Exhibit 3.14

GREENWAY ELEMENTARY SCHOOL

GREENWAY PORTABLES

Stormwater Management Report

February 2024

PREPARED FOR:
Beaverton School District
6550 SW Merlo Rd
Beaverton, OR 97003

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PRELIMINARY

PROJECT OVERVIEW

The proposed project is located at 9150 SW Downing Dr, Beaverton, OR 97008 (see **Figure 1** for Vicinity Map). The existing property is part of Greenway Elementary School and is bordered on all sides by residential properties. The proposed project improvements include the addition of three portable buildings, parking lot additions, and accompanying stormwater improvements.

The purpose of this stormwater management report is to present stormwater best management practices (BMP) for conveyance, hydromodification, and water quality treatment to be installed as part of the project. This report demonstrates that the proposed design meets or exceeds the minimum requirements for Clean Water Services (CWS) Standards per CWS R&O 19-5 as amended by R&O 19-22. **Table 1** below summarizes the requirements outlined by CWS.

Table 1. CWS R&O 19-5 (As Amended by R&O 19-22)

Design Requirement	CWS
Risk Level	Low
Development Class	Developed Area
Project Size	Medium (12,000 – 80,000 sf new/modified impervious area)
Project Category	Category 2
Hydromodification	Peak-Flow Matching Detention, using design criteria in Section 4.08.6c
Treatment Area	New Imp. + 3(Modified Impervious)
Treatment Storm	0.36 inches of precipitation falling in 4 hours with an average storm return period of 96 hours
Detention	Peak-Flow Matching detention, using design criteria in Section 4.08.6c
Conveyance	25-year; 24-hour SBUH Method

Table 2 below summarizes the design storm events and associated precipitation rates.

Table 2. Precipitation Frequency Estimates

Recurrence Interval	Total 24-hour Precipitation Depth
2-year	2.50
5-year	3.10
10-year	3.45
25-year	3.90

BASIN CHARACTERISTICS

Existing Conditions

The existing conditions of the project area consist of an elementary school, asphalt parking lot, concrete sidewalks, playground area, and play fields/open space. Existing stormwater runoff is collected into the existing conveyance system on site and is treated by an unknown method before it flows north and discharges to Fanno Creek north of the project.

Soil Characteristics

The Natural Resource Conservation Service (NRCS) Soil Survey identifies the existing soils onsite as various silty loams and are classified as Hydrologic Soil Group C. Hydrologic soil groups are based on estimates of runoff

potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. For the proposed site, soil type B was used to analyze the runoff potential. See **Appendix B** for Soil Survey information. The assumed curve numbers for this report are shown in **Table 3** below.

Table 3. Assumed Curve Numbers

Condition	Curve Number
Impervious Areas	98
Existing Impervious Areas	75
Existing Pervious Areas (Fair Condition)	79

Proposed Conditions

The proposed improvements include three (3) new portable buildings, new parking lot additions, and stormwater improvements. These improvements can be separated into two basins, Basin A and B. See **Figures 2 & 3** in **Appendix A** for the existing and proposed basin map.

Runoff from **Basin A** will be collected into the proposed storm system and be conveyed to a new 585 square foot (bottom area) rain garden. After being treated within the proposed rain garden, runoff will be conveyed into the existing storm system and will outfall into Fanno Creek to the north. Existing and proposed impervious and pervious areas are outlined in **Table 4** below.

Runoff from **Basin B** will be collected into the proposed storm system and be conveyed to a new 989 square foot (bottom area) rain garden. After being treated within the proposed rain garden, runoff will be conveyed into the existing storm system and will outfall into Fanno Creek to the north. Existing and proposed impervious and pervious areas are outlined in **Table 4** below.

Table 4. Impervious & Pervious Basin Areas

Basin	Pre-Development			Post-Development		
	Impervious (acres)	Pervious (acres)	Total Area (acres)	Impervious (acres)	Pervious (acres)	Total Area (acres)
A	0.009	0.172	0.182	0.172	0.009	0.182
B	0.000	0.190	0.190	0.190	0.000	0.190

STORMWATER MANAGEMENT

Per section 4.04.1 of the CWS R&O 19-5, new development and other activities which create or modify 1,000 square feet or greater of impervious surfaces or increase the amount of stormwater runoff or pollution leaving the site, are required to implement or fund permanent water quality approaches to reduce contaminants entering the storm and surface water system.

Water Quality

CWS treatment requirements and standards will be met by treatment and detention of all onsite runoff with the use of two (2) new non-structural flow through planters/rain gardens. The first rain garden (Rain Garden A) will be located east of the new parking lot addition and south of the existing school building. The second rain garden (Rain Garden B) will be located to the east of the proposed portable buildings and north of the existing school, in the existing soccer field area.

CWS water quality approach requires the treatment of a storm event totaling 0.36 inches of precipitation falling in 4 hours. Proposed water quality flows are outlined in **Table 5** below. Refer to **Appendix C** for water quality basin maps, hydrographs, and calculations.

$$CWS\ Water\ Quality\ Area\ (sf) = New\ Impervious + (3\ X\ Modified\ Impervious)$$

The water quality area was determined for CWS water quality flow calculations only. Water quality flow was determined based on Santa-Barbara Urban Hydrograph method for all proposed and contributing areas. The CWS water quality design flow anticipated from the water quality design storm is based on the following formula and is also shown in **Table 5** below.

$$CWS\ Water\ Quality\ Flow\ (cfs) = \frac{0.36\ (in.) * Area\ (sq.ft.)}{\left(12\ \frac{in}{ft}\right) * (4\ hr) * \left(60\ \frac{min}{hr}\right) * \left(60\ \frac{sec}{min}\right)}$$

Table 5. Water Quality Impervious Area

Basin	New Impervious Area (sf)	Modified Impervious Area (sf)	CWS Water Quality Area (sf)	CWS Water Quality Flow (cfs)	Proposed Treatment Method
A	7,098 sf (0.163 ac)	409 sf (0.009 ac)	8,290 sf (0.190 ac)	0.017	Rain Garden A
B	8,290 sf (0.190 ac)	0 sf	8,290 sf (0.190 ac)	0.017	Rain Garden B

Hydromodification Assessment & Detention

A CWS hydromodification assessment has been conducted per CWS DCS section 4.03.3. Following the point of discharge to the receiving reach determines the site is located within the Fanno Creek reach. This basin is considered to be in a "Low Risk" area. The development class lists the site within a "Developed Area". The total project re-developed new/modified impervious area is between 12,000 – 80,000 sf, which per CWS DCS 4.03.3.c.2 is classified as a "medium" project. Therefore, per Table 4-2 within CWS DCS 4.03.5, the project is classified as Category 2.

Projects within Category 2 represent those with a moderate anticipated risk. Per CWS DCS section 4.03.5.b, any of the following approaches may be used to address hydromodification:

1. Infiltration facility, using the Standard Sizing, as described in Section 4.08.5; or
2. Peak-Flow Matching Detention, using design criteria described in Section 4.08.5; or
3. Combination of Infiltration Facility and Peak-Flow Matching Detention, using criteria described in Section 4.08.5 and 4.08.6; or
4. Any option listed in Category 3

For the proposed project, Peak-Flow Matching Detention (Option #2) was used to size the proposed stormwater facilities. Detention requirements shall meet CWS requirements, summarized below in **Table 6**.

Table 6. CWS Table 4-7

Pre-Development Peak Runoff Rate	Post-Development Peak Runoff Rate Target
2-year, 24-hour	50% of 2-year, 24-hour
5-year, 24-hour	5-year, 24-hour
10-year, 24-hour	10-year, 24-hour
25-year, 24-hour	25-year, 24-hour

CWS requirements require that the proposed discharge for the 2-year, 24-hour storm be detained and reduced to 50% of the pre-development discharge rate. CWS also requires that the post-development runoff rates from the site do not exceed the pre-development runoff rates for the 5, 10, and 25-year events for peak flow matching. Refer to **Appendix D** for all pre- and post-developed hydrographs.

Basin A runoff will be managed by a new 580 sf (bottom area) and 1.0 ft deep rain garden. The proposed bottom of the rain garden is at elevation 190.00 and will discharge north from the rain garden. Flow within the rain garden will be managed by a soil section with 18" of growing media over 21" of drain rock, with a 6" perforated underdrain below. Flow will also be managed in the facility with a single 0.50" orifice. The rain garden will also include an overflow drain set 6" above the bottom elevation of the rain garden.

Basin B runoff will be managed by a new 847 sf (bottom area) and 1.0 ft deep rain garden. The proposed bottom of the rain garden is at elevation 180.00 and will discharge from the outflow pipe at the southwest end of the rain garden. Flow within the rain garden will be managed by a soil section with 18" of growing media over 12" of drain rock, with a perforated underdrain below. Flow will also be managed in the facility with a single 0.60" orifice. The rain garden will also include an overflow drain set 6" above the bottom elevation of the rain garden.

Table 7. Basin A: Pre-Development & Post-Development Runoff Rates

Design Storm Events	Pre-Developed Flow (cfs)	Post-Developed Targets (cfs)	Post-Developed Flow (cfs)	Detained Release Rate (cfs)
2-yr, 24-hr	0.029	0.015	0.100	**0.015**
5-yr, 24-hr	0.048	0.048	0.127	**0.024**
10-yr, 24-hr	0.061	0.061	0.142	**0.040**
25-yr, 24-hr	0.078	0.078	0.161	**0.072**

Table 8. Basin B: Pre-Development & Post-Development Runoff Rates

Design Storm Events	Pre-Developed Flow (cfs)	Post-Developed Targets (cfs)	Post-Developed Flow (cfs)	Detained Release Rate (cfs)
2-yr, 24-hr	0.031	0.016	0.109	**0.016**
5-yr, 24-hr	0.051	0.051	0.137	**0.021**
10-yr, 24-hr	0.065	0.065	0.153	**0.035**
25-yr, 24-hr	0.082	0.082	0.174	**0.062**

Conveyance

Per section 5.04.a and section 5.05.2a of the CWS Design & Construction Standards, storm conveyance systems for the proposed project must be sized to meet the 25-year, 24-hour design storm. The proposed pipe conveyance system was sized using the 25-year, 24-hour SBUH method. A network of proposed and existing 6" and 8" pipes will convey the project runoff along with existing building and hardscape runoff. See **Appendix E** for

the Conveyance Basin Map, tributary area hydrographs and Pipe Capacity Calculations. **Table 9** below provides a summary of the proposed and existing pipes conveying runoff from the project improvements.

Table 9. Pipe Capacity Table

Segment	Capacity (cfs)	Contributing Basin(s)	25-year Storm Flow Rate (cfs)
Pipe 1	6.48	A	0.161
Pipe 2	2.01	A	0.161
Pipe 3	1.80	B	0.174

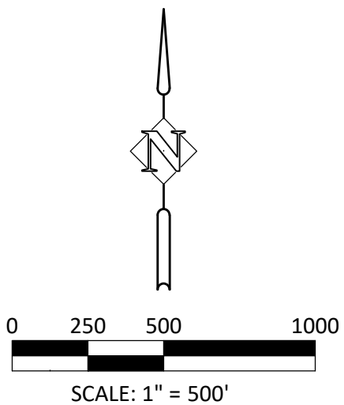
Downstream Analysis

Per section 5.05.4 of the CWS Design & Construction Standards, a downstream analysis must be completed for the project to a distance of at least 1/4 of a mile from the project outfall location. The proposed project will connect into the existing storm system running west to east across the site. From the project's connection point at the northeast side of the school, runoff flows north and discharges into Fanno Creek. Within the 1/4 mile of the proposed outfall to Fanno Creek, a tributary area including roughly 42 acres of residential area contributes a 25-year flow of 14.75 cfs (refer to **Figure 5** – Tributary Basin Map). The project contributes a 25-year flow of 0.449 cfs, well under 10% of the total tributary area flow for the discharge location. From the project discharge point at the north end of the site, the analysis continues for another 1/4 of a mile. There are no noticeable deficiencies downstream, and therefore the downstream system is adequate, and the analysis is complete. Refer to **Appendix F** for all downstream hydrographs and calculations.

ENGINEERING CONCLUSION

The proposed stormwater management plan will achieve stormwater management to Clean Water Services R&O 19-22 and City of Beaverton design standards.

Appendix A – Figures & Maps



SCALE: 1" = 500'

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR
DRAWN: HHPR
CHECKED: HHPR
DATE: 02/29/2024

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VICINITY MAP

GREENWAY PORTABLES

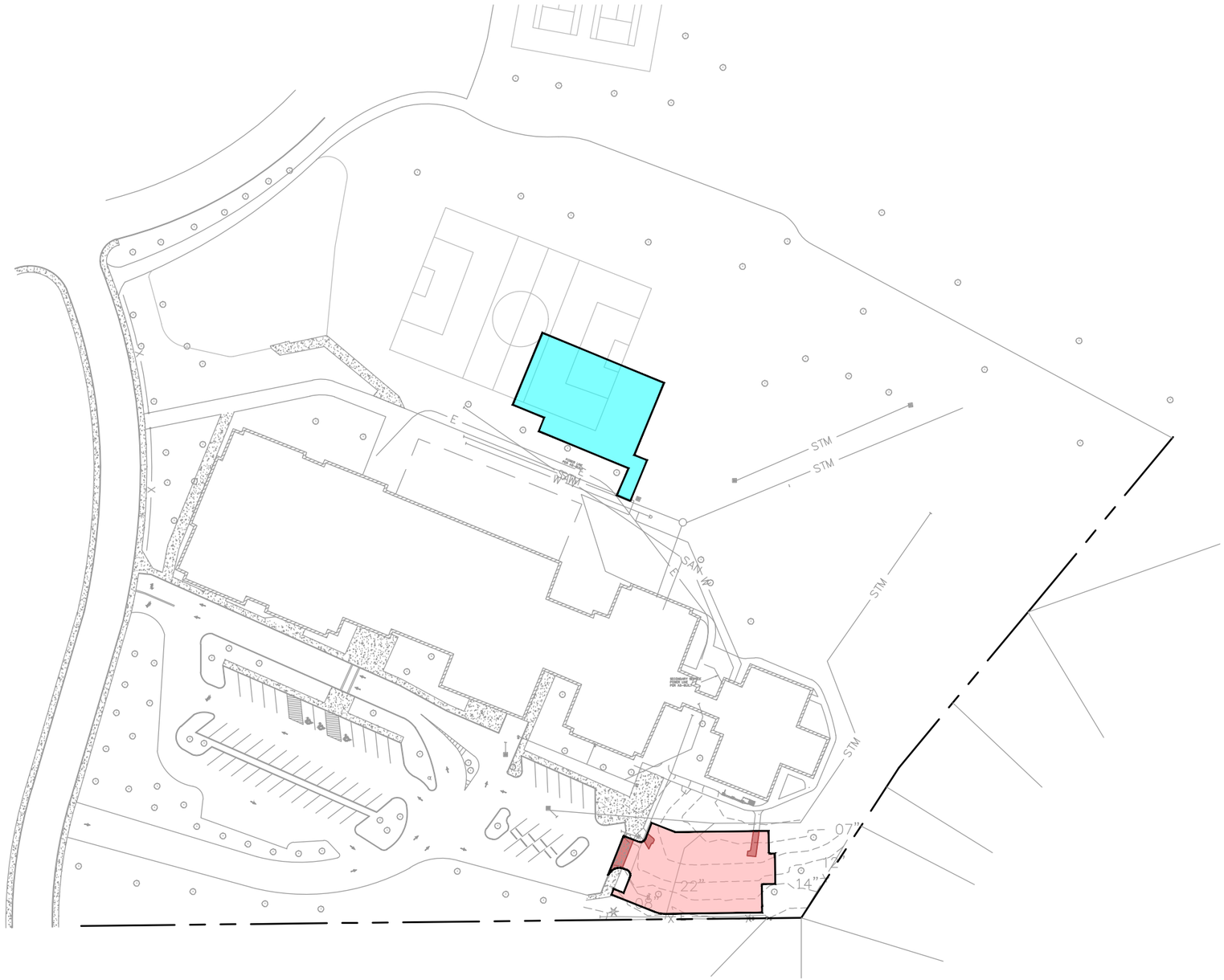
BEAVERTON, OR

SHEET NO. FIG. 1

JOB NO. BSD-122

P:\01-Portland\BSD (Beaverton School District)\BSD-122 (Greenway Portables)\BSD122-DOCS\Reports\Stormwater\Figures\ FIG. 1 - VICINITY MAP.dwg

P:\01-Portland\BSD (Beaverton School District)\BSD-122 (Greenway Portables)\BSD122-DOCS\Reports\Stormwater\Figures\ FIG. 2 - PRE-DEV BASIN MAP.dwg



BASIN A IMPERVIOUS
410 SF (0.009 AC)

BASIN A PERVIOUS
7,504 SF (0.172 AC)

BASIN B PERVIOUS
8,290 SF (0.190 AC)

N

0 50 100 200

SCALE: 1" = 100'

