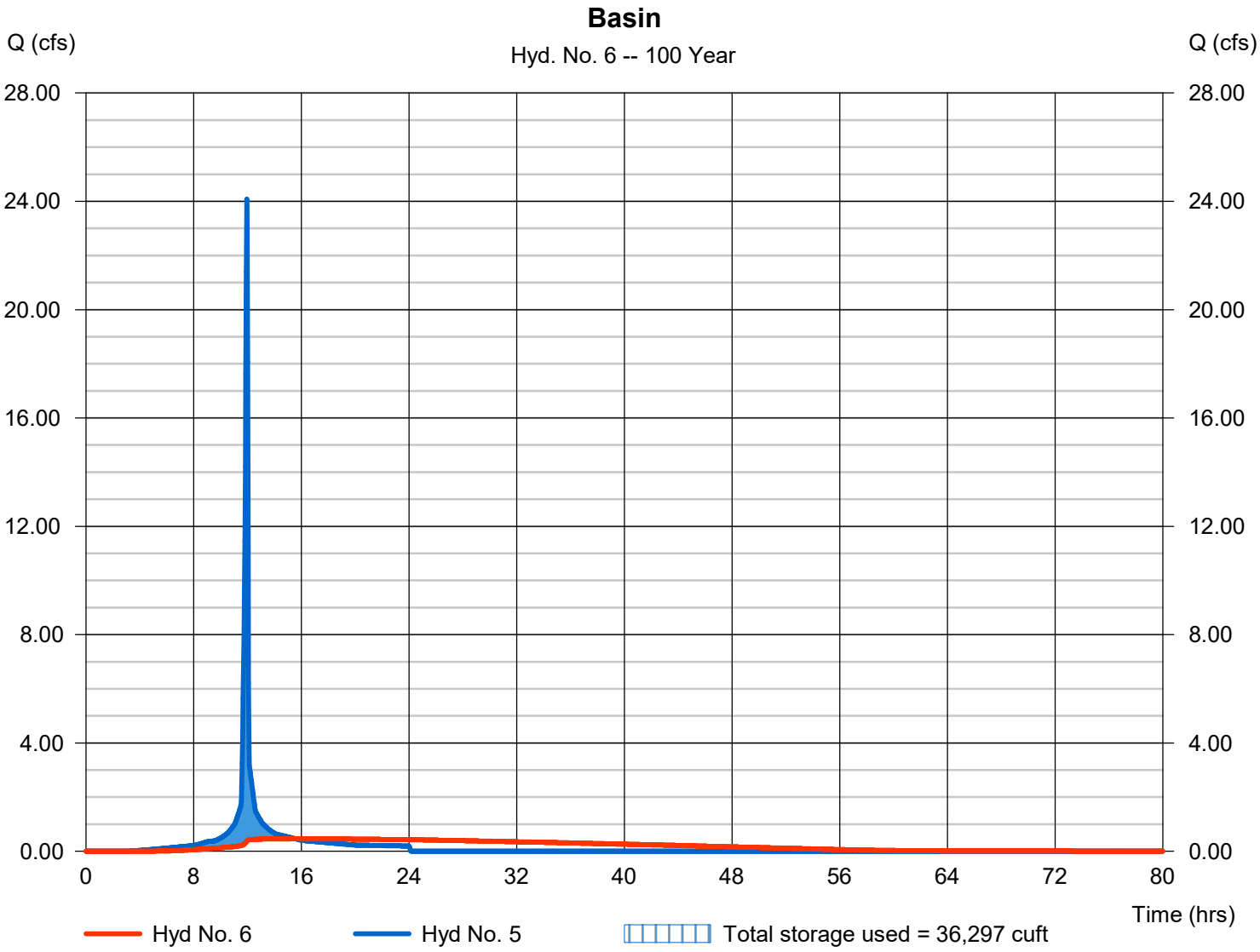
Hydrograph Report

Hyd. No. 6

Basin

Hydrograph type	=	Reservoir	Peak discharge	=	0.460 cfs
Storm frequency	=	100 yrs	Time to peak	=	15.57 hrs
Time interval	=	2 min	Hyd. volume	=	52,661 cuft
Inflow hyd. No.	=	5 - POST DA-1C	Max. Elevation	=	1079.91 ft
Reservoir name	=	Basin	Max. Storage	=	36,297 cuft

Storage Indication method used.

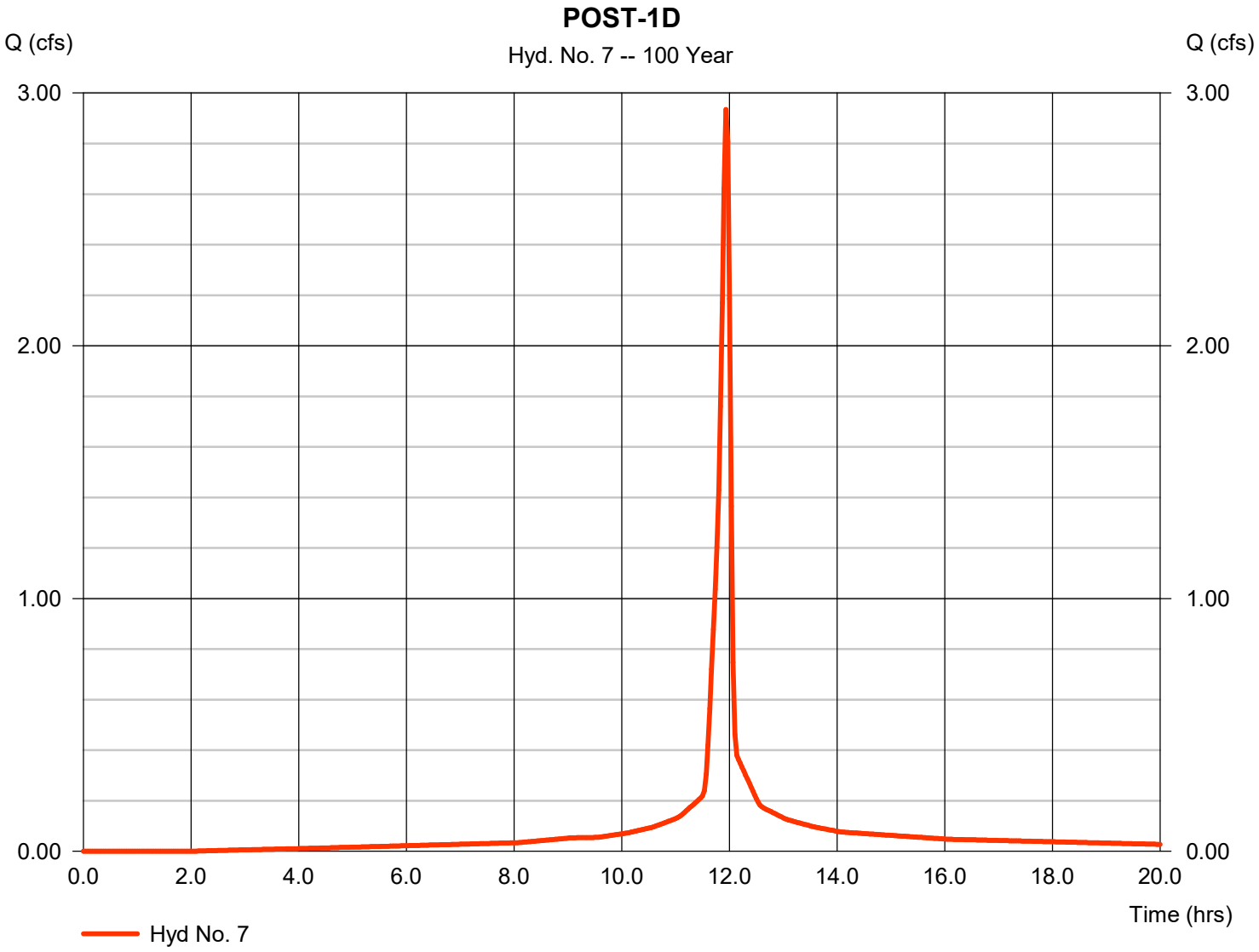


Hydrograph Report

Hyd. No. 7

POST-1D

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.934 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	6,662 cuft
Drainage area	=	0.440 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.03 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