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PRE-DEVELOPED BASIN MAP

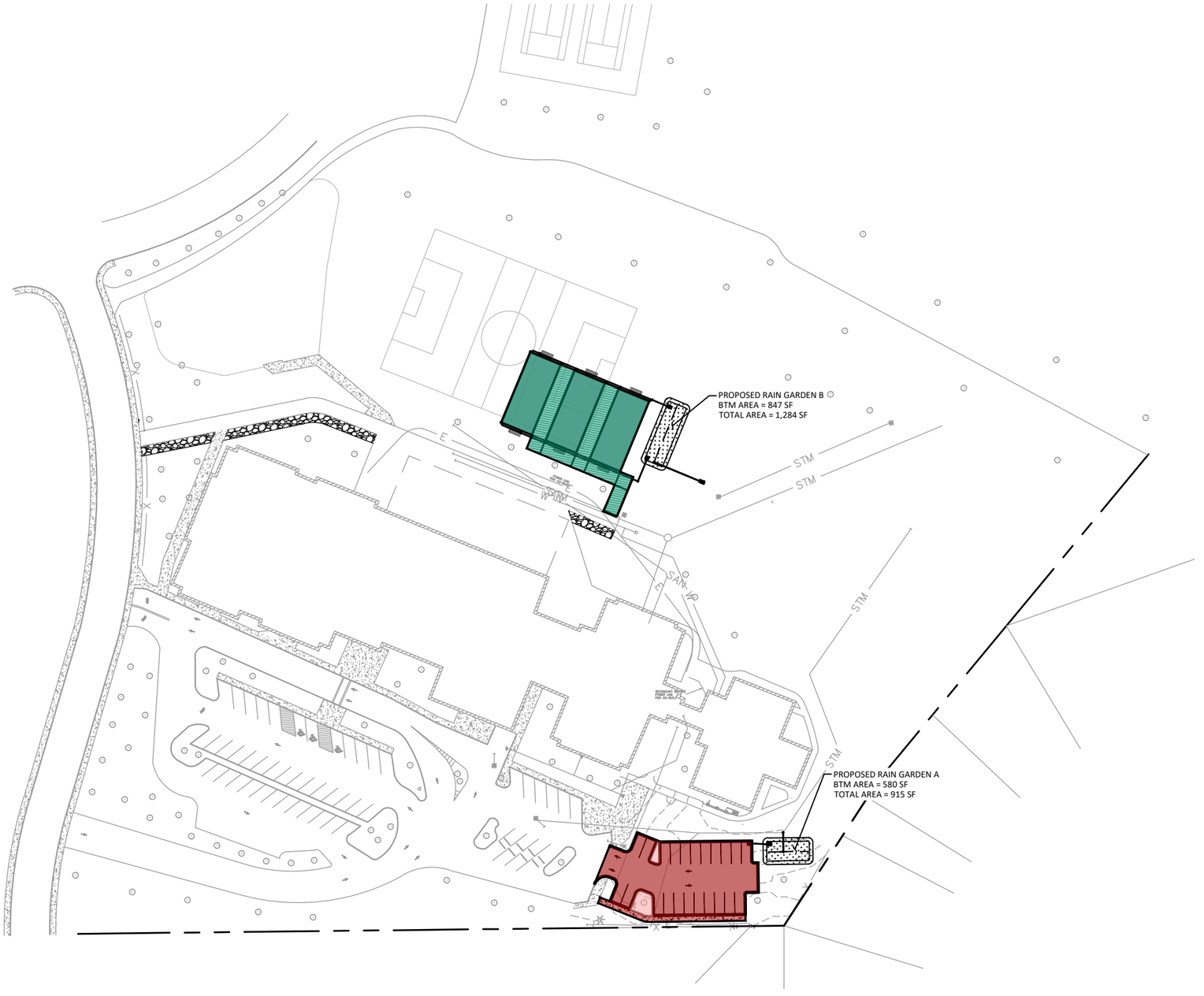
GREENWAY PORTABLES

BEAVERTON, OR

SHEET NO. FIG. 2

JOB NO. BSD-122

P:\01-Portland\BSD (Beaverton School District)\BSD-122 (Greenway Portables)\BSD122-DOCS\Reports\Stormwater\Figures\ FIG. 3 - POST-DEV BASIN MAP.dwg



BASIN A IMPERVIOUS
7,494 SF (0.172 AC)

BASIN A PERVIOUS
406 SF (0.009 AC)

BASIN B IMPERVIOUS
8,290 SF (0.190 AC)

0 50 100 200

SCALE: 1" = 100'

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POST-DEVELOPED BASIN MAP

GREENWAY PORTABLES

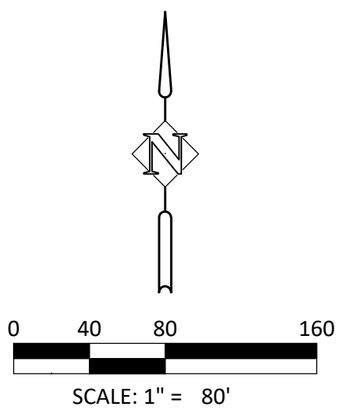
BEAVERTON, OR

SHEET NO. FIG. 3

JOB NO. BSD-122

PIPE CONVEYANCE TABLE

PIPE	CAPACITY (CFS)	CONTRIBUTING BASINS	25-YEAR STORM FLOW RATE (CFS)
1	6.48	BASIN A	0.161
2	2.01	BASIN A	0.161
3	1.80	BASIN B	0.174



SCALE: 1" = 80'

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PIPE CONVEYANCE MAP

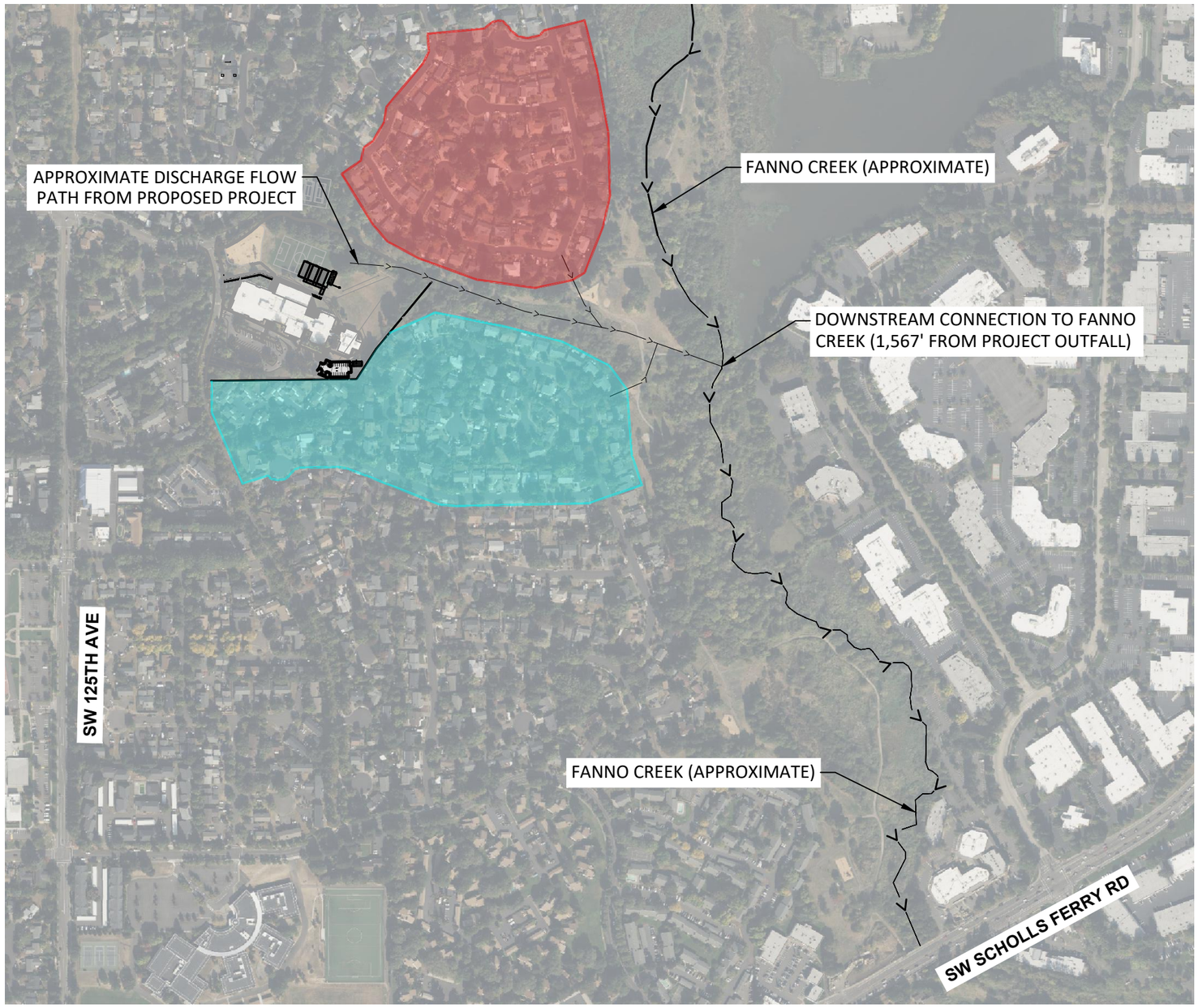
GREENWAY PORTABLES

BEAVERTON, OR

SHEET NO. FIG. 4

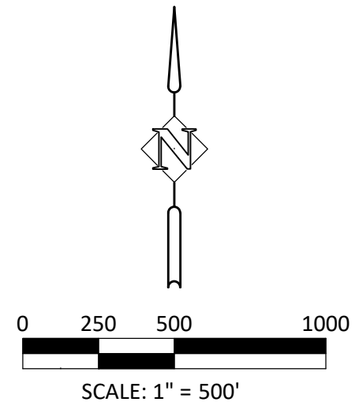
JOB NO. BSD-122

P:\01-Portland\BSD (Beaverton School District)\BSD-122 (Greenway Portables)\BSD122-DOCS\Reports\Stormwater\Figures\ FIG. 4 - CONVEYANCE MAP.dwg



TRIBUTARY BASIN AREAS

BASIN	PERVIOUS AREA	IMPERVIOUS AREA
BASIN A	5.03 ACRES	15.1 ACRES
BASIN B	5.40 ACRES	16.2 ACRES



SCALE: 1" = 500'

DATE	NO.	DESCRIPTION

REVISIONS

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TRIBUTARY/DOWNSTREAM BASIN MAP

GREENWAY PORTABLES

BEAVERTON, OR

SHEET NO. **FIG. 5**

JOB NO. BSD-122

P:\01-Portland\BSD (Beaverton School District)\BSD-122 (Greenway Portables)\BSD122-DOCS\Reports\Stormwater\Figures\ FIG. 5 - DOWNSTREAM BASIN MAP.dwg

Appendix B – Soil Survey Data

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 Washington County, Oregon

September 1, 2023

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 Scale: 1:1,220 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

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 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Washington County, Oregon
Survey Area Data: Version 22, Sep 14, 2022

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

Date(s) aerial images were photographed: Sep 26, 2022—Oct 11, 2022

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
1	Aloha silt loam	2.1	26.9%
13	Cove silty clay loam	0.4	4.7%
45B	Woodburn silt loam, 3 to 7 percent slopes	4.9	63.6%
45C	Woodburn silt loam, 7 to 12 percent slopes	0.4	4.9%
Totals for Area of Interest		**7.7**	**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.

Washington County, Oregon

1—Aloha silt loam

Map Unit Setting

National map unit symbol: 21x8
Elevation: 150 to 250 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 160 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Aloha and similar soils: 90 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aloha

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old loamy alluvium

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 46 inches: silt loam
H3 - 46 to 65 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R002XC007OR - Valley Swale Group
Forage suitability group: Somewhat Poorly Drained (G002XY005OR)
Other vegetative classification: Somewhat Poorly Drained (G002XY005OR)
Hydric soil rating: No

Minor Components

Huberly

Percent of map unit: 1 percent
Landform: Terraces

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

13—Cove silty clay loam

Map Unit Setting

National map unit symbol: 21xl
Elevation: 100 to 300 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cove and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cove

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Recent clayey alluvium

Typical profile

H1 - 0 to 8 inches: silty clay loam
H2 - 8 to 60 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: R002XC005OR - High Flood Plain Group
Hydric soil rating: Yes

Minor Components

Cove, clay surface

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Labish

Percent of map unit: 3 percent
Landform: Lakebeds (relict), flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Cove, peat substratum

Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: Yes

45B—Woodburn silt loam, 3 to 7 percent slopes

Map Unit Setting

National map unit symbol: 2209
Elevation: 150 to 400 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodburn and similar soils: 85 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodburn

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old alluvium

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 31 inches: silty clay loam
H3 - 31 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well 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 25 to 32 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R002XC008OR - Valley Terrace Group
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Minor Components

Dayton

Percent of map unit: 1 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

45C—Woodburn silt loam, 7 to 12 percent slopes

Map Unit Setting

National map unit symbol: 220b
Elevation: 150 to 400 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Woodburn and similar soils: 85 percent
Minor components: 1 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodburn

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old alluvium

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 31 inches: silty clay loam
H3 - 31 to 60 inches: silt loam

Properties and qualities

Slope: 7 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well 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 25 to 32 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R002XC008OR - Valley Terrace Group
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Minor Components

Dayton

Percent of map unit: 1 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2/]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1/]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2/]	Hydrologic condition [3/]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1] Average runoff condition, and I_a=0.2S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Appendix C – Water Quality Appendix

Hydraflow Table of Contents

1 - Year

Hydrograph Summary Report

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

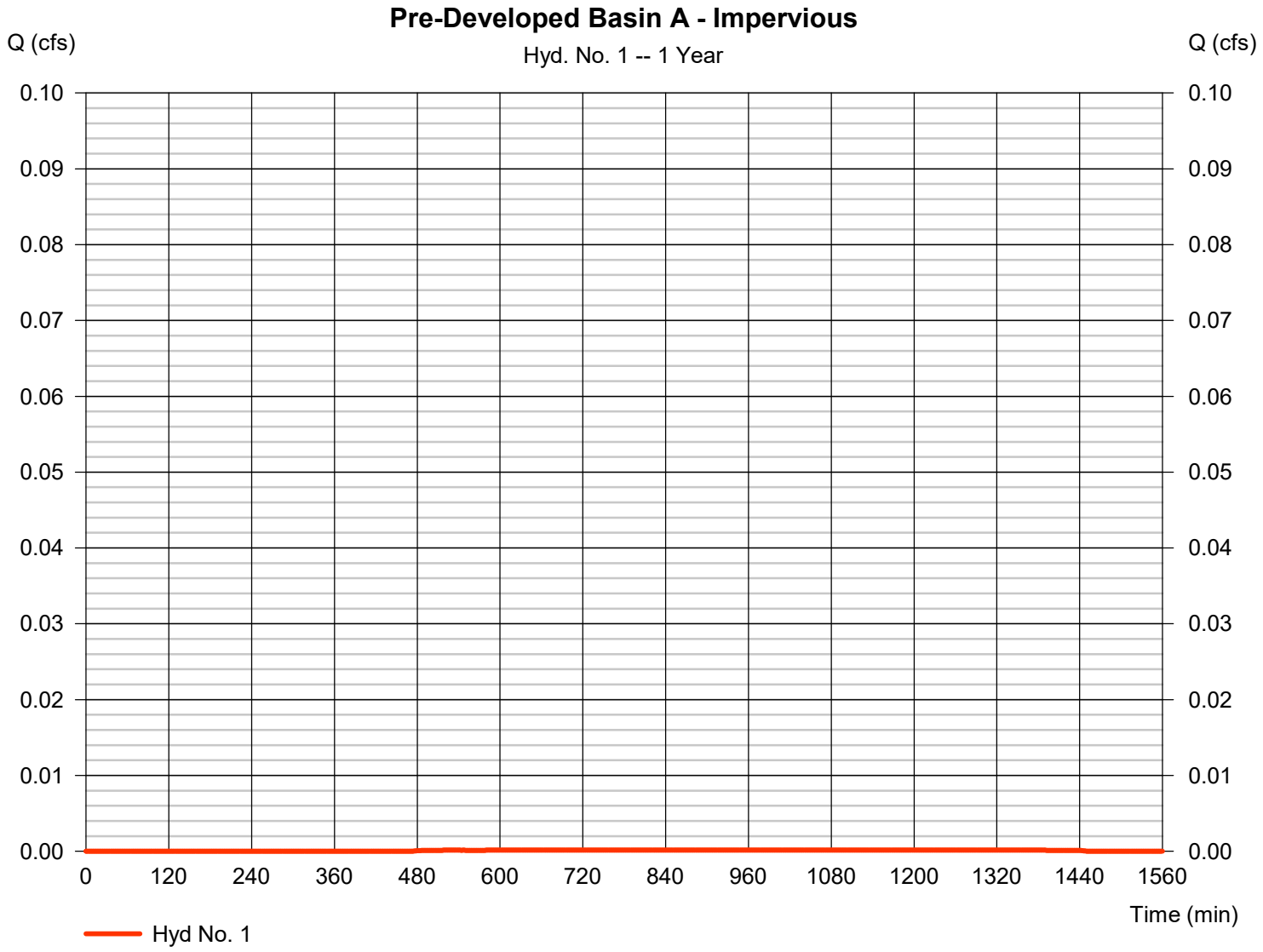
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.000	2	1004	8	------	------	------	Pre-Developed Basin A - Impervious
2	SBUH Runoff	0.008	2	480	232	------	------	------	Pre-Developed Basin A - Pervious
3	Combine	0.008	2	480	241	1, 2	------	------	Basin A Pre-Developed Runoff
5	SBUH Runoff	0.009	2	480	257	------	------	------	Pre-Developed Basin B - Pervious
7	SBUH Runoff	0.067	2	474	941	------	------	------	Post-Developed Basin A - Impervious
8	SBUH Runoff	0.000	2	480	12	------	------	------	Post-Developed Basin A - Pervious
9	Combine	0.067	2	474	953	7, 8	------	------	Basin A Post-Developed Runoff
11	SBUH Runoff	0.074	2	474	1,039	------	------	------	Post-Developed Basin B - Impervious
12	Combine	0.074	2	474	1,039	11	------	------	Basin B Post-Developed Runoff
14	Reservoir	0.011	2	704	941	9	188.89	362	Rain Garden A
15	Reservoir	0.015	2	654	1,027	12	179.99	371	Rain Garden B

Hydrograph Report

Hyd. No. 1

Pre-Developed Basin A - Impervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1004 min
Time interval	= 2 min	Hyd. volume	= 8 cuft
Drainage area	= 0.009 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.73 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

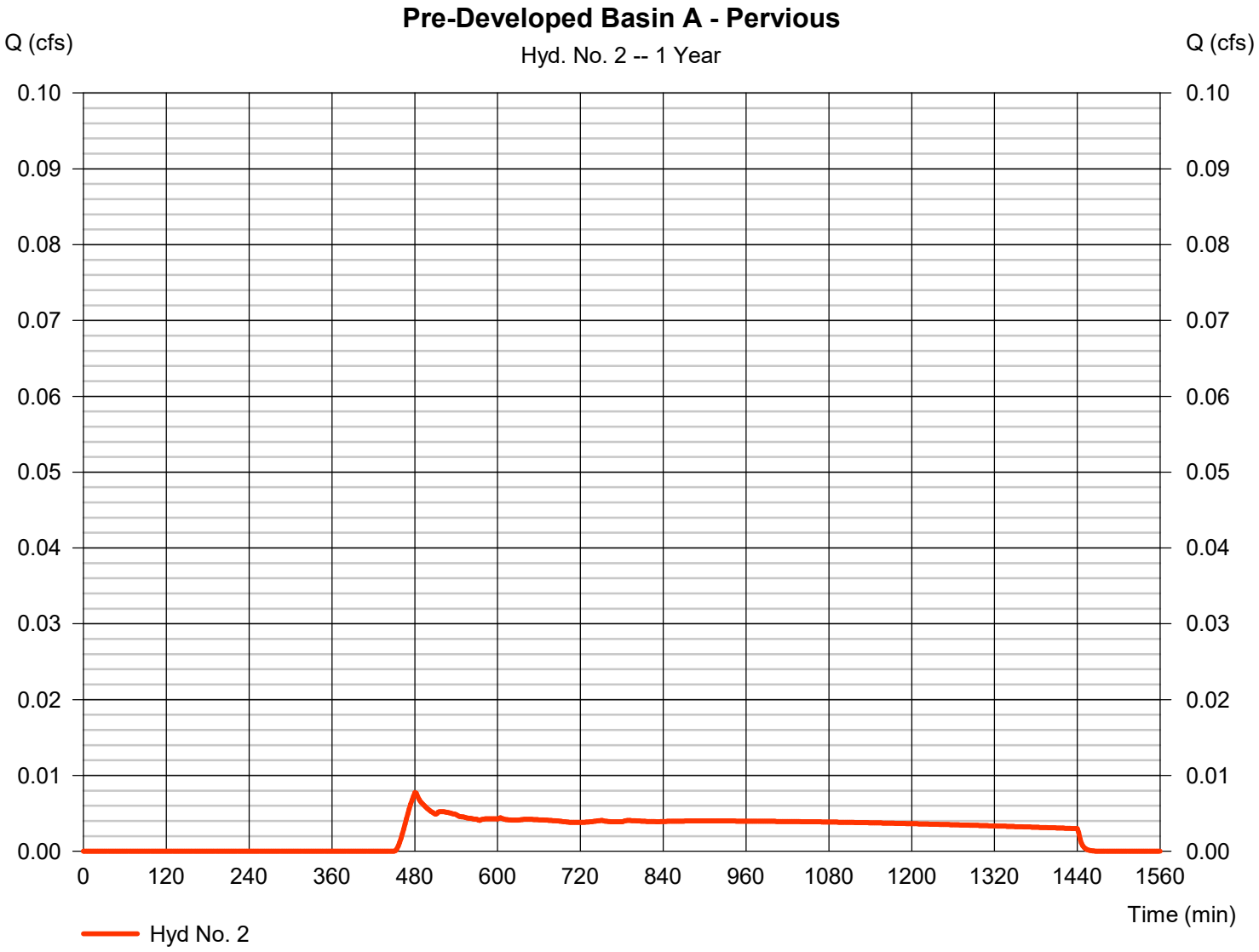


Hydrograph Report

Hyd. No. 2

Pre-Developed Basin A - Pervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 232 cuft
Drainage area	= 0.172 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.73 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

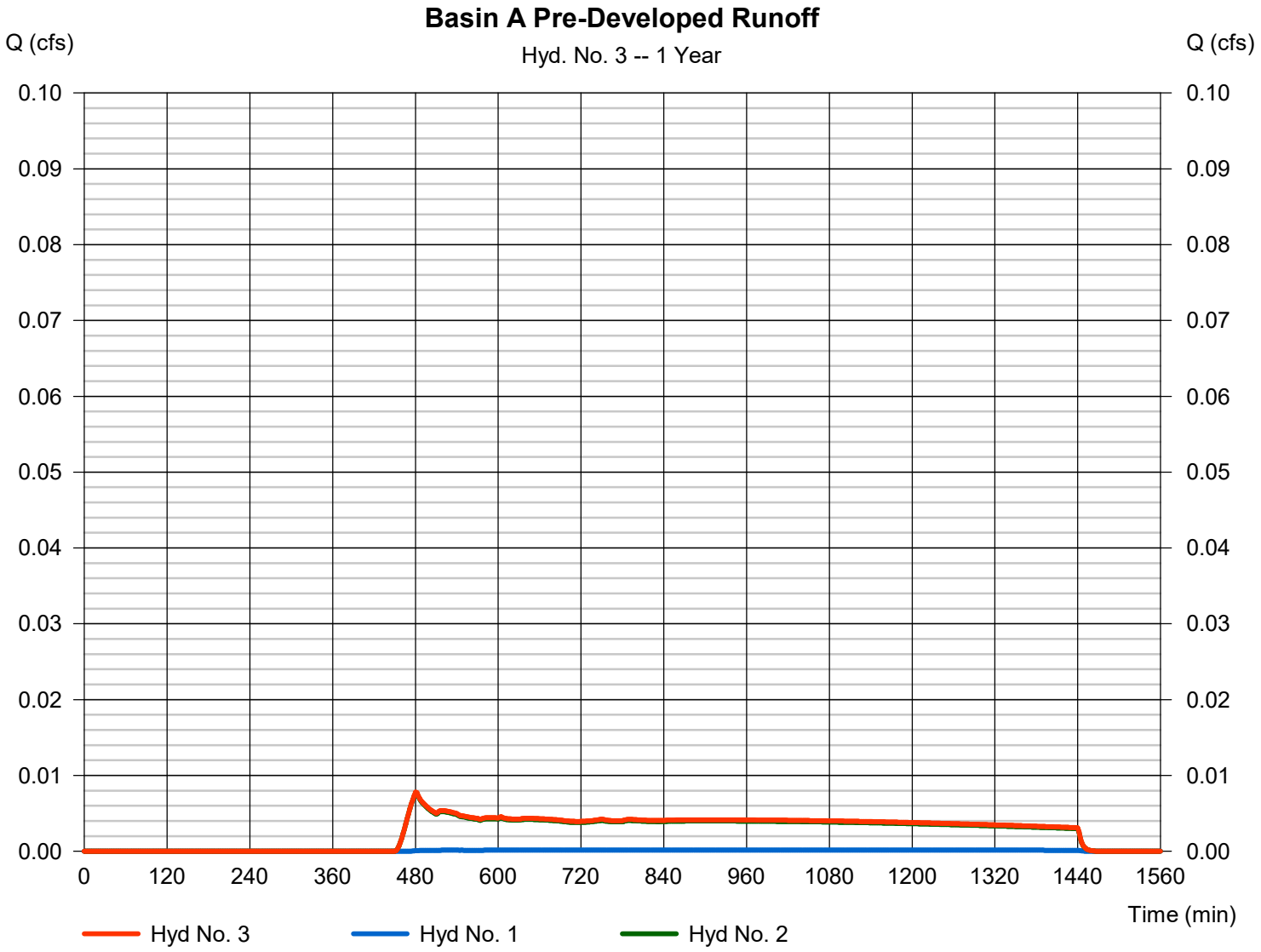


Hydrograph Report

Hyd. No. 3

Basin A Pre-Developed Runoff

Hydrograph type	= Combine	Peak discharge	= 0.008 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 241 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.181 ac

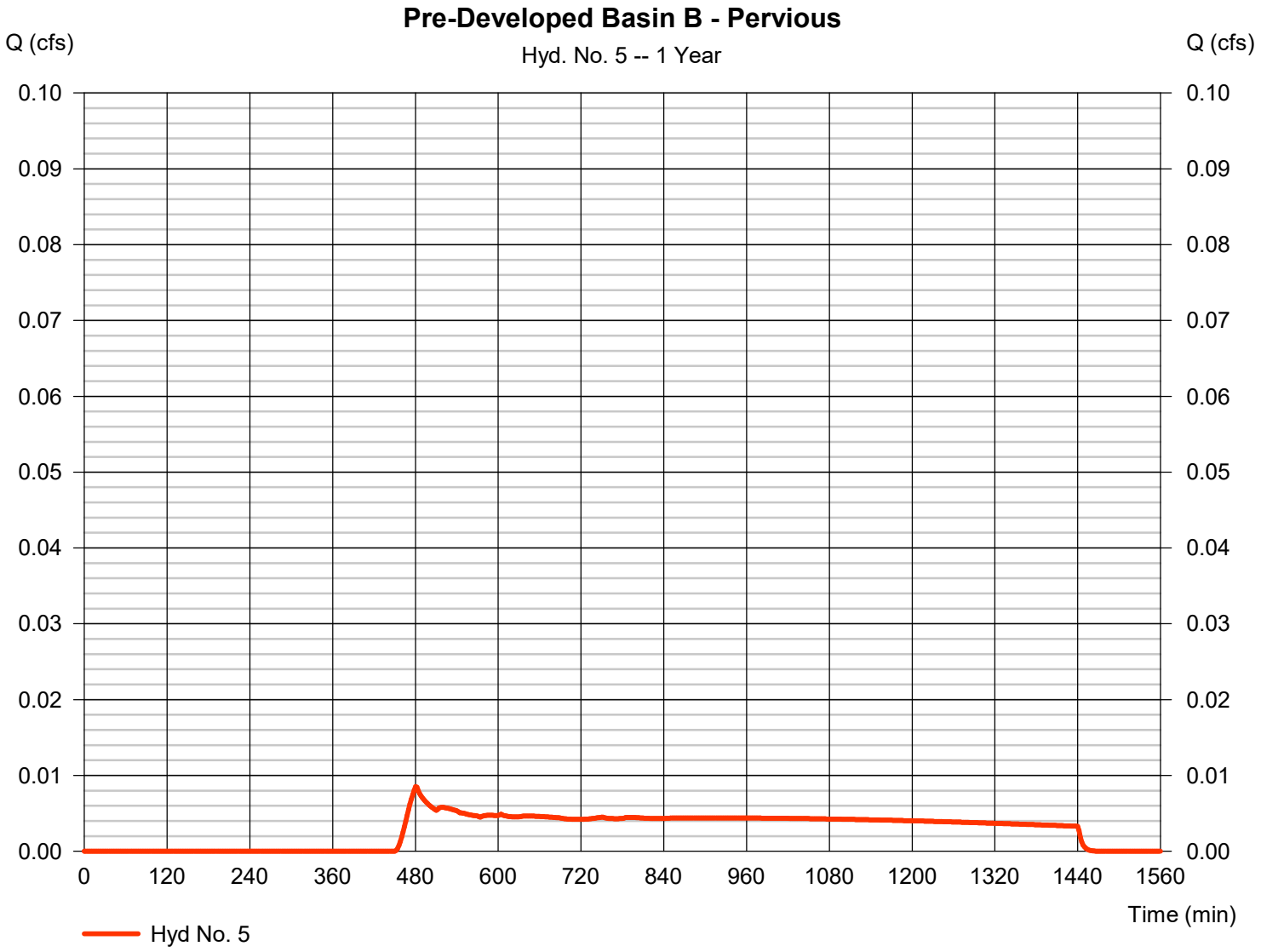


Hydrograph Report

Hyd. No. 5

Pre-Developed Basin B - Pervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.009 cfs
Storm frequency	=	1 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	257 cuft
Drainage area	=	0.190 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	1.73 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

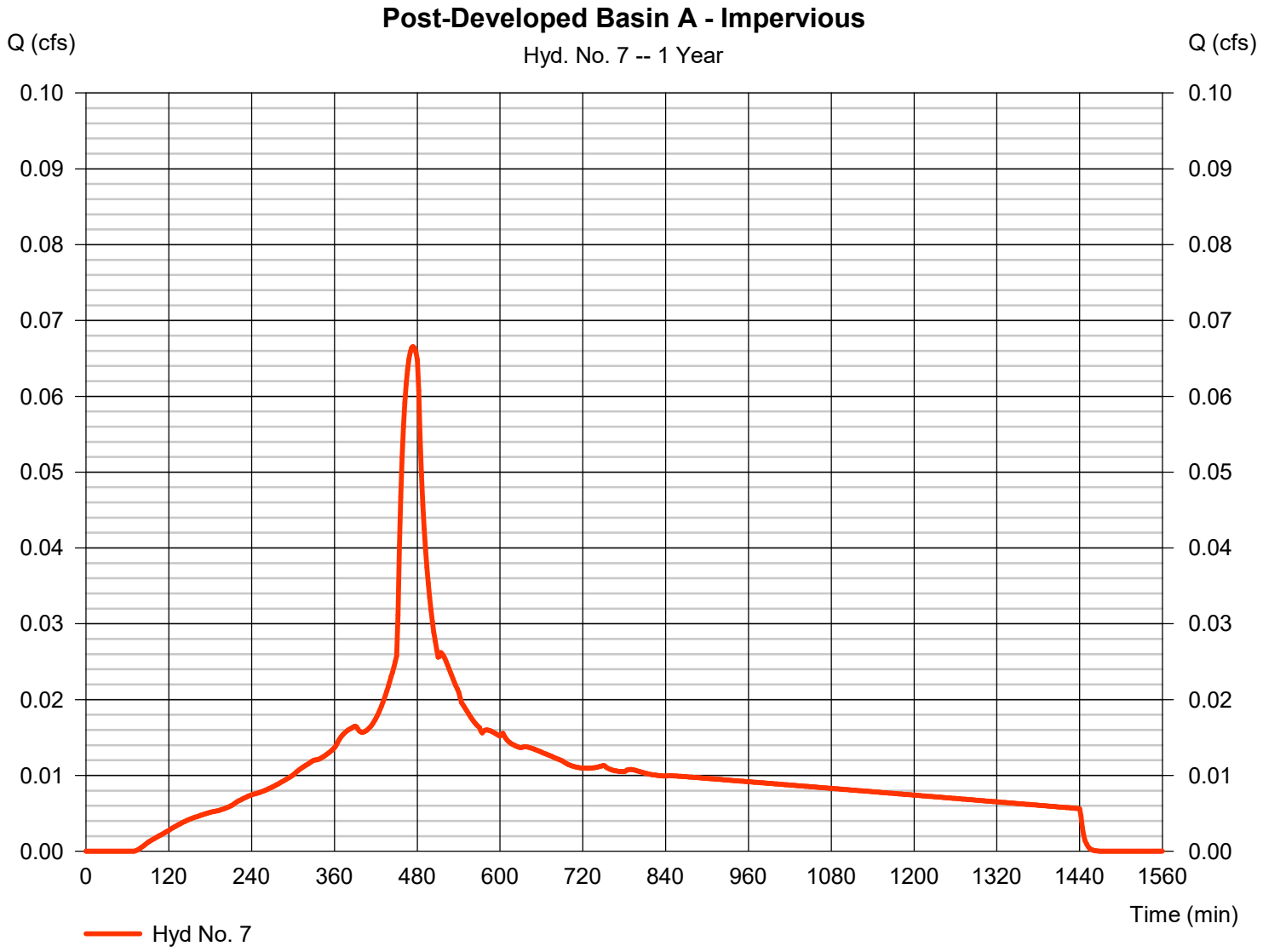


Hydrograph Report

Hyd. No. 7

Post-Developed Basin A - Impervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.067 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 941 cuft
Drainage area	= 0.172 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.73 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