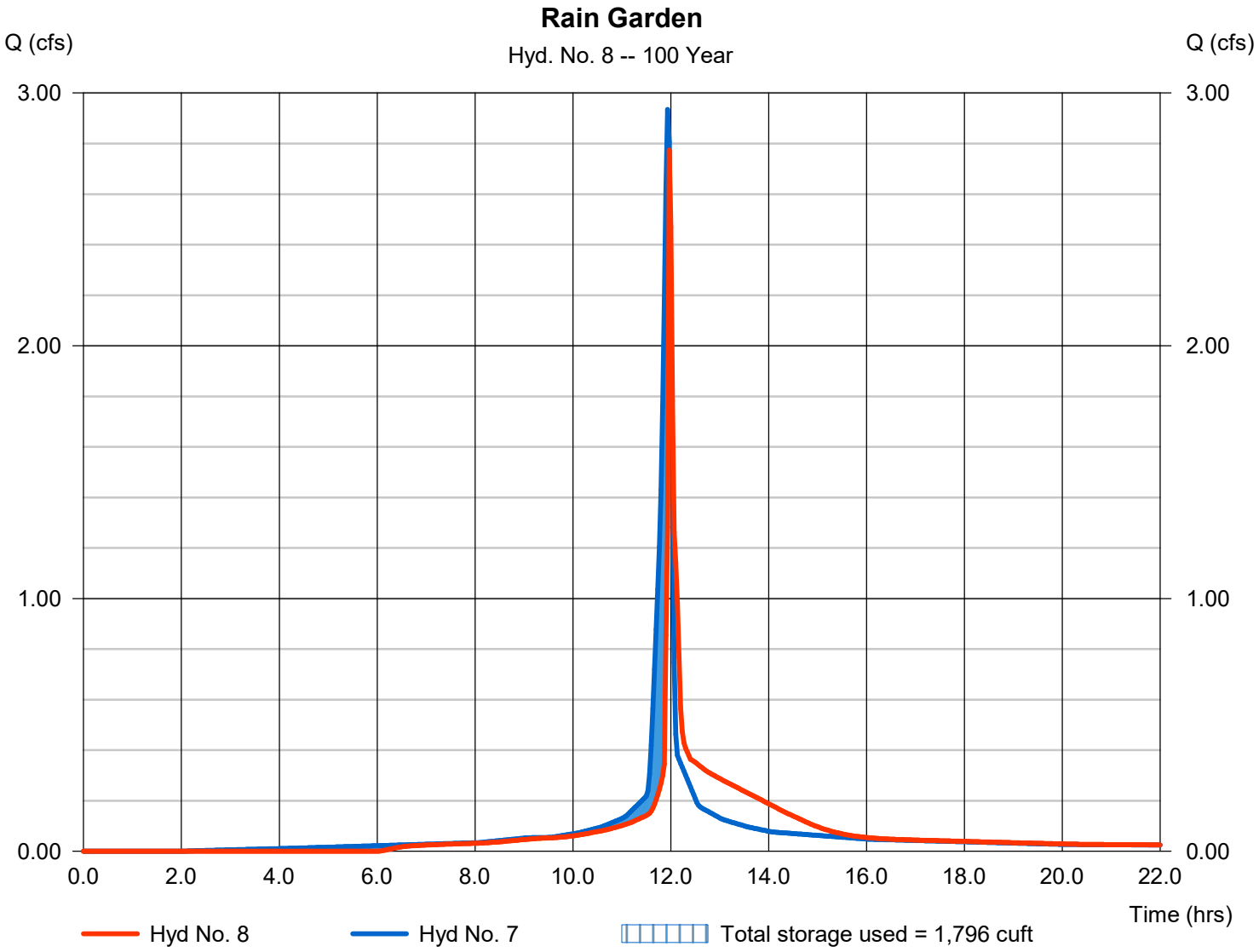
Hydrograph Report

Hyd. No. 8

Rain Garden

Hydrograph type	=	Reservoir	Peak discharge	=	2.774 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	6,503 cuft
Inflow hyd. No.	=	7 - POST-1D	Max. Elevation	=	1075.16 ft
Reservoir name	=	Rain Garden v1	Max. Storage	=	1,796 cuft

Storage Indication method used.

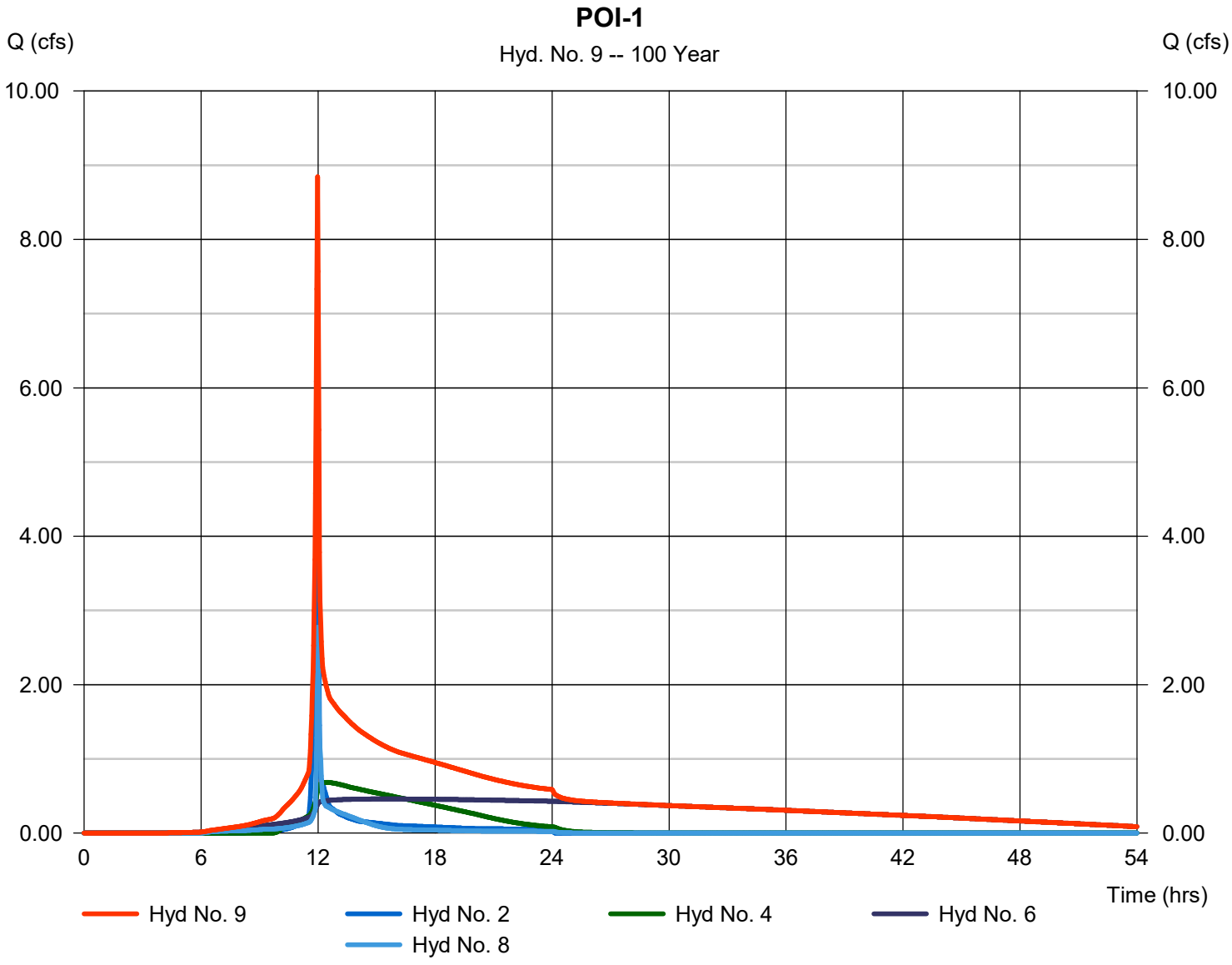


Hydrograph Report

Hyd. No. 9

POI-1

Hydrograph type	= Combine	Peak discharge	= 8.845 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 87,491 cuft
Inflow hyds.	= 2, 4, 6, 8	Contrib. drain. area	= 1.160 ac