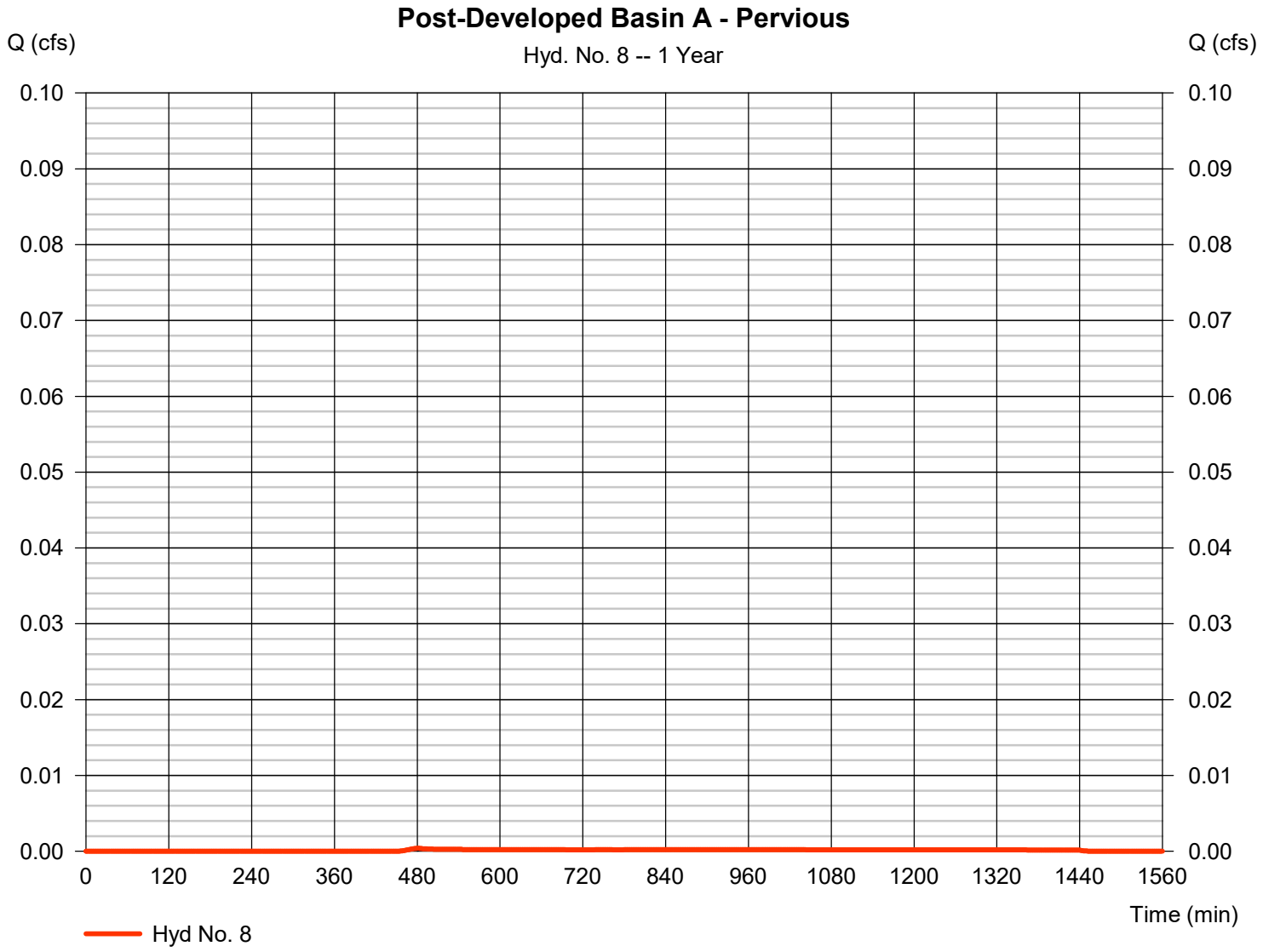


Hydrograph Report

Hyd. No. 8

Post-Developed Basin A - Pervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 12 cuft
Drainage area	= 0.009 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.73 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

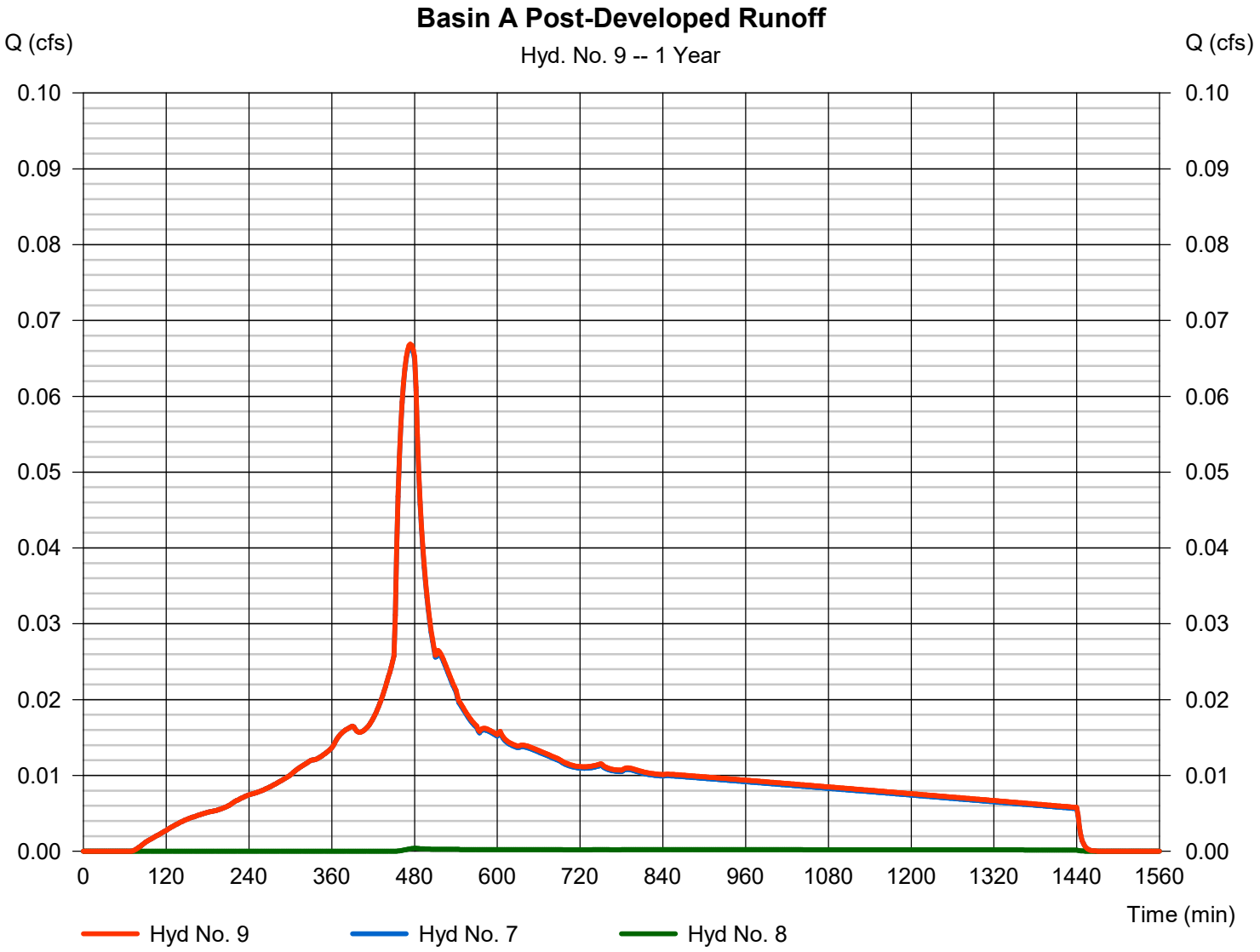


Hydrograph Report

Hyd. No. 9

Basin A Post-Developed Runoff

Hydrograph type	=	Combine	Peak discharge	=	0.067 cfs
Storm frequency	=	1 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	953 cuft
Inflow hyds.	=	7, 8	Contrib. drain. area	=	0.181 ac

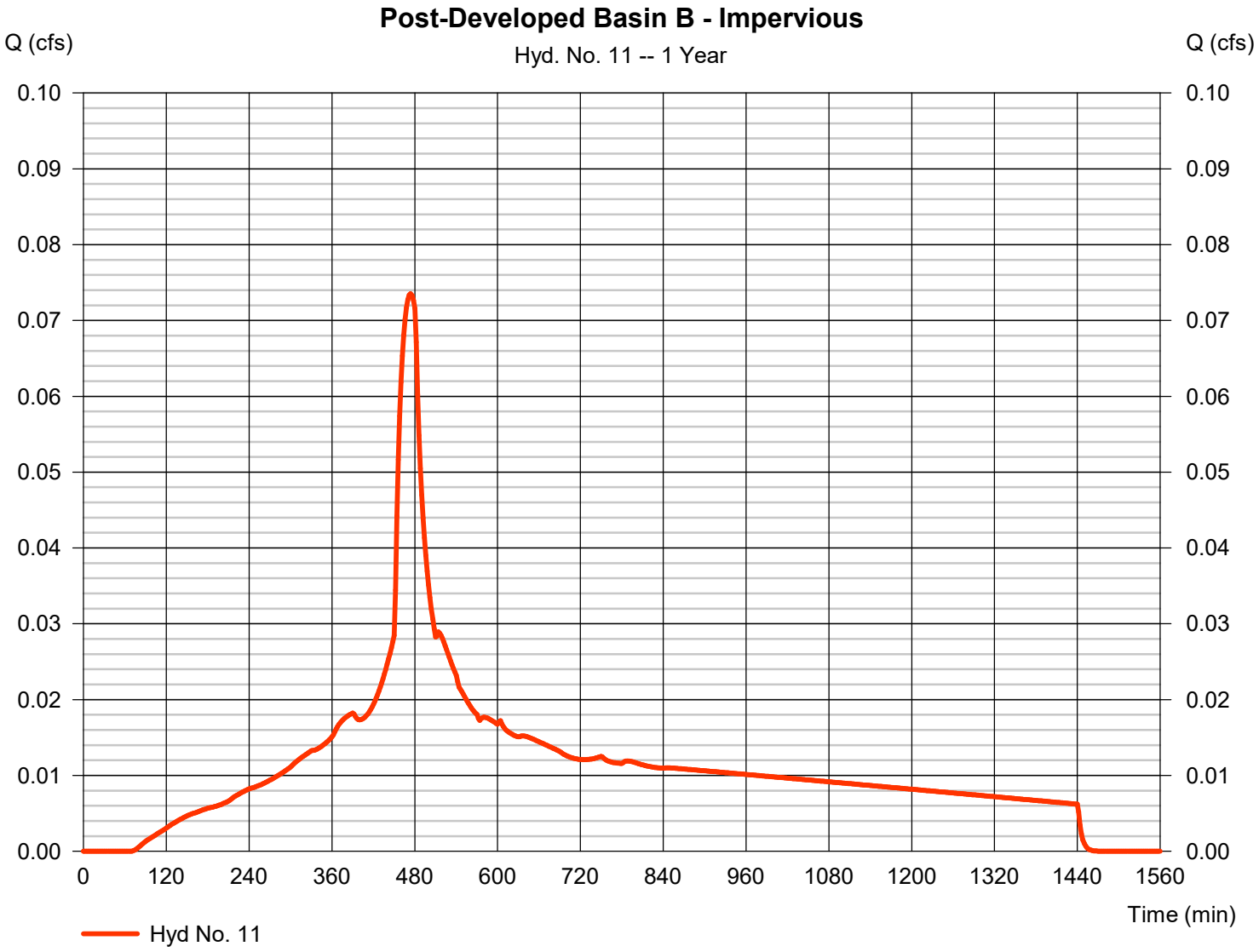


Hydrograph Report

Hyd. No. 11

Post-Developed Basin B - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.074 cfs
Storm frequency	=	1 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	1,039 cuft
Drainage area	=	0.190 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	1.73 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

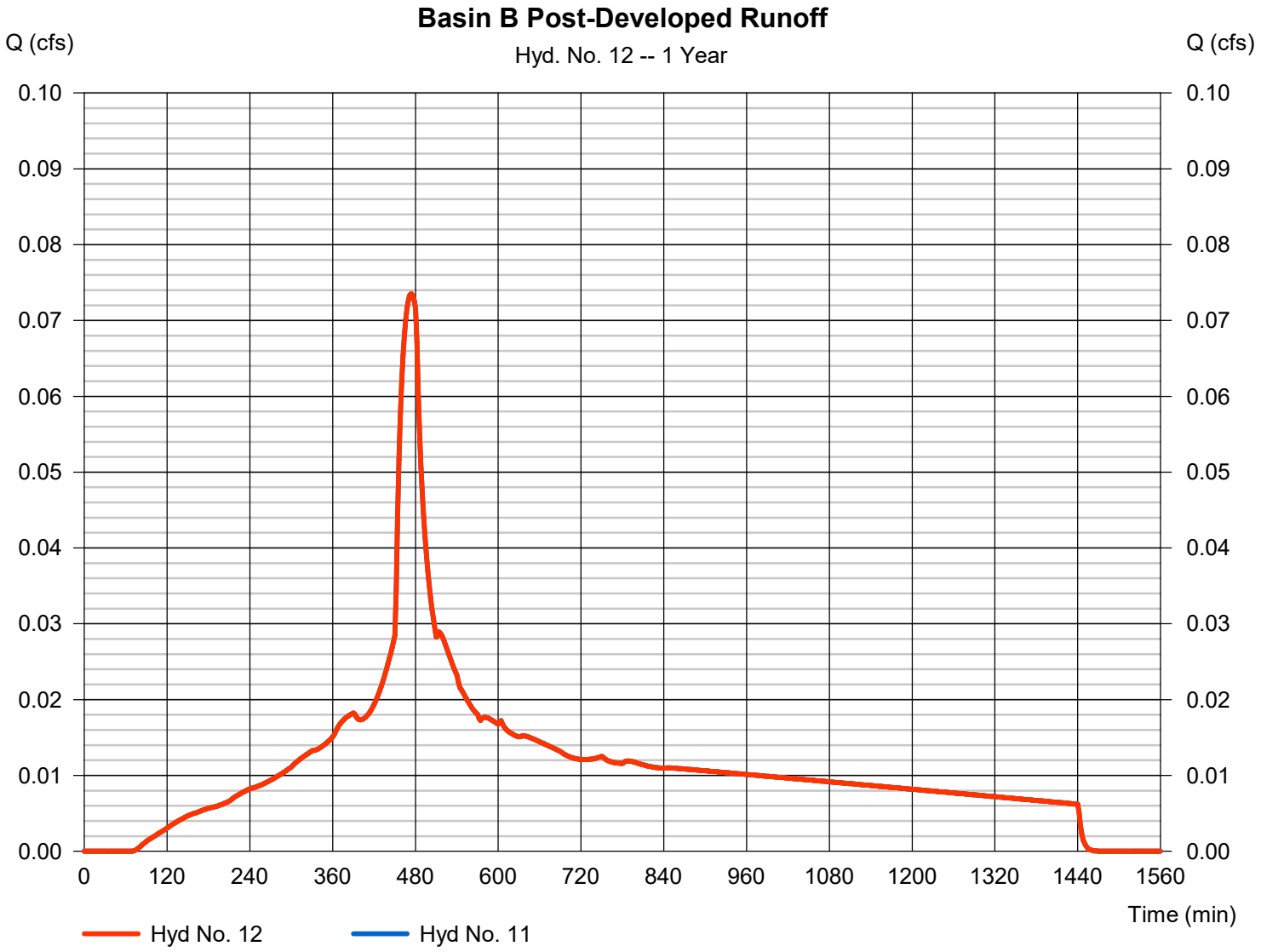


Hydrograph Report

Hyd. No. 12

Basin B Post-Developed Runoff

Hydrograph type	=	Combine	Peak discharge	=	0.074 cfs
Storm frequency	=	1 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	1,039 cuft
Inflow hyds.	=	11	Contrib. drain. area	=	0.190 ac