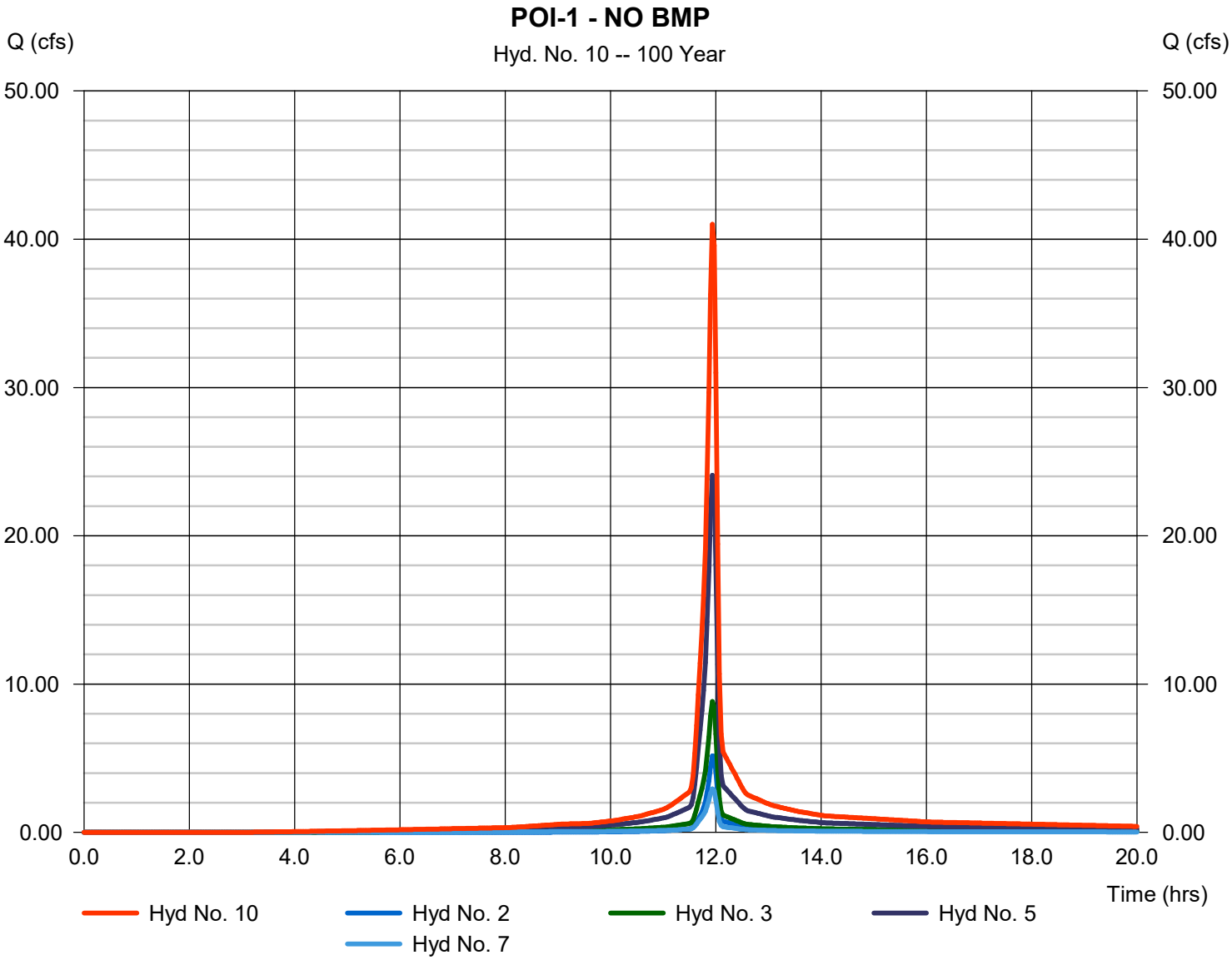


Hydrograph Report

Hyd. No. 10

POI-1 - NO BMP

Hydrograph type	= Combine	Peak discharge	= 41.01 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 88,927 cuft
Inflow hyds.	= 2, 3, 5, 7	Contrib. drain. area	= 6.760 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	42.6062	10.2000	0.8885	--------
2	45.6188	9.7000	0.8591	--------
3	0.0000	0.0000	0.0000	--------
5	0.0000	0.0000	0.0000	--------
10	49.8074	8.8000	0.7927	--------
25	46.5911	7.6000	0.7402	--------
50	42.8805	6.5000	0.6950	--------
100	39.4104	5.4000	0.6521	--------

File name: IDF Curve.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	3.80	2.95	2.42	2.06	1.80	1.60	1.44	1.31	1.21	1.12	1.04	0.98
2	4.53	3.52	2.90	2.48	2.17	1.93	1.74	1.59	1.47	1.36	1.27	1.19
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	6.22	4.87	4.04	3.47	3.06	2.74	2.49	2.28	2.11	1.97	1.85	1.74
25	7.14	5.58	4.64	4.00	3.53	3.18	2.90	2.67	2.48	2.32	2.18	2.06
50	7.85	6.11	5.08	4.40	3.90	3.52	3.22	2.97	2.77	2.60	2.45	2.32
100	8.56	6.63	5.52	4.78	4.25	3.85	3.53	3.27	3.06	2.87	2.72	2.58

Tc = time in minutes. Values may exceed 60.

09\3789 - Frydrych Apartment Project\Calcs\Civil\PCSM\Site Revision - 09-01-2020\Jackson Township Precipitation.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.02	2.41	0.00	0.00	3.38	4.00	4.50	5.03
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hydraflow Table of Contents

25 - Year

50 - Year

100 - Year

Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Mar 29 2024

Emergency Spillway (Dry Extended Detention Basin) - 100-yr

Rectangular Weir

Crest	= Sharp
Bottom Length (ft)	= 20.00
Total Depth (ft)	= 1.50

Calculations

Weir Coeff. Cw	= 3.33
Compute by:	Known Q
Known Q (cfs)	= 24.08

Highlighted

Depth (ft)	= 0.51
Q (cfs)	= 24.08
Area (sqft)	= 10.15
Velocity (ft/s)	= 2.37
Top Width (ft)	= 20.00

APPENDIX E

General Information

Instructions | *General* | Volume | Rate | Quality

Project Name: **Summerwind Townhomes**

Application Type: **PAG-02 NOI**

County: **Butler**

Municipality: **Cranberry Township**

Project Type: **Single-Family Housing**

(●) New Project ( ) Minor / Major Amendment

Area: **7.36** acres
(In Watershed)

Total Earth Disturbance: **7.36** acres
(In Watershed)

No. of Post-Construction Discharge Points: **1**

Start DP Numbering at: **001**

Discharge Point (DP) No.	Drainage Area (DA) (acres)	Earth Disturbance in DA (acres)	Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)	Receiving Waters	Ch. 93 Class	Structural BMP(s)
001	5.79	5.79	0.42	3.75	Discharge to MS4	WWF	Yes
Undetained Areas	1.57	1.57	0.12	0.12	Discharge to MS4	WWF	
Totals:	**7.36**	**7.36**	**0.54**	**3.87**			

Volume Management

Project: Summerwind Townhomes

Instructions | General | *Volume* | Rate | Quality

2-Year / 24-Hour Storm Event (NOAA Atlas 14): _____ inches

Alternative 2-Year / 24-Hour Storm Event: **2.41** inches

Alternative Source: **Cranberry Township Stormwater Ordinance**

Pre-Construction Conditions: *No. Rows:* **4** ☐ *Exempt from Meadow in Good Condition* ☑ *Automatically Calculate CN, Ia, Runoff and Volume*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Impervious as Meadow	0.10	D	78	0.564	0.73	265
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	0.41	N/A	93	0.151	1.69	2,522
Pervious as Meadow	0.44	D	78	0.564	0.73	1,166
Forested (Good Condition)	5.80	D	77	0.597	0.68	14,412
TOTAL (ACRES):	**6.75**				**TOTAL (CF):**	**18,366**

Post-Construction Conditions: *No. Rows:* **3**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	3.75	N/A	93	0.151	1.69	23,071
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	2.75	D	80	0.500	0.83	8,258
Woods (Good Condition)	0.25	D	77	0.597	0.68	621
TOTAL (ACRES):	**6.75**				**TOTAL (CF):**	**31,950**

ET CHANGE IN VOLUME TO MANAGE (CF): **13,584**

Non-Structural BMP Volume Credits:

☑ Tree Planting Credit

Number of new deciduous trees that will be planted within disturbed area: 111 — **CREDIT (CF):** **666**

Number of new evergreen trees that will be planted within disturbed area: 62 — **CREDIT (CF):** **620**

☑ Other (attach calculations):

Description: 5.8.1 Rooftop Disconnection — **CREDIT (CF):** **1,590**

Structural BMP Volume Credits: *No. Structural BMPs:* **19** *Start BMP Numbering at:* **1**

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Dry Extended Detention Basin	-	Off-Site	1.40	3,796	2,700	0.00	72	No	0.5	0	**0**	
001	2	Dry Extended Detention Basin	-	Off-Site	4.19	19,196	7,444	0.00	72	Yes	4.0	0	**0**	**7,355**
001	3	Vegetated Swale	-	to BMP No. 11	0.13	812	257	0.00	72	Yes	2.0	0	**0**	**135**
001	4	Vegetated Swale	-	to BMP No. 11	0.10	665	190	0.00	72	Yes	2.0	0	**0**	**100**