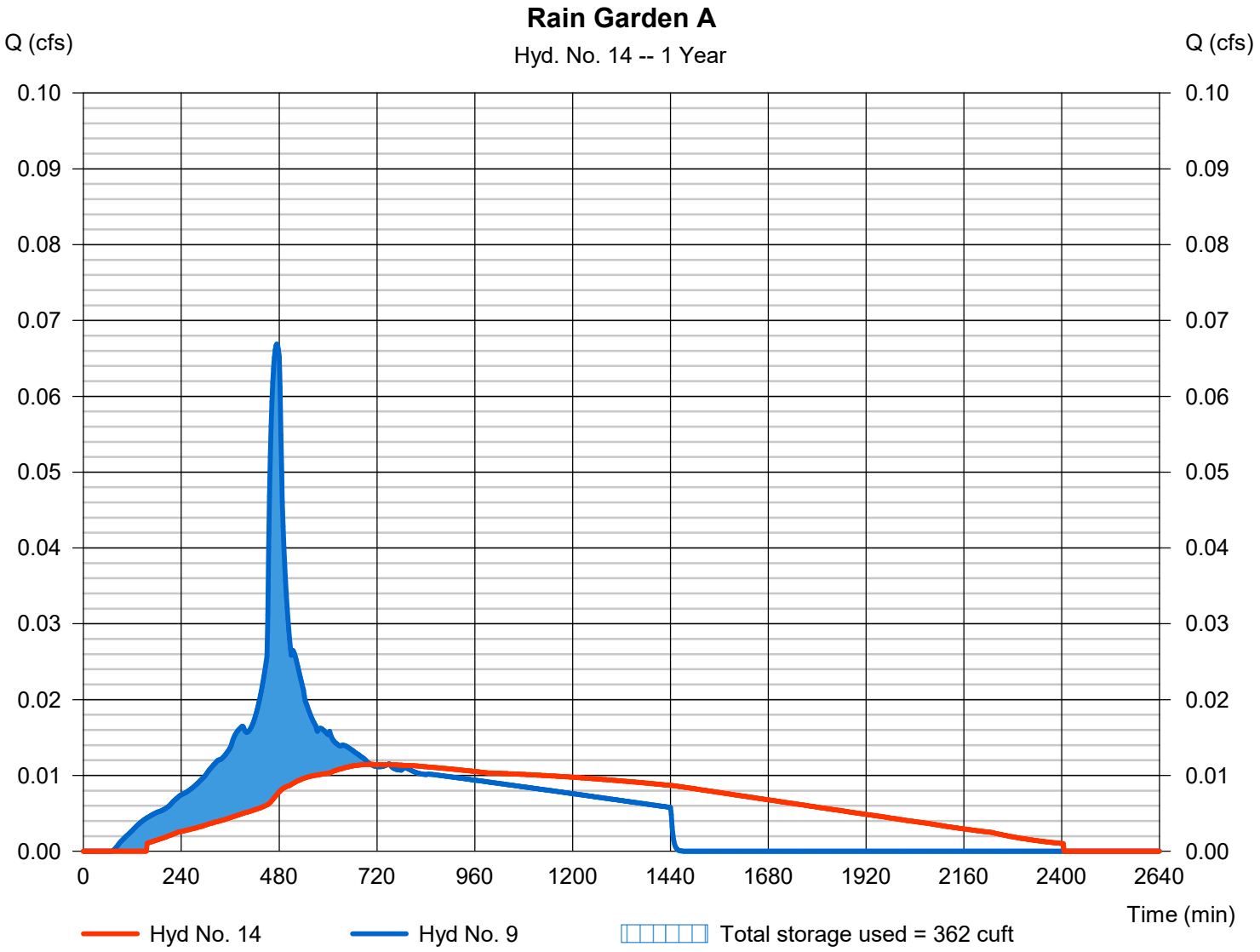
Hydrograph Report

Hyd. No. 14

Rain Garden A

Hydrograph type	=	Reservoir	Peak discharge	=	0.011 cfs
Storm frequency	=	1 yrs	Time to peak	=	704 min
Time interval	=	2 min	Hyd. volume	=	941 cuft
Inflow hyd. No.	=	9 - Basin A Post-Developed Runoff	Max. Elevation	=	188.89 ft
Reservoir name	=	Rain Garden A	Max. Storage	=	362 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Pond No. 1 - Rain Garden A

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	186.75	n/a	0	0
1.25	188.00	n/a	290	290
1.75	188.50	n/a	58	348
3.25	190.00	n/a	52	400
4.25	191.00	n/a	741	1,141

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.55	Inactive	0.00
Span (in)	= 6.00	0.55	0.40	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 186.75	186.75	187.50	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	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 190.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.000 (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	186.75	0.00	0.00	0.00	---	0.00	---	---	---	0.000	---	0.000
1.25	290	188.00	0.01 ic	0.01 ic	0.00	---	0.00	---	---	---	0.000	---	0.009
1.75	348	188.50	0.01 ic	0.01 ic	0.00	---	0.00	---	---	---	0.000	---	0.010
3.25	400	190.00	0.01 ic	0.01 ic	0.00	---	0.00	---	---	---	0.000	---	0.014
4.25	1,141	191.00	1.56 oc	0.00 ic	0.00	---	1.56 s	---	---	---	0.000	---	1.559

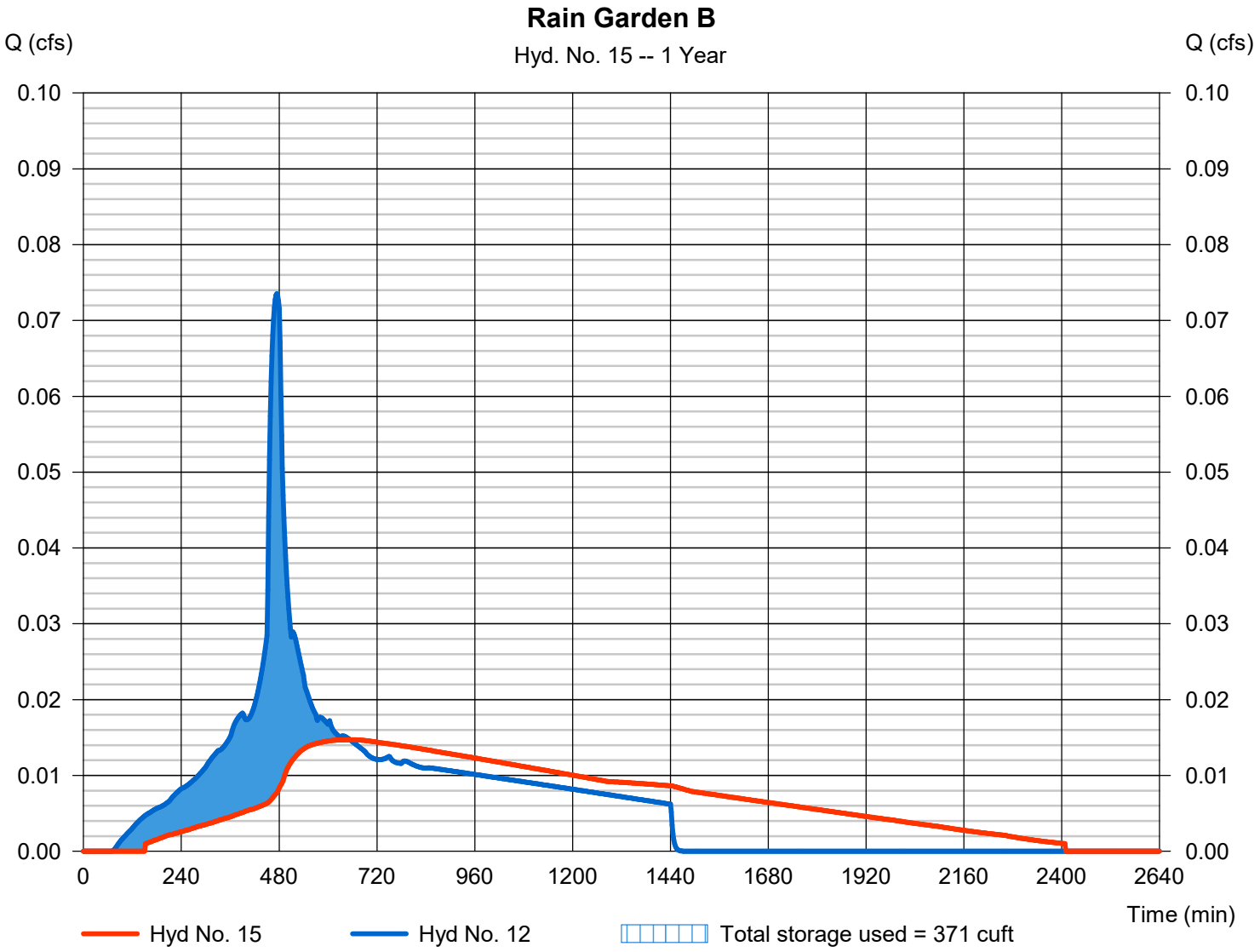
Hydrograph Report

Hyd. No. 15

Rain Garden B

Hydrograph type	=	Reservoir	Peak discharge	=	0.015 cfs
Storm frequency	=	1 yrs	Time to peak	=	654 min
Time interval	=	2 min	Hyd. volume	=	1,027 cuft
Inflow hyd. No.	=	12 - Basin B Post-Developed Runoff	Max. Elevation	=	179.99 ft
Reservoir name	=	Rain Garden B	Max. Storage	=	371 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Pond No. 3 - Rain Garden B

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	177.50	n/a	0	0
0.75	178.25	n/a	254	254
1.00	178.50	n/a	42	296
2.50	180.00	n/a	76	372
3.50	181.00	n/a	1,058	1,430

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.60	Inactive	0.00
Span (in)	= 6.00	0.60	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 177.50	177.50	0.00	0.00
Length (ft)	= 50.00	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)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 180.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.000 (by Wet area)

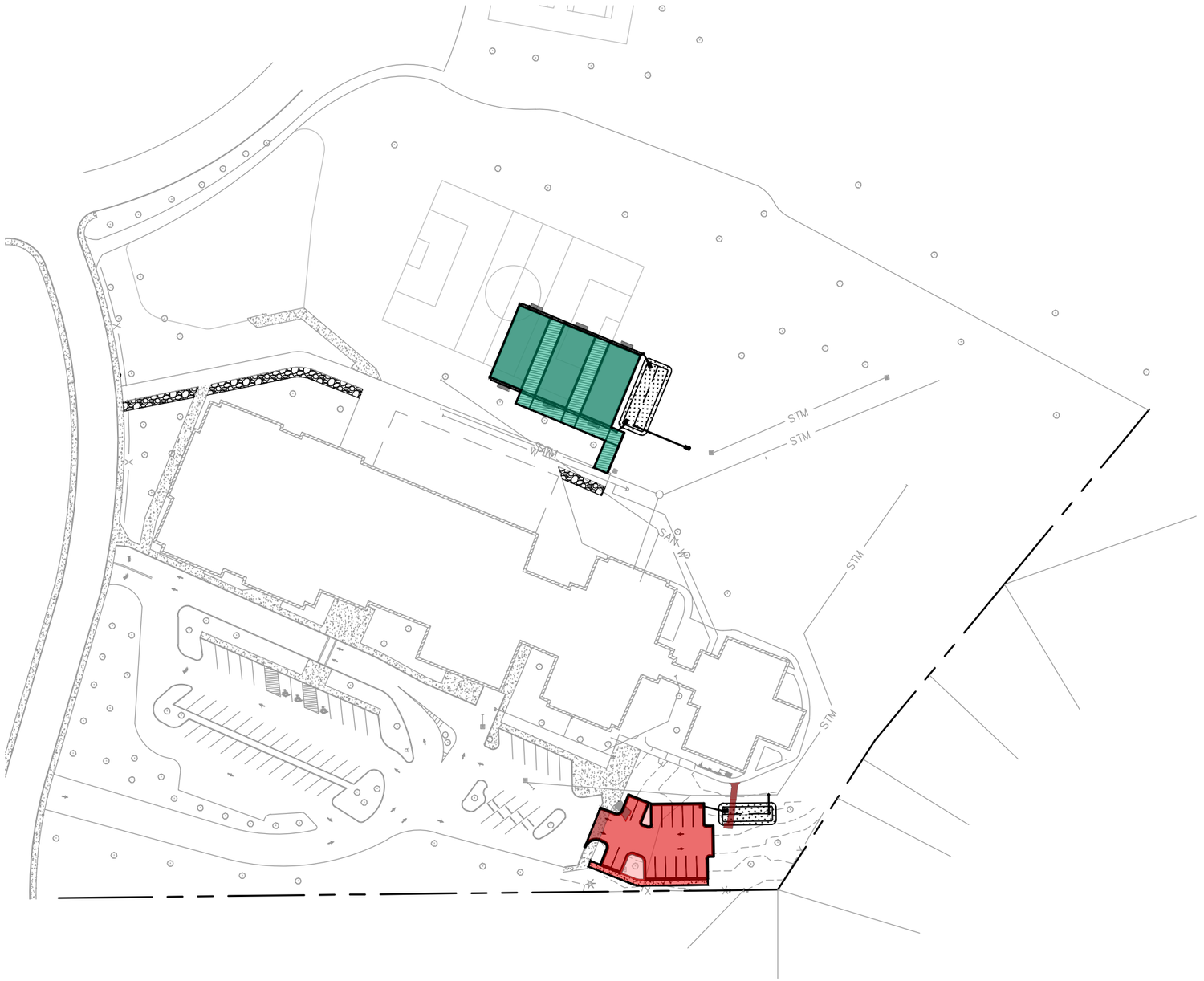
TW Elev. (ft) = 0.00

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	177.50	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.75	254	178.25	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.000	---	0.008
1.00	296	178.50	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.000	---	0.009
2.50	372	180.00	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.000	---	0.015
3.50	1,430	181.00	1.36 oc	0.00 ic	---	---	1.35 s	---	---	---	0.000	---	1.355

P:\01-Portland\BSD (Beaverton School District)\BSD-122 (Greenway Portables)\BSD122-DOCS\Reports\Stormwater\Figures\ FIG. 6 - WATER QUALITY BASIN MAP.dwg



BASIN A - NEW IMPERVIOUS
5,009 SF (0.115 AC)

BASIN A - MODIFIED IMPERVIOUS
491 SF (0.011 AC)

BASIN A - PERVIOUS
415 SF (0.010 AC)

BASIN B - NEW IMPERVIOUS
10,566 SF (0.243 AC)

BASIN B - PERVIOUS
768 SF (0.018 AC)

N

0 50 100 200

SCALE: 1" = 100'

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR
DRAWN: HHPR
CHECKED: HHPR
DATE: 02/26/2024

Harper Houf Peterson Righellis Inc.
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phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

WATER QUALITY BASIN MAP

GREENWAY PORTABLES

BEAVERTON, OR

SHEET NO. FIG. 6

JOB NO. BSD-122

Appendix D – Hydrographs

Hydraflow Table of Contents

BSD-122 Hydrographs.gpw

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

Thursday, 02 / 29 / 2024

2 - Year

5 - Year

10 - Year

25 - Year

Hydrograph Summary Report

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

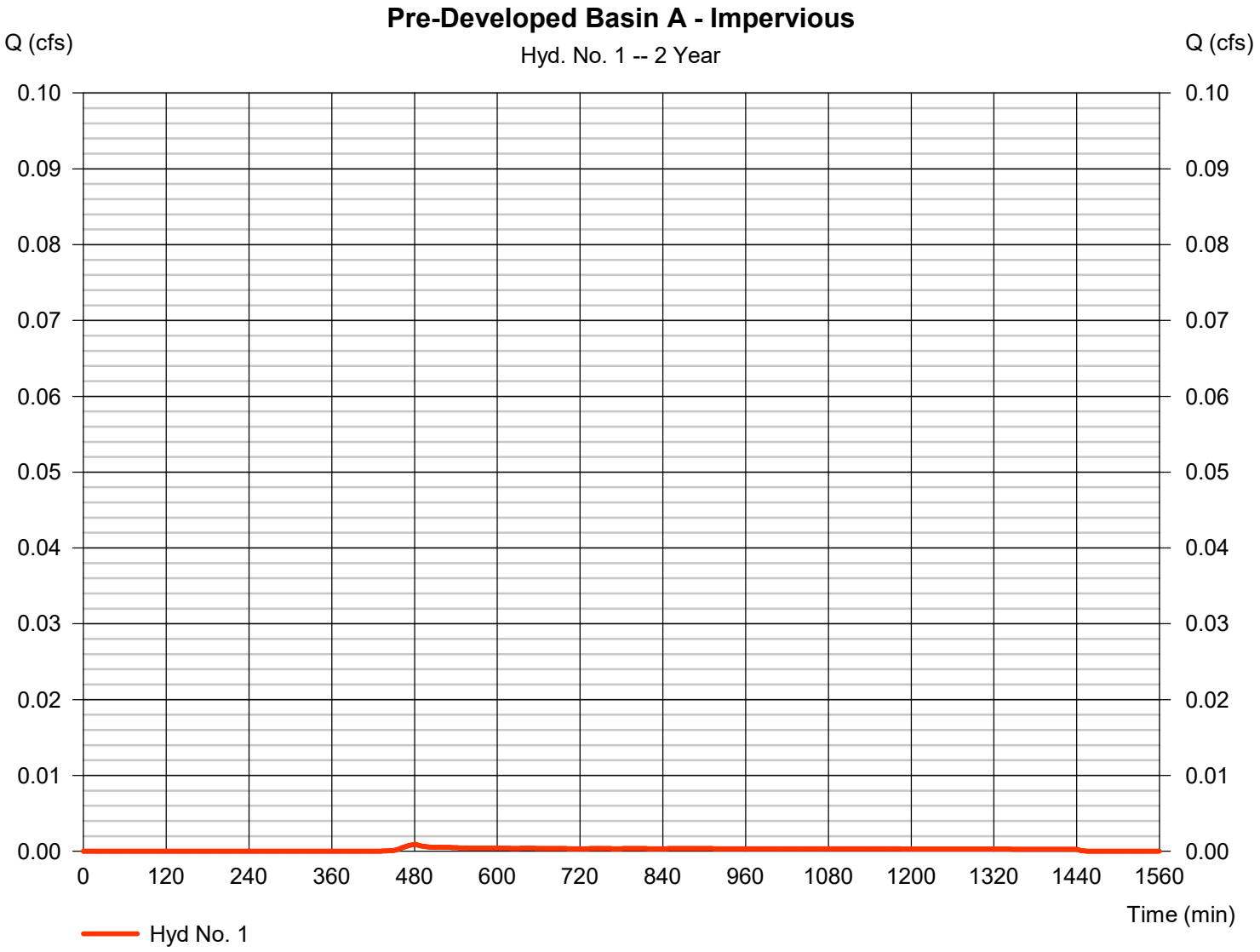
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.001	2	480	21	------	------	------	Pre-Developed Basin A - Impervious
2	SBUH Runoff	0.028	2	480	523	------	------	------	Pre-Developed Basin A - Pervious
3	Combine	0.029	2	480	544	1, 2	------	------	Basin A Pre-Developed Runoff
5	SBUH Runoff	0.031	2	480	578	------	------	------	Pre-Developed Basin B - Pervious
7	SBUH Runoff	0.099	2	474	1,418	------	------	------	Post-Developed Basin A - Impervious
8	SBUH Runoff	0.001	2	480	27	------	------	------	Post-Developed Basin A - Pervious
9	Combine	0.100	2	474	1,445	7, 8	------	------	Basin A Post-Developed Runoff
11	SBUH Runoff	0.109	2	474	1,566	------	------	------	Post-Developed Basin B - Impervious
12	Combine	0.109	2	474	1,566	11	------	------	Basin B Post-Developed Runoff
14	Reservoir	0.013	2	1008	1,433	9	189.35	641	Rain Garden A
15	Reservoir	0.016	2	896	1,554	12	180.27	659	Rain Garden B