001	5	Vegetated Swale	-	to BMP No. 12	0.11	785	187	0.00	72	Yes	2.0	0	**0**	**98**
001	6	Vegetated Swale	-	to BMP No. 17	0.11	781	180	0.00	72	Yes	2.0	0	**0**	**95**
001	7	Vegetated Swale	-	to BMP No. 16	0.11	781	178	0.00	72	Yes	2.0	0	**0**	**94**
001	8	Vegetated Swale	-	to BMP No. 15	0.11	782	182	0.00	72	Yes	2.0	0	**0**	**96**
001	9	Vegetated Swale	-	to BMP No. 1	0.10	297	308	0.00	72	Yes	2.0	0	**0**	**162**
001	10	Vegetated Swale	-	to BMP No. 1	0.10	270	327	0.00	72	Yes	2.0	0	**0**	**172**
001	11	Vegetated Swale	-	to BMP No. 1	0.15	658	293	0.00	72	Yes	2.0	0	**0**	**154**
001	12	Vegetated Swale	-	to BMP No. 2	0.05	159	222	0.00	72	Yes	2.0	0	**0**	**117**
001	13	Vegetated Swale	-	to BMP No. 2	0.10	480	272	0.00	72	Yes	2.0	0	**0**	**143**
001	14	Vegetated Swale	-	to BMP No. 2	0.11	300	324	0.00	72	Yes	2.0	0	**0**	**170**
001	15	Vegetated Swale	-	to BMP No. 2	0.12	325	324	0.00	72	Yes	2.0	0	**0**	**170**
001	16	Vegetated Swale	-	to BMP No. 2	0.05	153	168	0.00	72	Yes	2.0	0	**0**	**88**
001	17	Vegetated Swale	-	Off-Site	0.54	1,632	2,499	0.00	72	Yes	2.0	0	**0**	**1,314**
001	18	Vegetated Swale	-	Off-Site	0.27	732	710	0.00	72	Yes	2.0	0	**0**	**373**
001	19	Rain Garden / Bioretention	-	Off-Site	0.44	3,034	183	0.00	72	Yes	3.5	0	**0**	**159**
												Totals:		**10,997**

INFILTRATION & ET CREDITS (CF):	**10,997**
NET CHANGE IN VOLUME TO MANAGE (CF):	**13,584**
TOTAL CREDITS (CF):	**13,873**

VOLUME REQUIREMENT SATISFIED

Rate Control

Project: Summerwind Townhomes

Precipitation Amounts:

NOAA 2-Year 24-Hour Storm Event (in):		Alternative 2-Year 24-Hour Storm Event (in):	
NOAA 10-Year 24-Hour Storm Event (in):		Alternative 10-Year 24-Hour Storm Event (in):	**3.38**
NOAA 50-Year 24-Hour Storm Event (in):		Alternative 50-Year 24-Hour Storm Event (in):	**4.5**
NOAA 100-Year 24-Hour Storm Event (in):		Alternative 100-Year 24-Hour Storm Event (in):	**5.03**

☑ **Report Summary of Peak Rates Only**

Attach model input and output data or other calculations to support the rates reported below.

	Peak Discharge Rates (cfs)			
	Pre-Construction	**Post-Construction**	**Net Change**	
2-Year Storm:	**4.91**	**2.13**	**-2.78**	***Rate Control Satisfied***
10-Year Storm:	**9.95**	**4.09**	**-5.86**	***Rate Control Satisfied***
50-Year Storm:	**16.50**	**6.65**	**-9.85**	***Rate Control Satisfied***
100-Year Storm:	**19.75**	**8.84**	**-10.91**	***Rate Control Satisfied***

Water Quality

Project: Summerwind Townhomes

PRINT

Instructions | General | Volume | Rate | *Quality*

Pre-Construction Pollutant Loads:

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Impervious as Meadow	Grassland/Herbaceous	0.10	D	265	48.8	0.22	2.30	0.81	0.00	0.04
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	Highway (general)	0.41	N/A	2,522	141.0	0.43	2.65	22.21	0.07	0.42
Pervious as Meadow	Grassland/Herbaceous	0.44	D	1,166	48.8	0.22	2.30	3.55	0.02	0.17
Forested (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	5.80	D	14,412	45.0	0.13	1.05	40.50	0.12	0.94
	TOTAL (ACRES):	**6.75**					**TOTALS:**	**67.07**	**0.20**	**1.57**

Post-Construction Pollutant Loads (without BMPs):

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	Highway (general)	3.75	N/A	23,071	141.0	0.43	2.65	203.13	0.62	3.82
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	Open Space	2.75	D	8,258	78.0	0.25	1.25	40.22	0.13	0.64
Woods (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	0.25	D	621	45.0	0.13	1.05	1.75	0.01	0.04
	TOTAL (ACRES):	**6.75**					**TOTALS:**	**245.09**	**0.75**	**4.50**

POLLUTANT LOAD REDUCTION REQUIREMENTS (LBS):	TSS	TP	TN
	178.03	0.55	2.94

☑ **Characterize Undetained Areas (for Untreated Stormwater)** *No. Rows:* **2**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Woods (Good Condition)	**0.25**	**N/A**	**77**	**0.597**	**0.68**	**621**
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	**0.91**	**D**	**80**	**0.500**	**0.83**	**2,733**

Non-Structural BMP Water Quality Credits:

☑ Pervious Undetained Area Credit

TSS	TP	TN
2.55	0.01	0.07

☑ Other (attach calculations)

Description: **NS BMP 5.9.1 - Street Sweeping/Vacuuming**

TSS	TP	TN
55.70	0.17	0.62

Structural BMP Water Quality Credits:

☑ *Use default BMP Outflows and Median BMP Outflow Concentrations*

DP No.	BMP No.	BMP Name	MRC?	BMP DA (acres)	Vol. Routed to BMP (CF)	Inf. & ET Credits (CF)	Capture & Buffer Credits (CF)	Outflow (CF)	Outflow Conc. (mg/L)			Pollutant Loads (lbs)		
									TSS	TP	TN	TSS	TP	TN
001	1	Dry Extended Detention Basin	-	1.40	3,796	0		3,796	22.00	0.19	1.22	5.21	0.05	0.29
001	2	Dry Extended Detention Basin	-	4.19	19,196	7,355		11,841	22.00	0.19	1.22	16.27	0.14	0.90
001	3	Vegetated Swale	-	0.13	812	135		677	-	-	-	-	-	-
001	4	Vegetated Swale	-	0.10	665	100		565	-	-	-	-	-	-
001	5	Vegetated Swale	-	0.11	785	98		687	-	-	-	-	-	-
001	6	Vegetated Swale	-	0.11	781	95		686	-	-	-	-	-	-
001	7	Vegetated Swale	-	0.11	781	94		687	-	-	-	-	-	-
001	8	Vegetated Swale	-	0.11	782	96		686	-	-	-	-	-	-
001	9	Vegetated Swale	-	0.10	297	162		135	-	-	-	-	-	-
001	10	Vegetated Swale	-	0.10	270	172		98	-	-	-	-	-	-
001	11	Vegetated Swale	-	0.15	658	154		504	-	-	-	-	-	-
001	12	Vegetated Swale	-	0.05	159	117		42	-	-	-	-	-	-
001	13	Vegetated Swale	-	0.10	480	143		337	-	-	-	-	-	-
001	14	Vegetated Swale	-	0.11	300	170		130	-	-	-	-	-	-
001	15	Vegetated Swale	-	0.12	325	170		155	-	-	-	-	-	-
001	16	Vegetated Swale	-	0.05	153	88		65	-	-	-	-	-	-
001	17	Vegetated Swale	-	0.54	1,632	1,314		318	13.70	0.18	0.63	0.27	0.00	0.01
001	18	Vegetated Swale	-	0.27	732	373		359	13.70	0.18	0.63	0.31	0.00	0.01
001	19	Rain Garden / Bioretention	-	0.44	3,034	159		2,875	10.00	0.24	0.96	1.79	0.04	0.17

	TSS	TP	TN
POLLUTANT LOADS FROM STRUCTURAL BMP (TREATED) OUTFLOWS (LBS):	**23.85**	**0.24**	**1.39**
POLLUTANT LOADS FROM UNTREATED STORMWATER (LBS):	**15.05**	**0.05**	**0.25**
NON-STRUCTURAL BMP WATER QUALITY CREDITS (LBS):	**58.25**	**0.18**	**0.69**
NET POLLUTANT LOADS FROM SITE, POST-CONSTRUCTION (LBS):	**0.00**	**0.10**	**0.95**
POLLUTANT LOADS FROM SITE, PRE-CONSTRUCTION (LBS):	**67.07**	**0.20**	**1.57**

WATER QUALITY REQUIREMENT SATISFIED

CERTIFICATION

I certify under penalty of law and subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that the structure, function, and calculations contained in this spreadsheet have not been modified in comparison to the spreadsheet DEP has posted to its website or, if modifications were made, an explanation of the modifications made is attached to this spreadsheet.

DJA	4/1/2024
Spreadsheet User Name	Date

WORKSHEET 3. NON-STRUCTURAL BMP CREDITS

POI-1

PROTECTED AREA

1.1 Area of Protected Sensitive/Special Value Features (see WS 2)	0.0	**Ac.**
1.2 Area of Riparian Forest Buffer Protection	0.0	**Ac.**
3.1 Area of Minimum Disturbance/Reduced Grading	0.0	**Ac.**
(1.2 and 3.1 are included in overall protected area 1.1 value) **TOTAL**	0.0	**Ac.**

Site Area	*minus*	Protected Area	*equals*	Stormwater Management Area
6.86	*minus*	0.00	*equals*	6.86

This is the area that requires stormwater management

VOLUME CREDITS

3.1 Minimum Soil Compaction (See Chapter 8, page 22 – SW BMP Manual)

Lawn	0.00	**ft²**	x 1/4" x1/12	*equals*	***0*** **ft³**
Meadow		**ft²**	x 1/3" x1/12	*equals*	***0*** **ft³**

3.3 Protect Existing Trees (See Chapter 8, page 23 – SW BMP Manual)

For Trees within 100 feet of impervious area:

Tree Canopy	0.00	**ft²**	x 1/2" x 1/12	*equals*	***0*** **ft³**

5.1 Disconnect Roof Leaders to Vegetated Areas (See Chapter 8 page 25 – SW BMP Manual)

For runoff directed to areas protected under 5.8.1 and 5.8.2

Roof Area	57,228.00	**ft²**	x 1/3" x 1/12	*equals*	***1590*** **ft³**

For all other disconnected roof areas

Roof Area		**ft²**	x 1/4" x 1/12	*equals*	***0*** **ft³**

5.2 Disconnect Non-Roof impervious to Vegetated Areas
(See Chapter 8, page 26 – SW BMP Manual)

For Runoff directed to areas protected under 5.8.1 and 5.8.2

Impervious Area	0	**ft²**	x 1/3" x 1/12	*equals*	***0*** **ft³**

For all other disconnected roof areas

Impervious Area		**ft²**	x 1/4" x 1/12	*equals*	***0*** **ft³**

TOTAL NON-STRUCTURAL VOLUME CREDIT* **1590** **ft³**

**For use on Worksheet 5*

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-A

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Impervious (paved)	D	3,780.0	0.09	98	0.20	0.04	2.181	687	**No**		N/A	687.1
Open Space (good)	D	1,815.0	0.04	80	2.50	0.50	0.827	125	**No**		N/A	125.1
TOTAL:			*0.13*									**812.2**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-B

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Impervious (paved)	D	3,360.0	0.08	98	0.20	0.04	2.181	611	**No**		N/A	610.8
Open Space (good)	D	787.0	0.02	80	2.50	0.50	0.827	54	**No**		N/A	54.3
TOTAL:			*0.10*									**665.0**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

   P = 2-Year Rainfall (in)

   S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

   Q = Runoff (in)

   Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

   P = 2-Year Rainfall (in)

   R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-C

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Impervious (paved)	D	4,032.0	0.09	98	0.20	0.04	2.181	733	**No**		N/A	732.9
Open Space (good)	D	762.0	0.02	80	2.50	0.50	0.827	53	**No**		N/A	52.5
TOTAL:			*0.11*									**785.4**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-D

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Impervious (paved)	D	4,032.0	0.09	98	0.20	0.04	2.181	733	**No**		N/A	732.9
Open Space (good)	D	702.0	0.02	80	2.50	0.50	0.827	48	**No**		N/A	48.4
TOTAL:			*0.11*									**781.3**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-E

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Impervious (paved)	D	4,032.0	0.09	98	0.20	0.04	2.181	733	**No**		N/A	732.9
Open Space (good)	D	702.0	0.02	80	2.50	0.50	0.827	48	**No**		N/A	48.4
TOTAL:			*0.11*									**781.3**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-F

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Impervious (paved)	D	4,032.0	0.09	98	0.20	0.04	2.181	733	**No**		N/A	732.9
Open Space (good)	D	711.0	0.02	80	2.50	0.50	0.827	49	**No**		N/A	49.0
TOTAL:			*0.11*									**781.9**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

   P = 2-Year Rainfall (in)

   S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

   Q = Runoff (in)

   Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

   P = 2-Year Rainfall (in)

   R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-1.1

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Meadow	D	2,125.0	0.05	78	2.82	0.56	0.730	129	**No**		N/A	129.3
Open Space (good)	D	2,445.0	0.06	80	2.50	0.50	0.827	169	**No**		N/A	168.5
TOTAL:			*0.10*									**297.9**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

   P = 2-Year Rainfall (in)

   S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

   Q = Runoff (in)

   Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

   P = 2-Year Rainfall (in)

   R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-1.2

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Meadow	D	2,131.0	0.05	78	2.82	0.56	0.730	130	**No**		N/A	129.7
Open Space (good)	D	2,041.0	0.05	80	2.50	0.50	0.827	141	**No**		N/A	140.7
TOTAL:			*0.10*									**270.4**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

   P = 2-Year Rainfall (in)

   S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

   Q = Runoff (in)

   Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

   P = 2-Year Rainfall (in)

   R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-1.3

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Meadow	D	1,880.0	0.04	78	2.82	0.56	0.730	114	**No**		N/A	114.4
Open Space (good)	D	2,574.0	0.06	80	2.50	0.50	0.827	177	**No**		N/A	177.4
Impervious (paved)	D	2,016.0	0.05	98	0.20	0.04	2.181	366	**No**		N/A	366.5
TOTAL:			*0.15*									**658.3**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-2

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Open Space (good)	D	2,308.0	0.05	80	2.50	0.50	0.827	159	**No**		N/A	159.1
TOTAL:			*0.05*									**159.1**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

   P = 2-Year Rainfall (in)

   S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

   Q = Runoff (in)

   Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

   P = 2-Year Rainfall (in)

   R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-2.1

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Meadow	D	1,113.0	0.03	78	2.82	0.56	0.730	68	**No**		N/A	67.7
Open Space (good)	D	1,543.0	0.04	80	2.50	0.50	0.827	106	**No**		N/A	106.4
Impervious (paved)	D	1,680.0	0.04	98	0.20	0.04	2.181	305	**No**		N/A	305.4
TOTAL:			*0.10*									**479.5**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-2.2

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Meadow	D	2,839.0	0.07	78	2.82	0.56	0.730	173	**No**		N/A	172.7
Open Space (good)	D	1,840.0	0.04	80	2.50	0.50	0.827	127	**No**		N/A	126.8
TOTAL:			*0.11*									**299.6**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-2.3

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Meadow	D	3,370.0	0.08	78	2.82	0.56	0.730	205	**No**		N/A	205.1
Open Space (good)	D	1,736.0	0.04	80	2.50	0.50	0.827	120	**No**		N/A	119.7
TOTAL:			*0.12*									**324.7**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-2.4

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Meadow	D	1,401.0	0.03	78	2.82	0.56	0.730	85	**No**		N/A	85.2
Open Space (good)	D	989.0	0.02	80	2.50	0.50	0.827	68	**No**		N/A	68.2
TOTAL:			*0.05*									**153.4**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-3

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Open Space (good)	D	23,680.0	0.54	80	2.50	0.50	0.827	1,632	**No**		N/A	1632.4
TOTAL:			*0.54*									**1632.4**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

   P = 2-Year Rainfall (in)

   S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

   Q = Runoff (in)

   Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

   P = 2-Year Rainfall (in)

   R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

VS-4

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Meadow	D	8,119.0	0.19	78	2.82	0.56	0.730	494	**No**		N/A	494.0
Open Space (good)	D	3,455.0	0.08	80	2.50	0.50	0.827	238	**No**		N/A	238.2
TOTAL:			*0.27*									**732.2**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

P = 2-Year Rainfall (in)

R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

WORKSHEET 4. CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

PROJECT: **Freedom Road Townhomes**

2-Year Rainfall: **2.41** **in**

RG-1

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)	Q Under 0.5" ?	R_v	Q Runoff[3] (in) SSHM Method	Final Runoff Volume[2] (ft^3)
Impervious (paved)	D	15,300.0	0.35	98	0.20	0.04	2.181	2,781	**No**		N/A	2781.1
Open Space (good)	D	3,677.0	0.08	80	2.50	0.50	0.827	253	**No**		N/A	253.5
TOTAL:			*0.44*									**3034.6**

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

   P = 2-Year Rainfall (in)

   S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

   Q = Runoff (in)