Hydrograph Report

Hyd. No. 1

Pre-Developed Basin A - Impervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 2 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 21 cuft
Drainage area	= 0.009 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

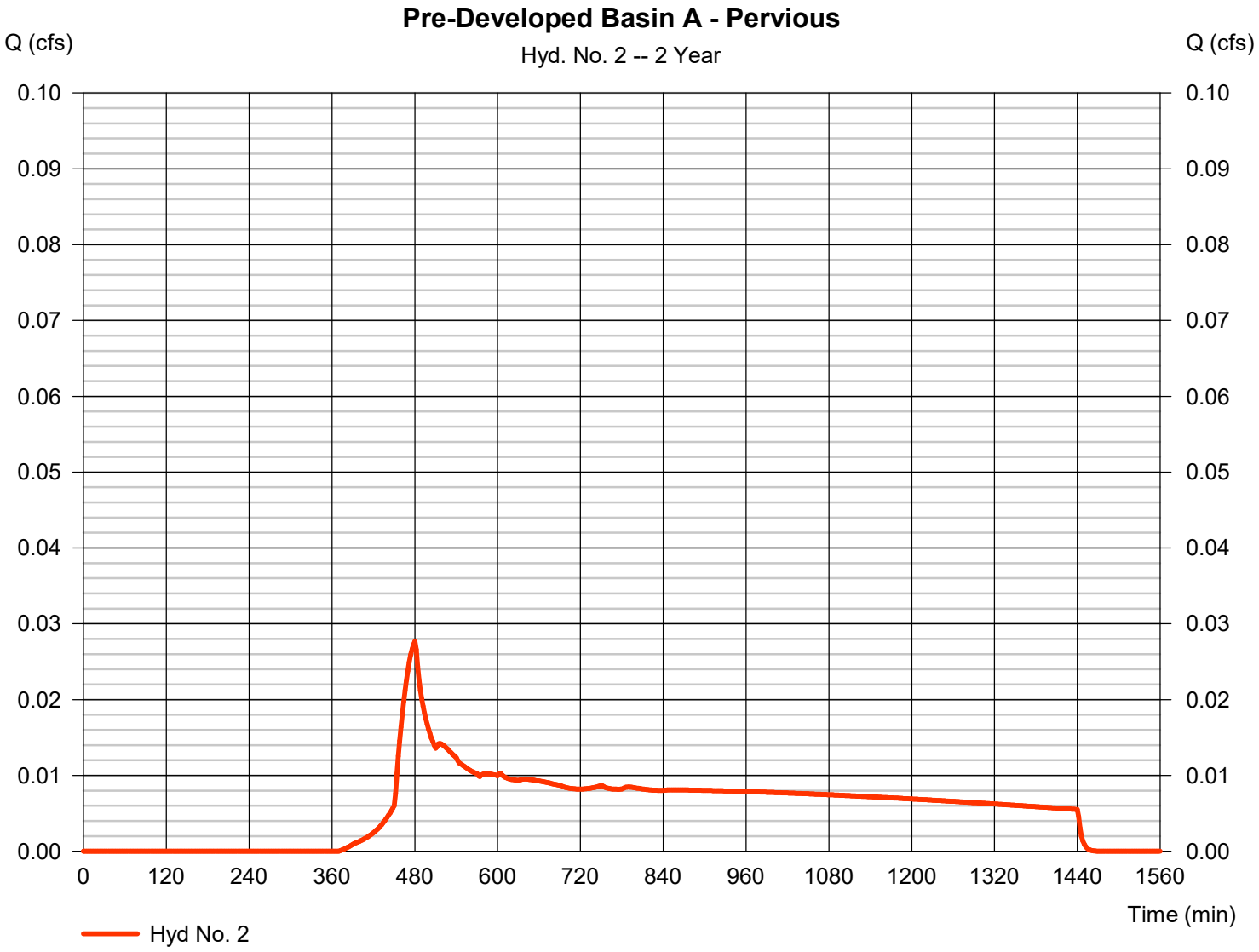


Hydrograph Report

Hyd. No. 2

Pre-Developed Basin A - Pervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.028 cfs
Storm frequency	= 2 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 523 cuft
Drainage area	= 0.172 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

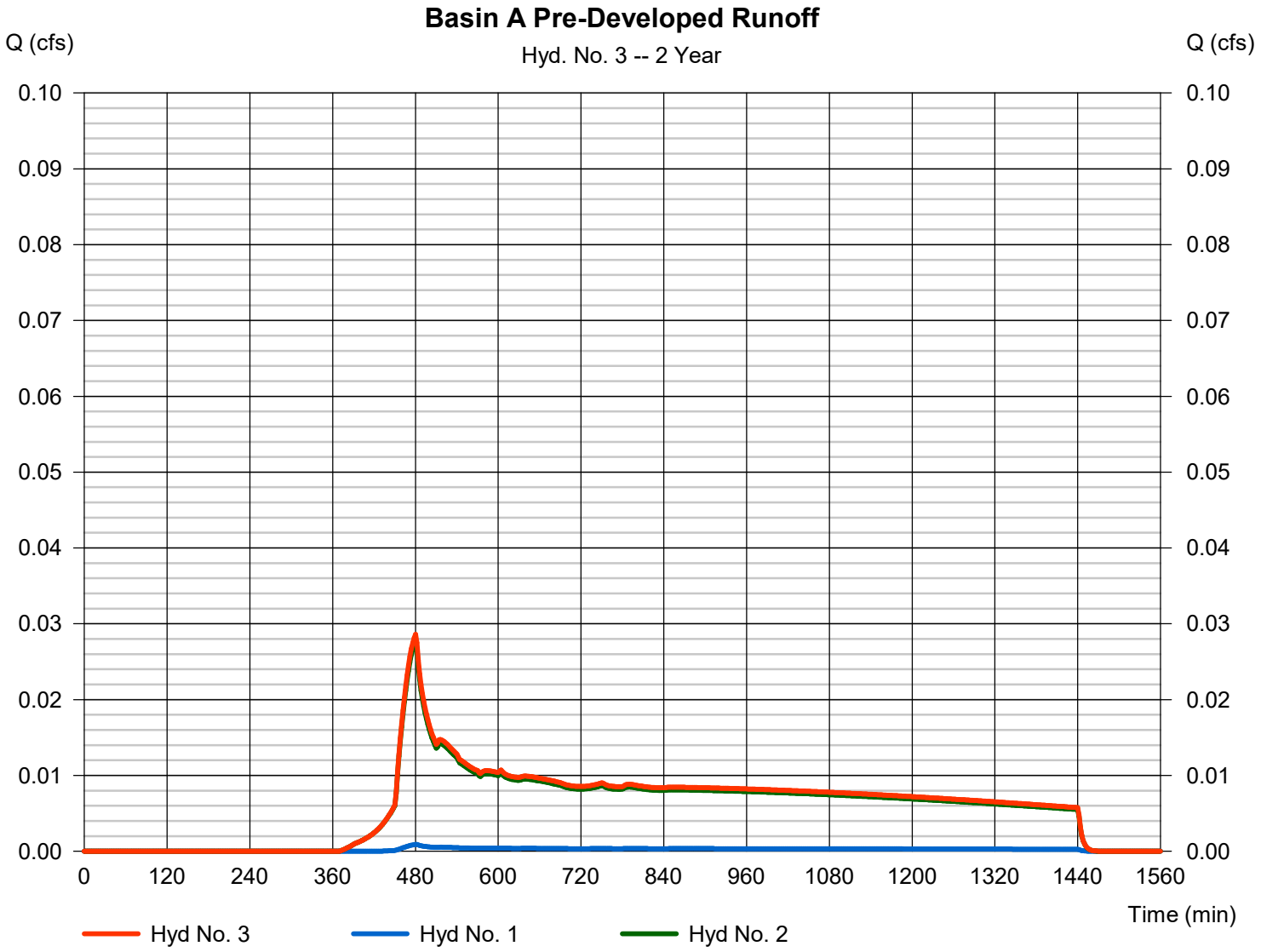


Hydrograph Report

Hyd. No. 3

Basin A Pre-Developed Runoff

Hydrograph type	=	Combine	Peak discharge	=	0.029 cfs
Storm frequency	=	2 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	544 cuft
Inflow hyds.	=	1, 2	Contrib. drain. area	=	0.181 ac

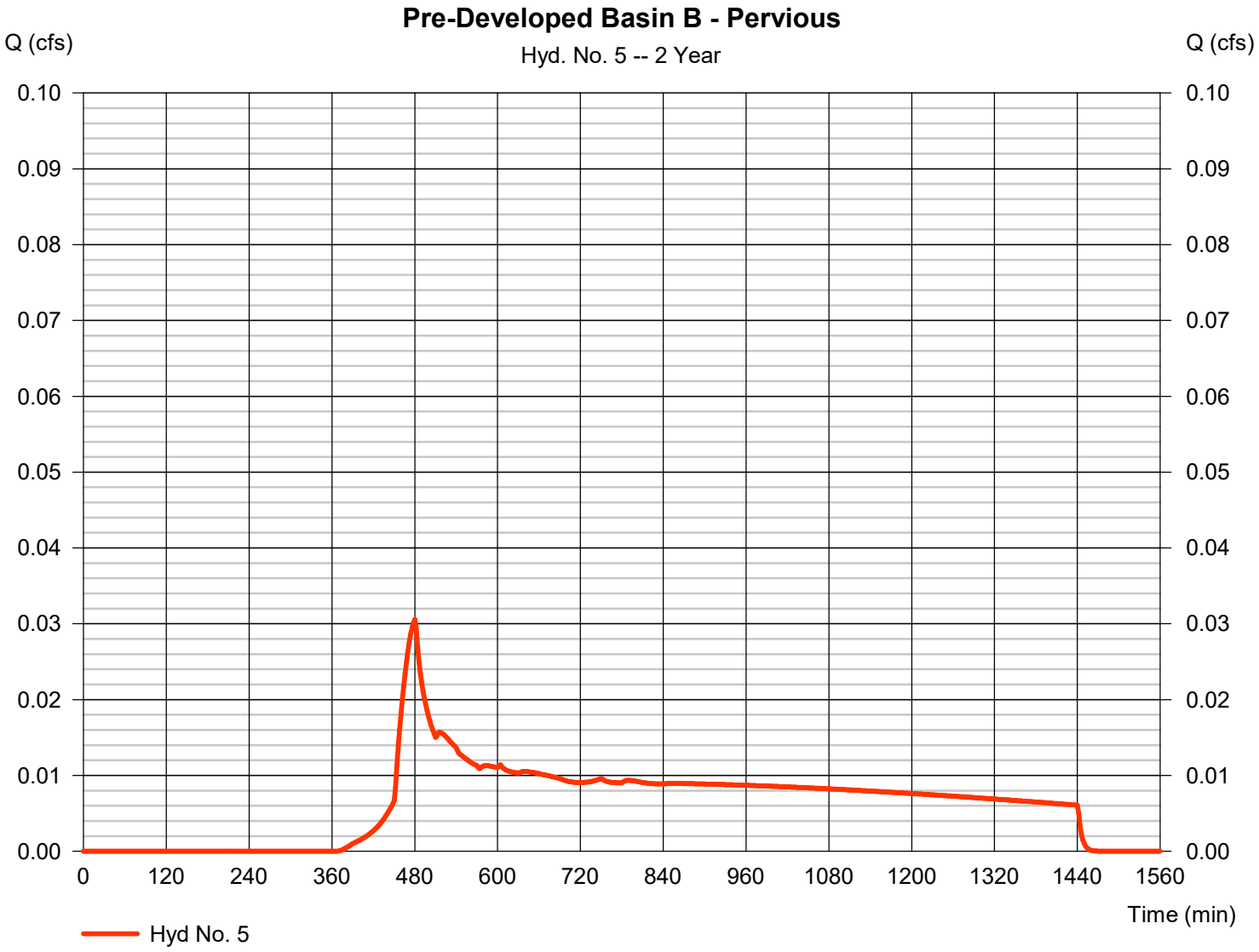


Hydrograph Report

Hyd. No. 5

Pre-Developed Basin B - Pervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.031 cfs
Storm frequency	=	2 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	578 cuft
Drainage area	=	0.190 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.50 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

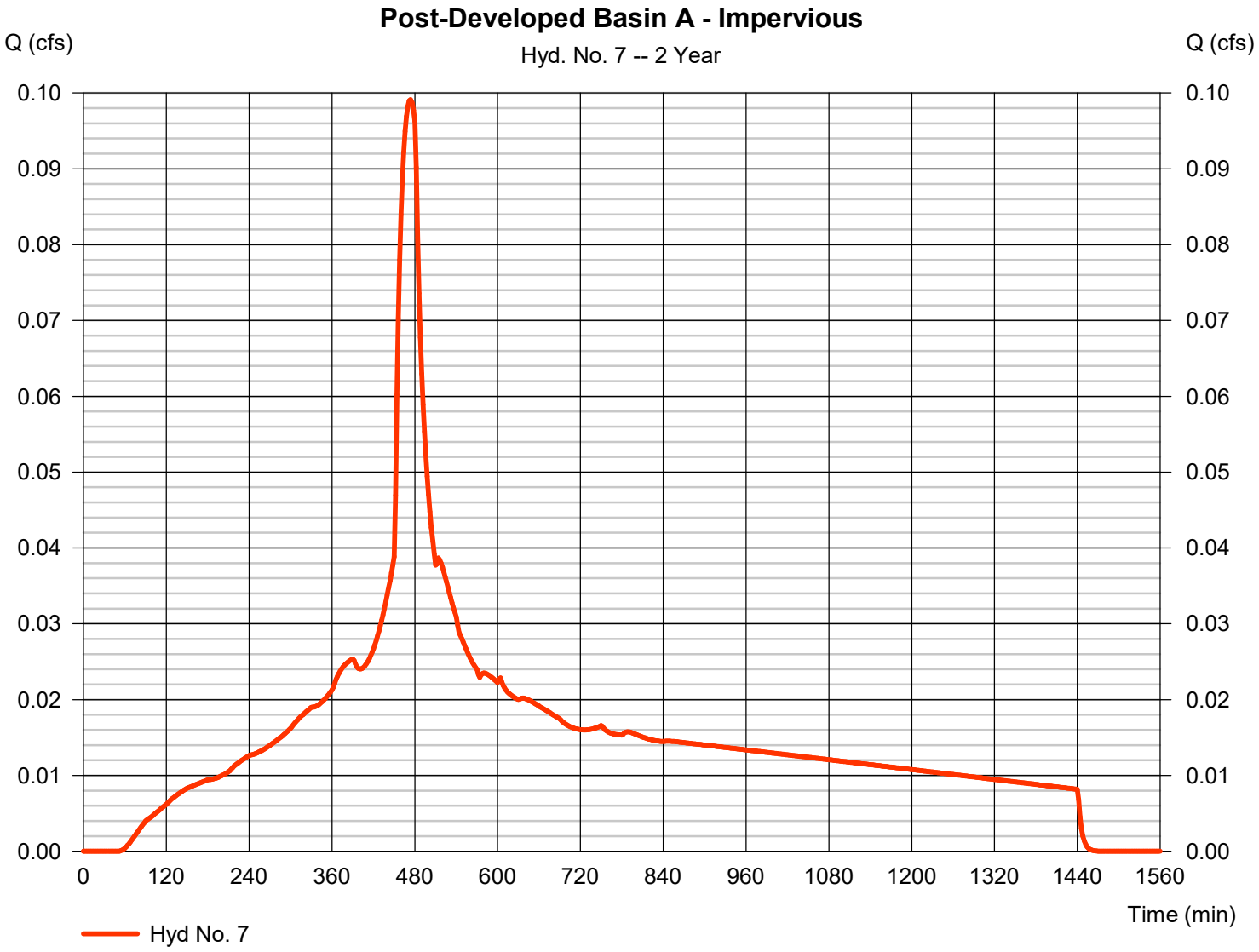


Hydrograph Report

Hyd. No. 7

Post-Developed Basin A - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.099 cfs
Storm frequency	=	2 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	1,418 cuft
Drainage area	=	0.172 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.50 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