   Area = Land use area (sq. ft)

3. Runoff (in) = $Q = P \times R_v$

   P = 2-Year Rainfall (in)

   R_v = Area-weighted Runoff Coefficient

Rainfall (in.)	Volumetric Runoff Coefficients, R_v						
	Impervious Areas				Pervious Areas		
	Flat Roofs/ Large Unpaved Parking Areas	Pitched Roofs	Large Imperv. Areas	Small Imperv. Areas and Uncurbed Roads	Sandy Soils (HSG A)	Silty Soils (HSG B)	Clayey Soils (HSG C & D)
0.5	0.75	0.94	0.97	0.62	0.02	0.09	0.17
1.5	0.88	0.99	0.99	0.77	0.05	0.15	0.24

BMP Manual, December 2006

Note:
Runoff Volume must be calculated for EACH land use type/condition and HSG.
The use of a weighted CN value for volume calculations is not acceptable.
A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

NON-STRUCTURAL BMP POLUTANT LOAD REDUCTION CALCULATION

PROJECT: Summerwind Townhomes

2-Year Rainfall: 2.41 in

NS BMP 5.9.1 - Street Sweeping / Vacuuming

Cover Type Condition	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Initial Runoff Volume[2] (ft^3)
Impervious	C	40,946.4	0.94	98	0.20	0.04	2.18	7,443
TOTAL:			*0.94*					7,443

2-Year Volume Increase (ft3):	**7,443**

Event Mean Pollutant Concentrations	
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	
TSS (mg/L)	141
TP (mg/L)	0.43
TN (mg/L)	2.65

Pollutant Loads	
TSS (lbs)	65.53
TP (lbs)	0.20
TN (lbs)	1.23

From Stormwater BMP Manual - Appendix A - Table A-4:

	TSS (%)	TP (%)	TN (%)
Pollutant Removal Efficiency	85	85	50

Pollutant Load Reduction Credits	
TSS (lbs)	55.70
TP (lbs)	0.17
TN (lbs)	0.62

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = $Q = (P - 0.2S)^2 / (P+0.8S)$ where

P = 2-Year Rainfall (in)

S = (1000/CN)-10

2. Runoff Volume (CF) = Q x Area x 1/12

Q = Runoff (in)

Area = Land use area (sq. ft)

Pollutant Loads are calculated by the equation:

Event Mean Pollutant Concentration (mg/L) x (Runoff Volume (CF) / 43,560 CF/acre-ft) x 2.72 (conversion factor)

Note:

Runoff Volume must be calculated for EACH land use type/condition and HSG.

The use of a weighted CN value for volume calculations is not acceptable.

A minimum of 20% of existing impervious coverage MUST be designated as meadow, per PaDEP BMP Guidelines.

APPENDIX F

PENDING FINAL

APPENDIX G

OPERATION, MAINTENANCE, AND INSPECTION SCHEDULE

General

Stormwater facilities and permanent BMPs must be inspected in accordance with this document. All documentation on scheduled inspections, times of inspections, maintenance completed, remedial actions taken to make repairs, and any modifications or reconstruction of the storm system shall be maintained and available for review at alltimes.

Disposal of the accumulated sediment must be in accordance with all applicable local, state, and federal guidelines and regulations. If any drainage structure or outfall indicates the presence of petroleum it shall be removed and disposed of immediately in accordance with applicable regulations.

Detention facilities

This section includes any detention facilities (if present), as well as associated pipes, catch basins and the outlet structures that enter and exit the detention basin.

It is important to regularly inspect the structural elements (inlet/outlet pipes and animal grates) of the detention basin in order to ensure that storm water is flowing in and out of the pond as originally designed.

Debris and sediment commonly clog detention basins and reduce the pond's overall effectiveness.

1. Inspect the inlet pipes and outlet pipes for structural integrity on an annual basis. Check inlet/outlet pipes for structural integrity to ensure they are not crumbling or broken.

    a. Inspect riprap at the inlet pipes. Replace when the riprap is clogged with sediment and debris.

2. Conduct routine inspections for trash or other debris that may be blocking the inlet or outlet pipes or emergency spillway monthly and after all rain events. Remove all trash and debris from the basin as necessary. Improperly maintained ponds can harbor breeding area for mosquitos and reduce the storage volume of the pond.

3. Inspect and clean the storm sewer system and catch basins upstream from the detention basin every 5 years or as needed

4. Inspect for sediment accumulation at the inlet pipes (semiannually and after rain events), as it is important to clean out sediment that might be restricting water flow. Remove accumulated sediment with a shovel and wheelbarrow if it is blocking water flow. Small amounts of removed sediment can be spread evenly on upland areas and seeded with natural vegetation.

5. Inspect the stone around the riser/standpipe/outlet pipe (semiannually and after rain events). If stone has accumulated sediment, vegetation and/or debris to an extent that water is not flowing through the stone and out of the pond as originally designed, then stone should be replaced with clean 3" diameter stone choked with clean 6astone.

6. Inspect for excess sediment accumulation in the pond (annually). Remove every 5-10 years or when the sediment accumulation is more than 6-12".

7. Have a professional civil engineer inspect the pond to ensure it is functioning properly (annually). Compare existing conditions to as-built engineering plans.

Catch basins

All catch basins (if present) shall be inspected to ensure they have adequate sump capacity, oil/grease hoods are in place, frames and grates are not damaged, and access manhole brick and mortar is intact.

1. Inspect catch basins four times per year.

2. Clean sump annually or whenever basin sump becomes filled with sediment to half its depth (2').

If inspection indicates the presence of petroleum, it shall be removed and disposed of immediately in accordance with applicable regulations.

Drain manholes/overflow control structures

All drain manholes (if present) and overflow control structures (if present) shall be inspected to ensure manhole frames and covers are not damaged, inlet and outlet pipes are draining freely, and access manhole brick and mortar is intact.

1. Inspect structures annually.

2. Clean structures as field determined.

If inspection indicates the presence of petroleum, it shall be removed and disposed of immediately in accordance with applicable regulations.

Water quality structures (Stormceptor drain inlets & separator unit)

All water quality structures (if present) shall be inspected to ensure manhole frames and covers are not damaged, and unit is draining freely.

1. Inspect every (6) months for the first year, and no less then annually thereafter.

2. Inspect unit immediately after any fuel, oil or chemical spill.

3. Clean unit once sediment depth reaches 15%, approximately 8”, of storage capacity.

If inspection indicates the presence of petroleum, it shall be removed and disposed of immediately in accordance with applicable regulations.

Bio-retention areas

All bio-retention areas (if present) shall be inspected to ensure plant material is maintained and pruned, and area is free of trash. Do not store snow in bio-retention area.

1. Inspect area every three (3) months.
2. Remove any accumulated trash.
3. Remove and replace any dead vegetation in spring or fall.
4. Prune plantings in spring and fall as necessary.
5. Inspect sod filter strip for erosion.
6. Replace hardwood mulch every two (2) years.
7. Replace entire media and all vegetation as needed should system fail.

If inspection indicates the presence of petroleum, it shall be removed and disposed of immediately in accordance with applicable regulations.

Pavement sweeping & vacuuming

1. Street sweeping should occur in the spring immediately following the last anticipated snowfall.
2. Street sweeping should be scheduled during non-winter months and conducted once per month during April, May, June, July, August, and September, at a minimum.

Drainage swales

Grass drainage swales shall be inspected for any slope erosion, ponding, or sedimentation. Inspect basin twice a year, or after a major storm event (1" rainfall in 24-hour period).

1. Remove trash and debris.
2. Remove accumulated sediment in swale.
3. Mow side slopes at least twice a year. Grass shall not be cut shorter than 4" tall.

Stone spillways and level spreaders

Inspect all rip-rap spillways and level spreaders (if present) twice a year, or after a major storm event (1" rainfall in 24-hour period). Inspect if rip-rap has been damaged and note any type of erosion. Remove any trash, debris, and accumulated sediment.

Underground storm water volume mitigation facility

The owner of the proposed underground storm water control facilities (if present) shall at all times operate and maintain the facilities in a safe and operable condition so as not to imperil life, health, safety, or property located above or below the facility.

The owner of the facility shall be responsible for the evaluation of the safety and operational status of the facility and all appurtenant structures and the modification thereof in accordance with the requirement to ensure protection of life and property as specified above.

The owner of the facility shall inspect the facilities and all appurtenant works according to the following schedule:

1. Perform cleaning during the installation of work and upon completion of the work.

2. Remove from site all excess materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

    a. Removal of any excess materials, debris, and equipment shall be done in a manner that is both in compliance with any and all local, state, and federal regulations, as well as ultimate disposal occurring only a site deemed approved and acceptable by the Pennsylvania Department of Environmental Protection.