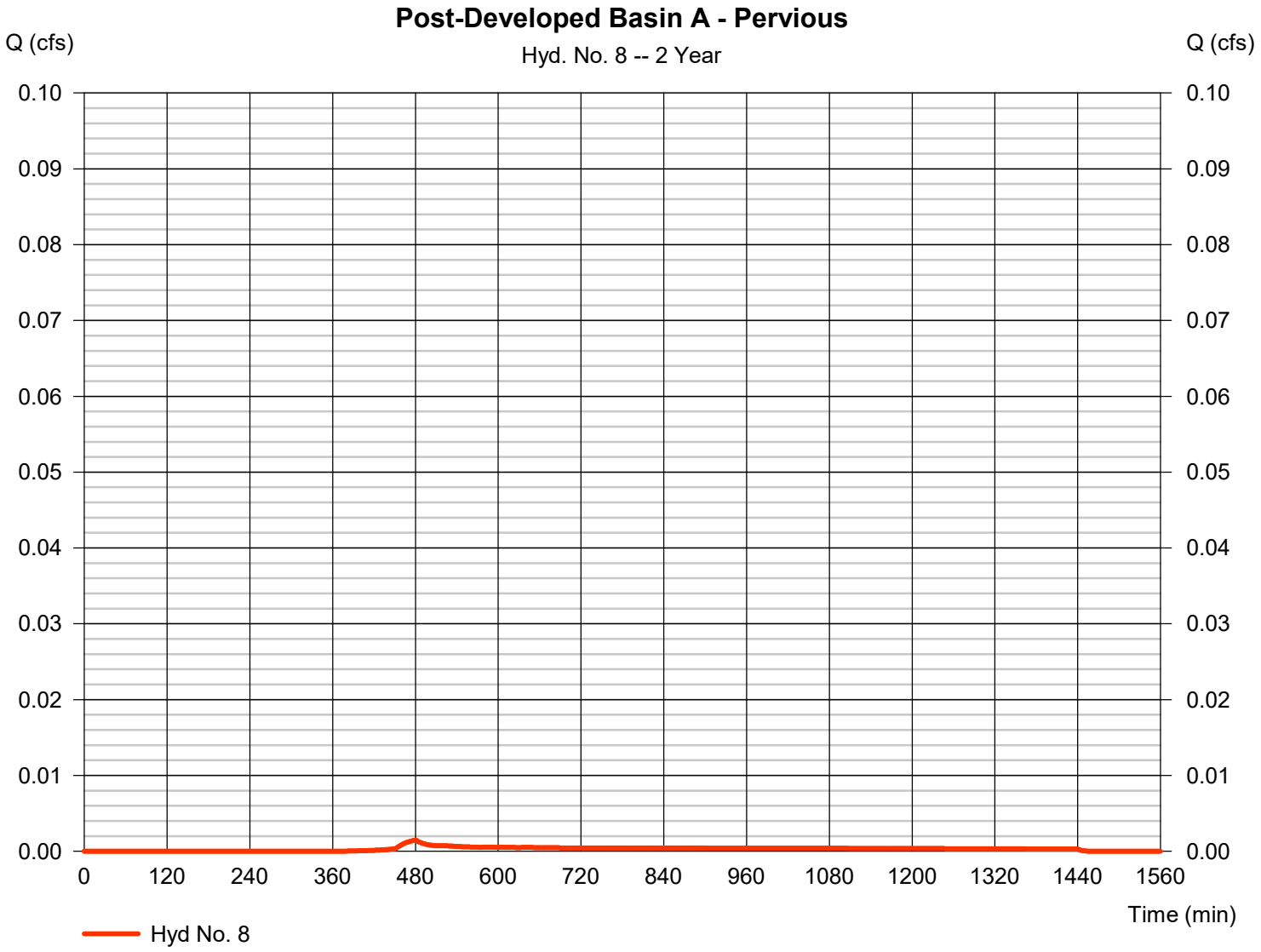


Hydrograph Report

Hyd. No. 8

Post-Developed Basin A - Pervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.001 cfs
Storm frequency	=	2 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	27 cuft
Drainage area	=	0.009 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.50 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

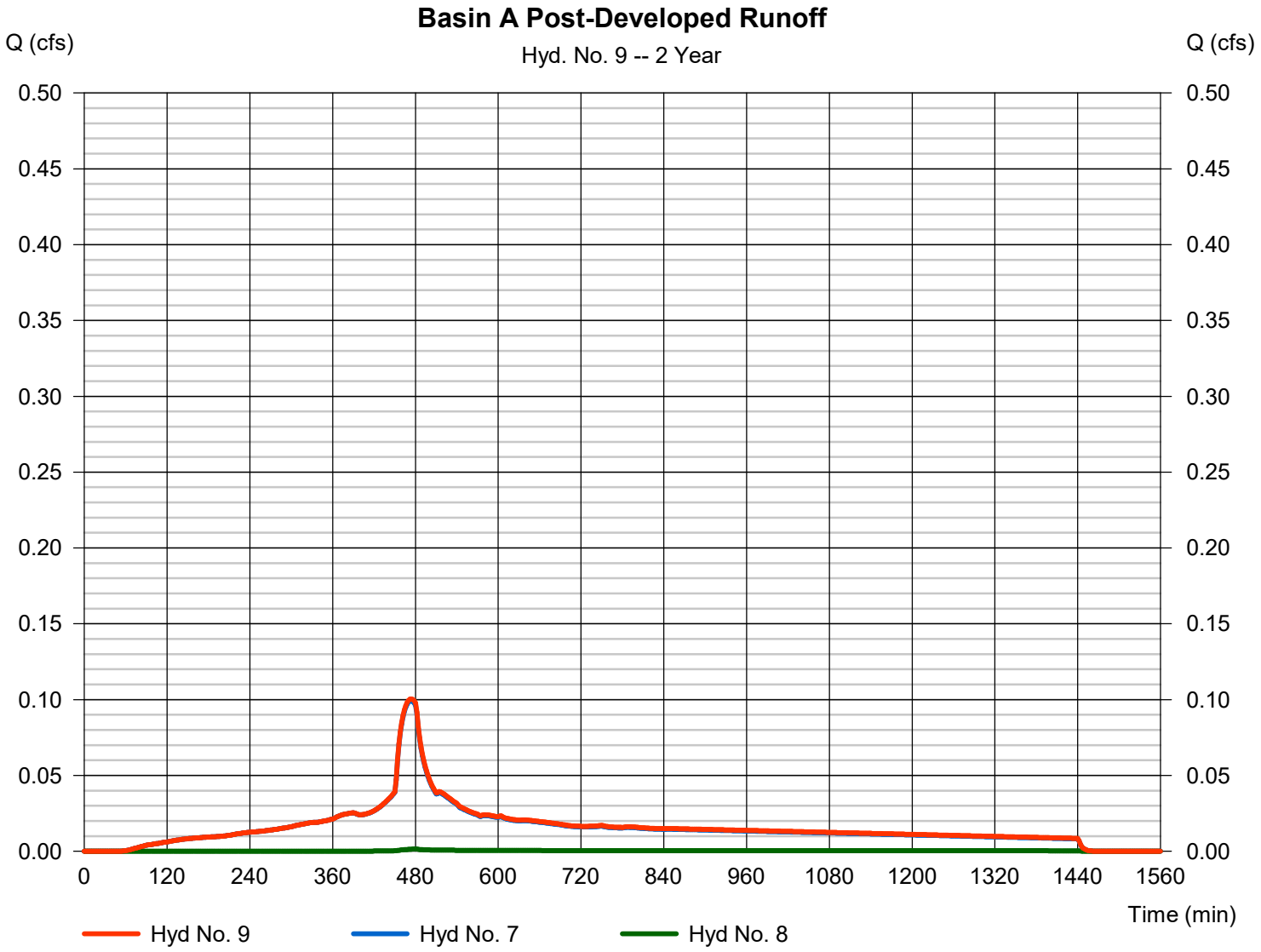


Hydrograph Report

Hyd. No. 9

Basin A Post-Developed Runoff

Hydrograph type	= Combine	Peak discharge	= 0.100 cfs
Storm frequency	= 2 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 1,445 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.181 ac

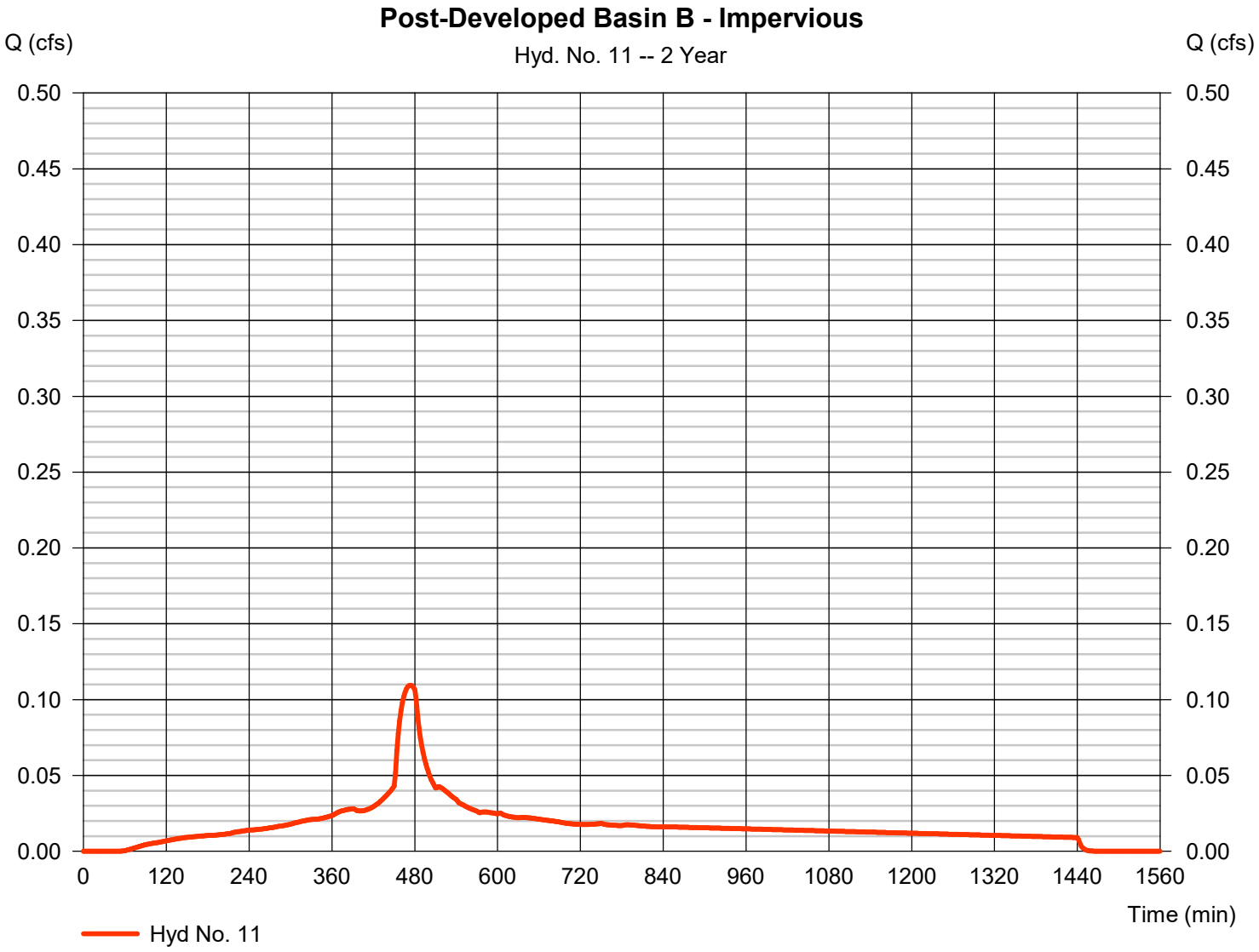


Hydrograph Report

Hyd. No. 11

Post-Developed Basin B - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.109 cfs
Storm frequency	=	2 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	1,566 cuft
Drainage area	=	0.190 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.50 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

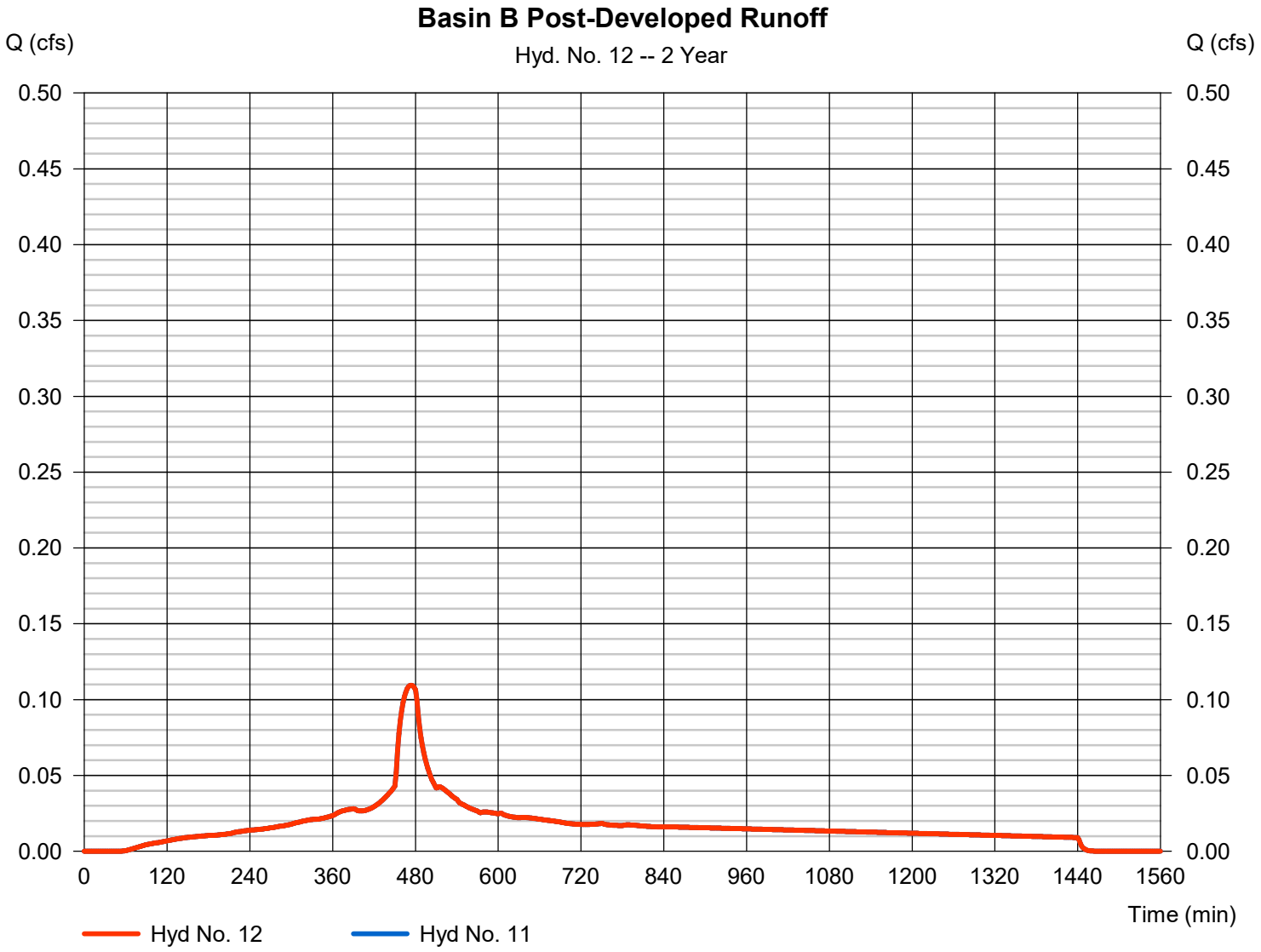


Hydrograph Report

Hyd. No. 12

Basin B Post-Developed Runoff

Hydrograph type	= Combine	Peak discharge	= 0.109 cfs
Storm frequency	= 2 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 1,566 cuft
Inflow hyds.	= 11	Contrib. drain. area	= 0.190 ac



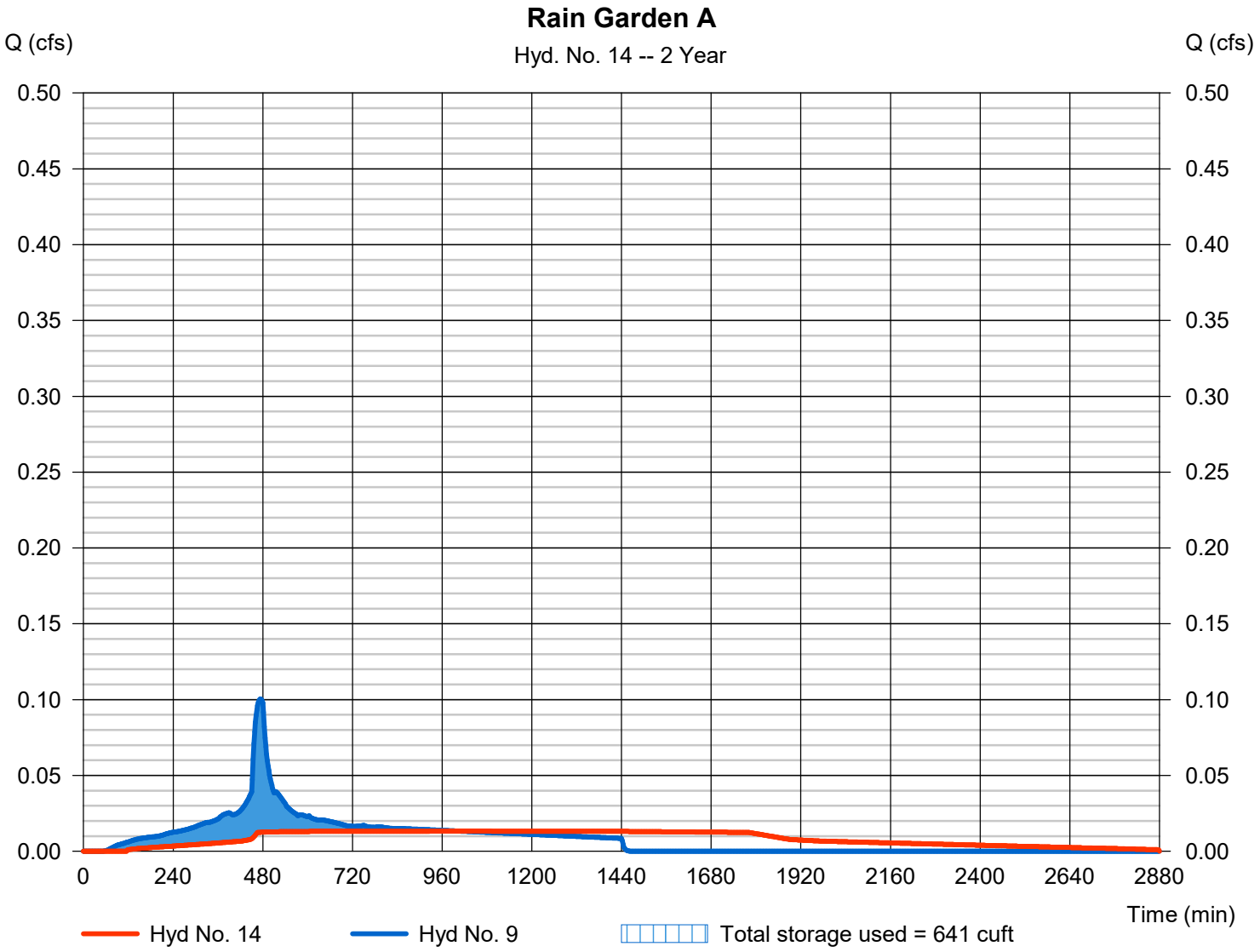
Hydrograph Report

Hyd. No. 14

Rain Garden A

Hydrograph type	=	Reservoir	Peak discharge	=	0.013 cfs
Storm frequency	=	2 yrs	Time to peak	=	1008 min
Time interval	=	2 min	Hyd. volume	=	1,433 cuft
Inflow hyd. No.	=	9 - Basin A Post-Developed Runoff	Max. Elevation	=	189.35 ft
Reservoir name	=	Rain Garden A	Max. Storage	=	641 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Pond No. 1 - Rain Garden A