In addition, the on-going maintenance and operations of this facility is also required. Any storm water devices that are part of this project, shall be inspected twice annually, at a minimum. The necessary maintenance measures shall be implemented as outlined above.

Vegetation notes

All areas to be stabilized by vegetation shall be inspected for rills or gullies, bare soil patches or accumulation of sediment at the toe of slopes. Eroded areas shall be regraded, and substandard vegetated areas shall be re-seeded and mulched as specified on the plans.

Project wastes and recycling criteria

Provide convenient, well-maintained, and properly located toilet facilities. Provide for regular inspections, service, and disposal. Locate toilet facilities away from storm drain inlets and waterways to prevent accidental spills and contamination of storm water. Treat or dispose of sanitary and septic waste in accordance with state or local regulations.

Proper material use, storage, waste disposal, and training of employees and subcontractors can prevent or reduce the discharge of hazardous and toxic wastes to storm water. Implement a comprehensive set of waste- management practices for hazardous or toxic materials, such as paints, solvents, petroleum products, pesticides, wood preservatives, acids, roofing tar, and other materials.

Solid or construction waste

1. Designate trash and bulk waste-collection areas on-site
2. Recycle materials whenever possible (e.g., paper, wood, concrete, oil)
3. Segregate and provide proper disposal options for hazardous material wastes
4. Clean up litter and debris from the construction site daily
5. Locate waste-collection areas away from streets, gutters, watercourses, and storm drains.
6. Waste-collection areas (dumpsters, and such) are often best located near construction site entrances to minimize traffic on disturbed soils. Consider secondary containment around waste collection areas to further minimize the likelihood of contaminated discharges.

Sanitary and septic waste

1. Provide restroom facilities on-site.
2. Maintain clean restroom facilities and empty porta-johns regularly.
3. Provide secondary containment pans under porta-johns, where possible.
4. Provide tie-downs or stake downs for porta-johns in areas of high winds.
5. Educate employees, subcontractors, and suppliers on locations of facilities.
6. Do not discharge or bury wastewater at the construction site.
7. Inspect facilities for leaks, repair or replace immediately.

Hazardous materials and wastes

1. Develop and implement employee and subcontractor education, as needed, on Hazardous and toxic waste handling, storage, disposal, and cleanup.
2. Designate hazardous waste-collection areas on-site.
3. Place all hazardous and toxic material wastes in secondary containment.
4. Hazardous waste containers should be inspected to ensure that all containers.
5. Are labeled properly and that no leaks are present.

On-going post development issues

1. Follow manufacturer's recommended maintenance procedures for all BMPs

2. Maintenance of BMPs will vary according to the specific area and site conditions

3. Remove sediment from BMPs as appropriate and properly dispose of sediment into Controlled areas to prevent soil from returning to the BMP during subsequent
   Rain events

4. Remove sediment from paved roadways and from around BMPs protecting storm Drain inlets

5. Removal of all organic materials (leaves, grass clippings, mulch, tree branches, Etc.) Shall be conducted immediate upon observation, and per all necessary local, State, and federal regulations.

Removal of any excess materials, debris, and equipment shall be done in a manner that is both in compliance with any and all local, state, and federal regulations, as well as ultimate disposal occurring only a site deemed approved and acceptable by the Pennsylvania Department of Environmental Protection.

Housekeeping operations:

1. Good housekeeping and material management reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

    a. All materials stored on-site must be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.

    b. Products shall be kept in their original containers with the original manufacturer's label.

    c. Substances should not be mixed with one another unless recommended by the manufacturer.

    d. Whenever possible, all of a product will be used up before disposing of a container.

    e. Original materials labels and material safety data sheets (MSDS) shall be kept by the owner.

    f. Petroleum products:

        i. All on-site vehicles and parking areas shall be monitored weekly for leaks and spills. Spills shall be cleaned immediately.

ii. Petroleum products shall be stored under cover and shall be in tightly sealed containers that are clearly labeled.

g. Fertilizers:

i. Fertilizers shall only be used in the minimum amounts as recommended by the manufacturer.

ii. The contents of any un-used fertilizer shall be transferred to a clearly labeled, sealable plastic bin, to avoid spillage.

h. Paints solvents.

i. All paints and solvents shall be stored in original manufacturer's containers in a covered location.

ii. The use of paints and solvents shall, whenever possible, be limited to service or storage bays. Where not possible, the work area shall be protected with impermeable drop clothes or tarps. At no point shall material be used in parking or access ways that are tributaries to the drainagesystem.

2. Spill control practices:

a. Manufacturer's recommended methods shall be clearly posted for spill clean-up and school personnel shall be made aware of the procedures and the locations of cleanup information and supplies.

b. Material and equipment necessary for spill clean-up will be kept on-site in a designated material storage area. Equipment will include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, absorbent materials, sand, sawdust and plastic & metal trash containers specifically kept and labeled for thispurpose.

c. All spills must be cleaned-up immediately after discovery.

d. Spills of toxic or hazardous material must be reported to the appropriate state, local or federal agency, as required by-law.

3. The washing of vehicles shall be limited to areas within the buildings that are served by a floor drain system and on-site tight tank. Wash water with its combination of solvents, detergents and oil/greases should not be allowed to enter any part of the on-site drainage system.

4. Snow plowing operations shall stockpile snow, ice and accumulated materials in areas where snow melt will flow into the on-site drainage systems, including drainage basins. No plowing or storage of

snow is allowed in bio-retention areas or wetland resource areas.

5. During winter conditions sand use site-wide shall be applied to the minimum extent possible to maintain safe conditions.

6. Winter treatment of porous pavement areas shall be limited to plowing.

Recycling Parameters for Post Construction Storm Water Management:

*NOTE: This section applies to all housekeeping and recycling removal of foreign debris and related items/components during the Post Construction Storm Water phase of the project and applies to all previous mentions of such within this document.

Differentiation must be identified between construction waste (waste generated before the site is entirely stabilized, completed, and converted) to the post construction phase.

Erosion control wastes differ from post construction generated materials and must be addressed and handled separately from the traditional form of recycling criteria that often is outlined in erosion and sedimentation control plan guidelines:

Regarding wastes generated after the plan is fully operational, all wastes from post construction BMPs, such as silt/gravel, trash/litter/floatables, grass clippings, branches, leaves, etc., shall be removed from the site and recycled or disposed of in accordance with the department's solid waste management regulations at Title 25 PA. Code 260.1 et seq., 271.1., and 287.1 et seq. No wastes or other materials shall be burned, buried, dumped, or discharged at the site.

APPENDIX H

Resume

Gary A. Sheffler, Jr., PE/PLS (Bud)
Principal Engineering/Surveyor

EDUCATION

The Pennsylvania State University
Associate Degree in Engineering, Mechanical Engineering, 1986
University of Pittsburgh
Bachelor of Science Degree, Civil Engineering, 1991

REGISTRATION

Professional Engineering License, Pennsylvania (PE057446)
Professional Engineering License, West Virginia (21452)
Professional Engineering License, Texas (120725) (Inactive)
Professional Land Surveyor License, Pennsylvania (SU075518)

PROFESSIONAL ENGINEERING/SURVEYING EXPERIENCE

Sheffler & Company, Inc., Sewickley, Pennsylvania
Vice President/Project Manager/Engineer - 1993 to 2008
Principal Engineer/Surveyor - 2016 to Present

As a Principal Engineer/Surveyor and Co-Founder of Sheffler & Company, Inc., Bud oversees the firm's Engineering, Surveying and Energy Markets and is the consulting member of the Safety Committee. He began his career as a Field Surveyor in 1982 with Sheffler & Company, Inc. He earned an Associate degree in Mechanical Engineering and a Bachelor of Science degree in Civil Engineering. Bud has designed, supervised and managed the civil engineering, property and construction surveying, and environmental permitting of hundreds of private land development and municipal projects. He has extensive experience in commercial retail, industrial, and single and multi-family residential projects. For over the past decade, Bud has been the company's primary liaison with some of the world's largest and leading energy and exploration producers.

Office experience as V.P./Project Manager/Engineer included design work associated with several new, large-scale, privately owned commercial/retail centers and industrial/office parks. These projects are located primarily in western Pennsylvania. A partial list of the commercial projects includes: Cranberry Commons Shopping Center (Cranberry Township, PA); Cranberry Square Project (Cranberry Township, PA); Parkway Plaza Project (Moon Township, PA); Parkway Plaza Annex Project (Moon Township, PA); Uniontown Plaza Project (Uniontown, PA); Belle Vernon Retail Center Project (Belle Vernon, PA); Centre Square Project (Chippewa Township, PA); Franklin Mall Project (Washington, PA); Rock Airport of Pittsburgh Office Park (West Deer Township, PA); Northchase Business Park (Cranberry Township, PA).

Office experience as V.P./Project Manager/Engineer included design work associated with several new residential communities. These projects are located primarily in western Pennsylvania. A partial list of the residential communities includes: Taylor Ridge (Adams

Township, PA); Springer Manor (Moon Township, PA); Shadow Creek (Cranberry Township, PA); Staunton Heights (Moon Township, PA); McCormick Farms (Moon Township, PA); Broad Hill Farms & Courts (Moon Township, PA); Cherrington (Moon Township, PA); Country Club Estates (Robinson Township, PA); Meadow View Estates (Robinson Township, PA); Diamond Run (Ohio Township, PA); The Preserve (Cranberry Township, PA); Ventana Hills Apartments (Robinson Township, PA); Bear Run Village Apartments (Ohio Township, PA); The Village At Sewickley Hills Apartments (Ohio Township & Sewickley Hills Boro., PA); The Gables At Brickyard Hill (Adams Township, PA); Foxmoor Apartments (Cranberry Township, PA).

Office experience included engineering and management duties associated with the design and construction of four (4) new golf course developments and design renovations to three (3) existing golf courses. These projects are located in western Pennsylvania. The new golf courses were Diamond Run Golf Club (Ohio Township, PA); Indiana Run Golf Club (Avella, PA); The Madison Club (Sewickley Township, PA); and Alta Mira Golf Links (Unity Township, PA). The golf course renovation projects were Pheasant Ridge Golf Course (Middlesex Township, PA); Butler's Golf Course (Elizabeth, PA); and Highland Country Club (Ross Township, PA).

Work experience included preparation of site construction plans, technical specifications, and environmental permit applications. Responsibilities included preparation of property, topographic, and planimetric surveys, site plans, grading plans, utility plans, landscape plans, profile plans, cross sections, construction details, and technical specifications. Utility plans included layout and design of stormwater collection and conveyance structures, gravity flow sanitary sewers, forced main sanitary sewers, water lines, gas lines, elec/tele/catv lines, etc.. Several projects included preparation of Joint PaDEP/U.S. Army COE 105/404 permits for relocation of existing streams, construction of stream enclosures, and construction of replacement wetlands. Work included preparation of hydrologic and hydraulic studies for existing and proposed streams and conveyance structures. All projects included preparation of detailed stormwater management plans meeting local, state, and federal requirements. NPDES permit applications and supporting erosion & sediment pollution control plans were prepared for earthmoving operations at each project. Wetland mitigation and stream relocation grading/planting plans were prepared in cooperation with the environmental consultants for several projects. Detailed quantity takeoffs, construction cost estimates, and project schedules were prepared. Work also included field monitoring/construction management during construction for several projects. Field experience included construction supervision and inspection of residential and commercial construction projects. Performed compliance inspections of erosion & sediment pollution control devices and stormwater management structures/facilities. Performed inspections of permanent stormwater drainage facilities and detention/retention facilities. Coordinated construction activities with contractors, owners, governmental reviewing agencies, conservation districts, etc.. Participated in pre-construction field meetings with governmental agencies such as PaDEP, U.S. Army Corps of Engineers (COE), and local conservation districts.

Field surveying experience included property boundary and construction surveying work associated with residential and commercial projects. Responsibilities included acting as survey

crew chief and instrument man utilizing Trimble GPS systems, Wild/Lieca total stations, digital data collection equipment, leveling instruments, and linear measurement equipment. Work included recon of field evidence, traverse surveys, layout of property boundaries, construction stakeout, reduction of field notes, linear/angular closure calculations, and courthouse research. Responsible for implementation and configuration of gps systems, total stations, electronic data collection, and reduction of data using AutoCAD computer software.

PVE Sheffler, LLC, Sewickley, Pennsylvania
Principal & COO - 2008 to 2016

Mr. Sheffler was one of the Principals and Co-Founder of PVE Sheffler, LLC. At that time, he maintained nineteen (19) years of experience in civil engineering design, property and construction surveying, and environmental permitting of private land development projects. His primary role at PVE Sheffler was Chief Operations Officer and Principal in charge of the Energy Services and Surveying Services divisions. Bud and the other Principals at PVE Sheffler grew the firm from twenty-two (22) staff members and one (1) office in 2008 to one hundred seventy (170) staff members and seven (7) offices.

Baker Engineers, Moon Township, Pennsylvania
Assistant Engineer - 1989 to 1992

Office experience as Assistant Engineer included design work associated with the Greater Pittsburgh International Airport Project (GPIA). Work included the design and review of permanent and temporary stormwater management facilities and drainage control structures for several bid packages. Responsibilities included performing hydrologic and hydraulic calculations, modification of plans/details, review of shop drawings and schedules. Assisted in the design of sanitary sewer systems including preparation of conceptual design plans and profile drawings. Prepared quantity takeoffs and cost estimates. Assisted in the design of the Hangar Service Roads including development of plan, profile, cross section, and detail drawings for construction. Responsibilities included layout and design of all facilities and/or structures associated with the Hangar Service Roads (ie., geometry, grades, pavement, curbs, gutters, guiderail, fences, drainage structure, etc.). Assisted in the design of stormwater management facilities and permanent drainage structures for the employee parking lots and rental car access roadways. Responsibilities included layout and design of drainage structures, hydrologic and hydraulic calculations, quantity takeoffs, cost estimates and schedules for construction. Prepared conceptual design plans for stationary snow melt pits/structures along runway aprons and taxiways. Responsibilities included development of grading plans, earthwork computations, construction details, drainage collection and conveyance systems

Office experience as Assistant Engineer included design work associated with the USX Gary Works Project (Gary, Indiana). Assisted in the design of a proposed solid waste landfill at the USX Gary Works site. Responsibilities included preparation of grading plans, erosion &

sediment pollution control plans, storage volume calculations, lining system design, leachate collection and conveyance system design, layout and design of access/haul roads, design of cover/closure requirements, layout and design of stormwater management facilities, design plans for relocation of existing overhead and underground utilities, preparation of technical specifications for construction, and preparation of cost estimates and construction schedules. Work associated with this project included development of digital 3D models of the proposed landfill for presentation purposes using computer aided design/rendering software.

Office experience as Assistant Engineer included design work associated with the Republic Engineered Steels Project (Madison, Ohio). Assisted in the preparation of design plans and specifications for closure of an existing sludge/slurry impoundment. Responsibilities included development of erosion & sediment pollution control plans, specifications for removal, treatment and disposal of sludge, plans and specifications for closure of the existing impoundment, preparation of volumes and cost estimates for removal, treatment and closure of the facility.

Office experience as Assistant Engineer included design work associated with the Greensburg Expressway Project (Greensburg, Pennsylvania). Prepared a stormwater management plan for modifications to the Greensburg Expressway. Work included hydrologic and hydraulic calculations for a new surface impoundment and drainage structures.

RESIDENTIAL LAND DEVELOPMENT EXPERIENCE

Pennsylvania & Ohio Limited Liability Corporations
Member – 2017 to Present

In January of 2017, Bud joined several PA based professionals to create a private, residential land development partnership. As a licensed professional Engineer & Surveyor, Bud's role is to oversee all land planning, due diligence, design engineering, land surveying, local, state, and federal environmental permitting, municipal entitlement, sitework bidding, and final public facility dedications. The partnership developed relationships with a few national home builders such as NVR (Ryan Homes – Heartland Homes), Dan Ryan Builders, Acorn Builders, and Maronda Homes, etc. The group currently has several lot purchase agreements and ongoing projects with Ryan Homes and Heartland Homes in PA and Ohio.

Projects Currently Under Construction:

- Maplecrest, Municipality of Monroeville, Allegheny County, PA.
  - 133 lot plan containing "empty nester" single family dwellings.
- Brookhaven, Adams Township, Butler County, PA
  - 35 lot plan containing $700k plus single family dwellings.
- Seneca Trails, Jackson Township, Butler County, PA
  - 272 unit mixed-use development containing townhomes and single family dwellings.
- Alkire, Grove City, Columbus, OH
  - 36 lot plan containing "entry to the market" single family dwellings.
- Rosehill, City of Reynoldsburg, Columbus, OH
  - 76 unit townhome development.

Future Projects:

- Alvi Project, Plum Boro, Allegheny County, PA
  - 165 lot plan containing single family dwellings. LOI from Dan Ryan Builders.
- Wilson Ridge, City of Reynoldsburg, Columbus, OH
  - 81 unit townhome development. LOI from Ryan Homes.
- Hidden Meadows, Grove City, Columbus, OH
  - 80 lot plan containing single family dwellings. LOI from Ryan Homes.