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	186.75	n/a	0	0
1.25	188.00	n/a	290	290
1.75	188.50	n/a	58	348
3.25	190.00	n/a	52	400
4.25	191.00	n/a	741	1,141

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.55	Inactive	0.00
Span (in)	= 6.00	0.55	0.40	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 186.75	186.75	187.50	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	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 190.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.000 (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	186.75	0.00	0.00	0.00	---	0.00	---	---	---	0.000	---	0.000
1.25	290	188.00	0.01 ic	0.01 ic	0.00	---	0.00	---	---	---	0.000	---	0.009
1.75	348	188.50	0.01 ic	0.01 ic	0.00	---	0.00	---	---	---	0.000	---	0.010
3.25	400	190.00	0.01 ic	0.01 ic	0.00	---	0.00	---	---	---	0.000	---	0.014
4.25	1,141	191.00	1.56 oc	0.00 ic	0.00	---	1.56 s	---	---	---	0.000	---	1.559

0 - 1.25: Drain Rock Section (3/4")
1.25 - 1.75: Drain Rock Section (1 1/2" - 3/4")
1.75 - 3.25: Growing Media Section
3.25 - 4.25: Ponding Depth

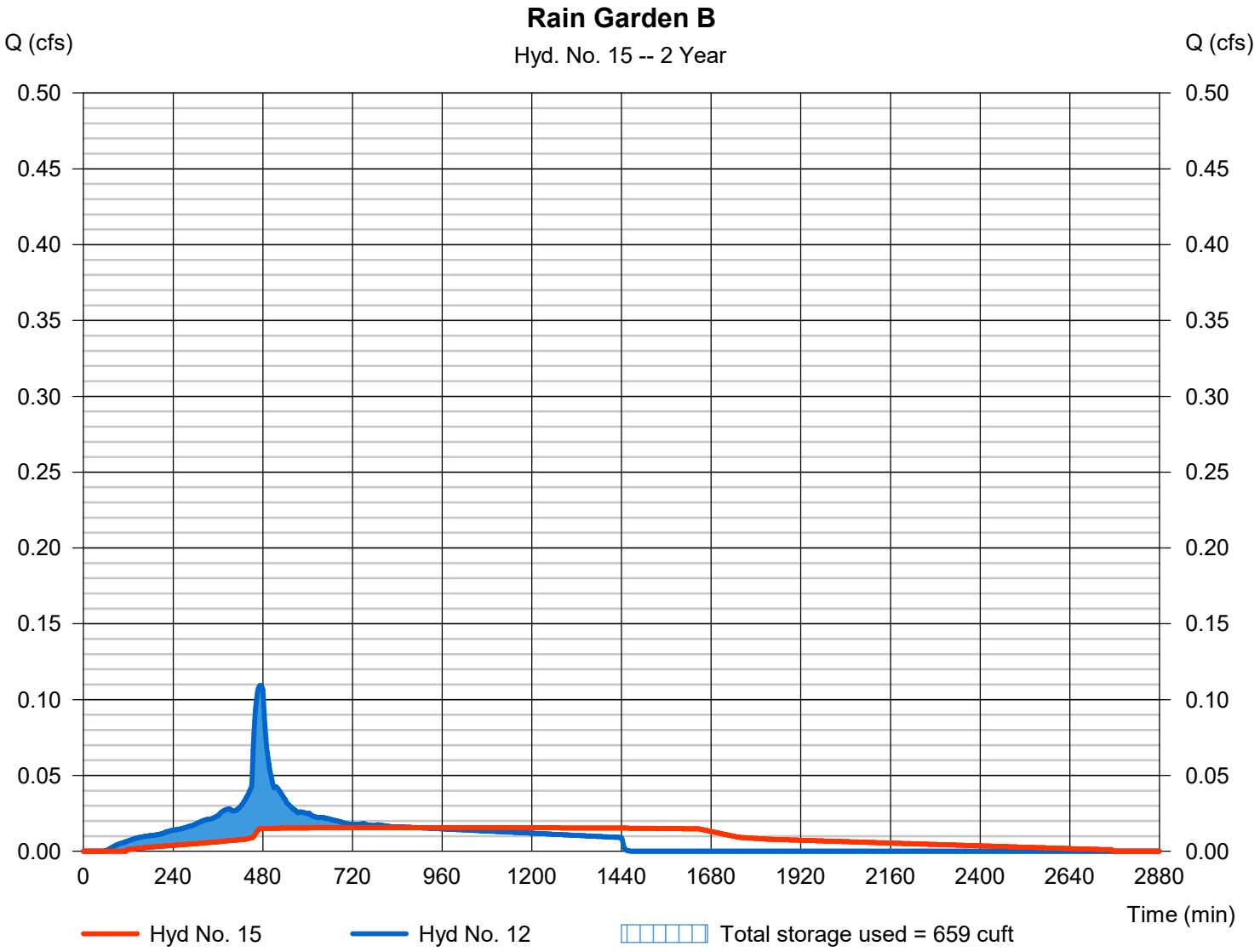
Hydrograph Report

Hyd. No. 15

Rain Garden B

Hydrograph type	=	Reservoir	Peak discharge	=	0.016 cfs
Storm frequency	=	2 yrs	Time to peak	=	896 min
Time interval	=	2 min	Hyd. volume	=	1,554 cuft
Inflow hyd. No.	=	12 - Basin B Post-Developed Runoff	Max. Elevation	=	180.27 ft
Reservoir name	=	Rain Garden B	Max. Storage	=	659 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Pond No. 3 - Rain Garden B

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	177.50	n/a	0	0
0.75	178.25	n/a	254	254
1.00	178.50	n/a	42	296
2.50	180.00	n/a	76	372
3.50	181.00	n/a	1,058	1,430

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.60	Inactive	0.00
Span (in)	= 6.00	0.60	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 177.50	177.50	0.00	0.00
Length (ft)	= 50.00	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)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 180.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.000 (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	177.50	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.75	254	178.25	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.000	---	0.008
1.00	296	178.50	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.000	---	0.009
2.50	372	180.00	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.000	---	0.015
3.50	1,430	181.00	1.36 oc	0.00 ic	---	---	1.35 s	---	---	---	0.000	---	1.355

0 - 0.75: Drain Rock Section (3/4")
0.75 - 1.00: Drain Rock Section (1 1/2" - 3/4")
1.00 - 2.50: Growing Media Section
2.50 - 3.50: Ponding Depth

Hydrograph Summary Report

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

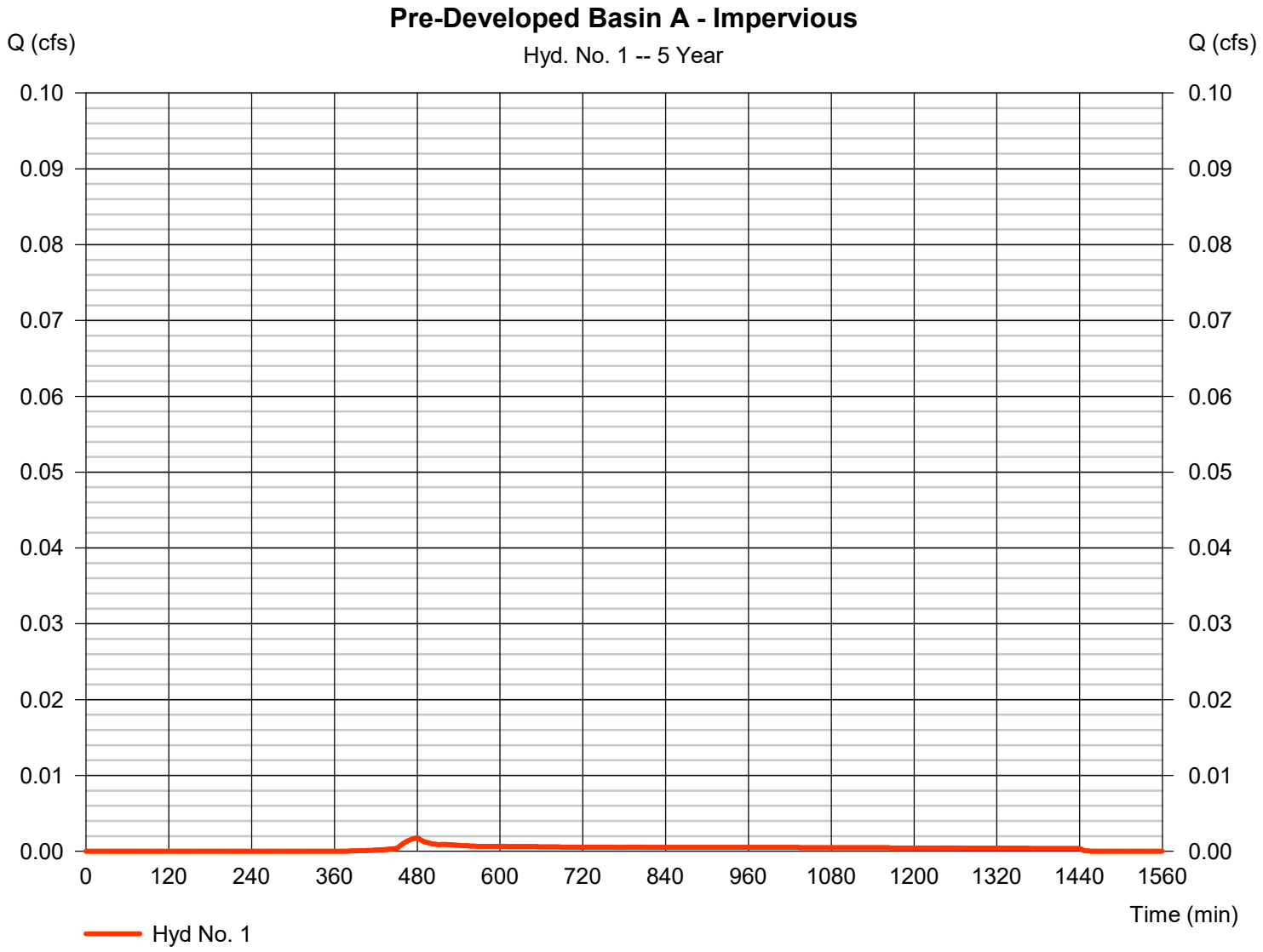
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.002	2	480	34	------	------	------	Pre-Developed Basin A - Impervious
2	SBUH Runoff	0.047	2	480	788	------	------	------	Pre-Developed Basin A - Pervious
3	Combine	0.048	2	480	822	1, 2	------	------	Basin A Pre-Developed Runoff
5	SBUH Runoff	0.051	2	480	870	------	------	------	Pre-Developed Basin B - Pervious
7	SBUH Runoff	0.124	2	474	1,791	------	------	------	Post-Developed Basin A - Impervious
8	SBUH Runoff	0.002	2	480	41	------	------	------	Post-Developed Basin A - Pervious
9	Combine	0.127	2	474	1,832	7, 8	------	------	Basin A Post-Developed Runoff
11	SBUH Runoff	0.137	2	474	1,978	------	------	------	Post-Developed Basin B - Impervious
12	Combine	0.137	2	474	1,978	11	------	------	Basin B Post-Developed Runoff
14	Reservoir	0.025	2	654	1,820	9	189.50	785	Rain Garden A
15	Reservoir	0.021	2	808	1,966	12	180.50	902	Rain Garden B

Hydrograph Report

Hyd. No. 1

Pre-Developed Basin A - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.002 cfs
Storm frequency	=	5 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	34 cuft
Drainage area	=	0.009 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.10 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

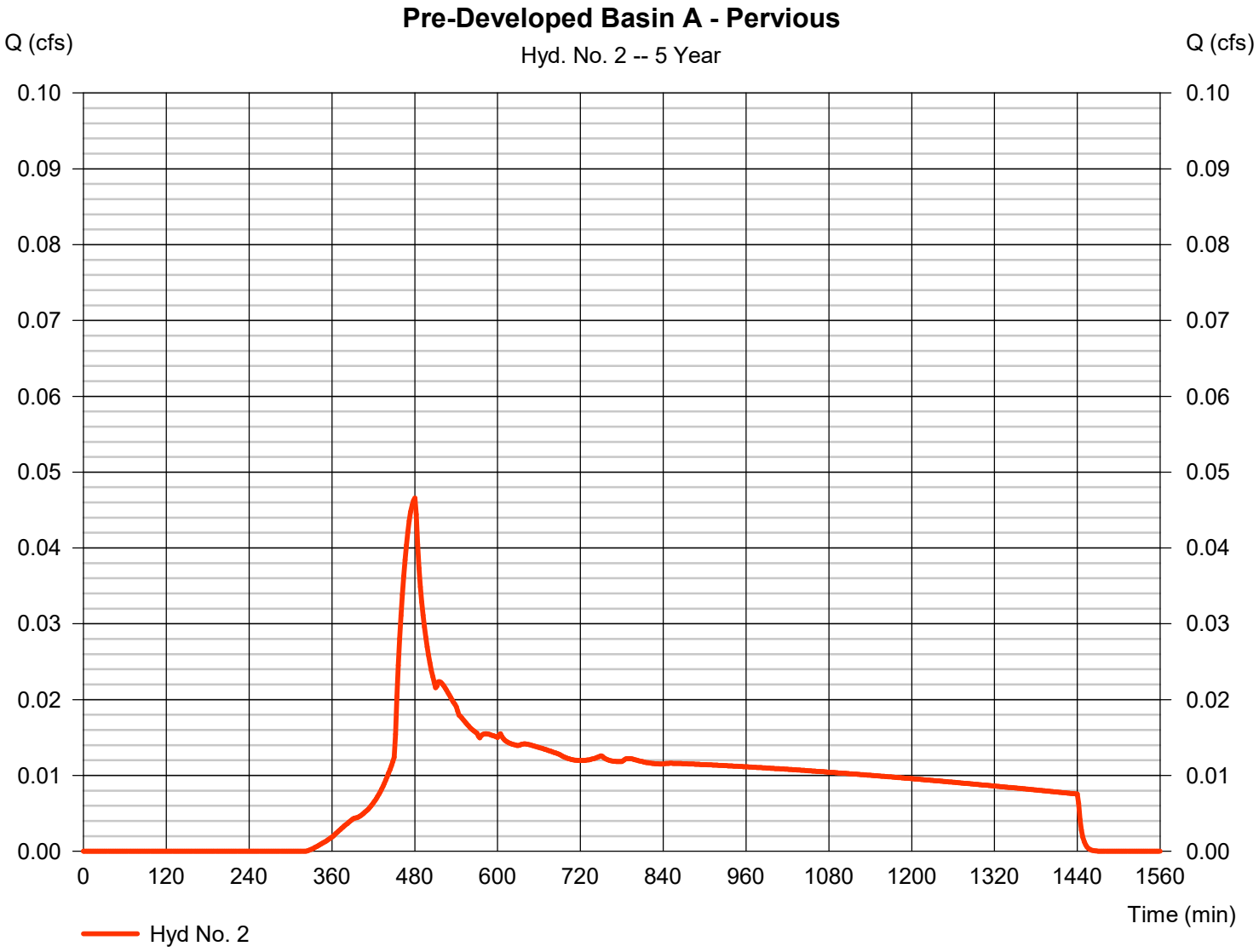


Hydrograph Report

Hyd. No. 2

Pre-Developed Basin A - Pervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.047 cfs
Storm frequency	= 5 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 788 cuft
Drainage area	= 0.172 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.10 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

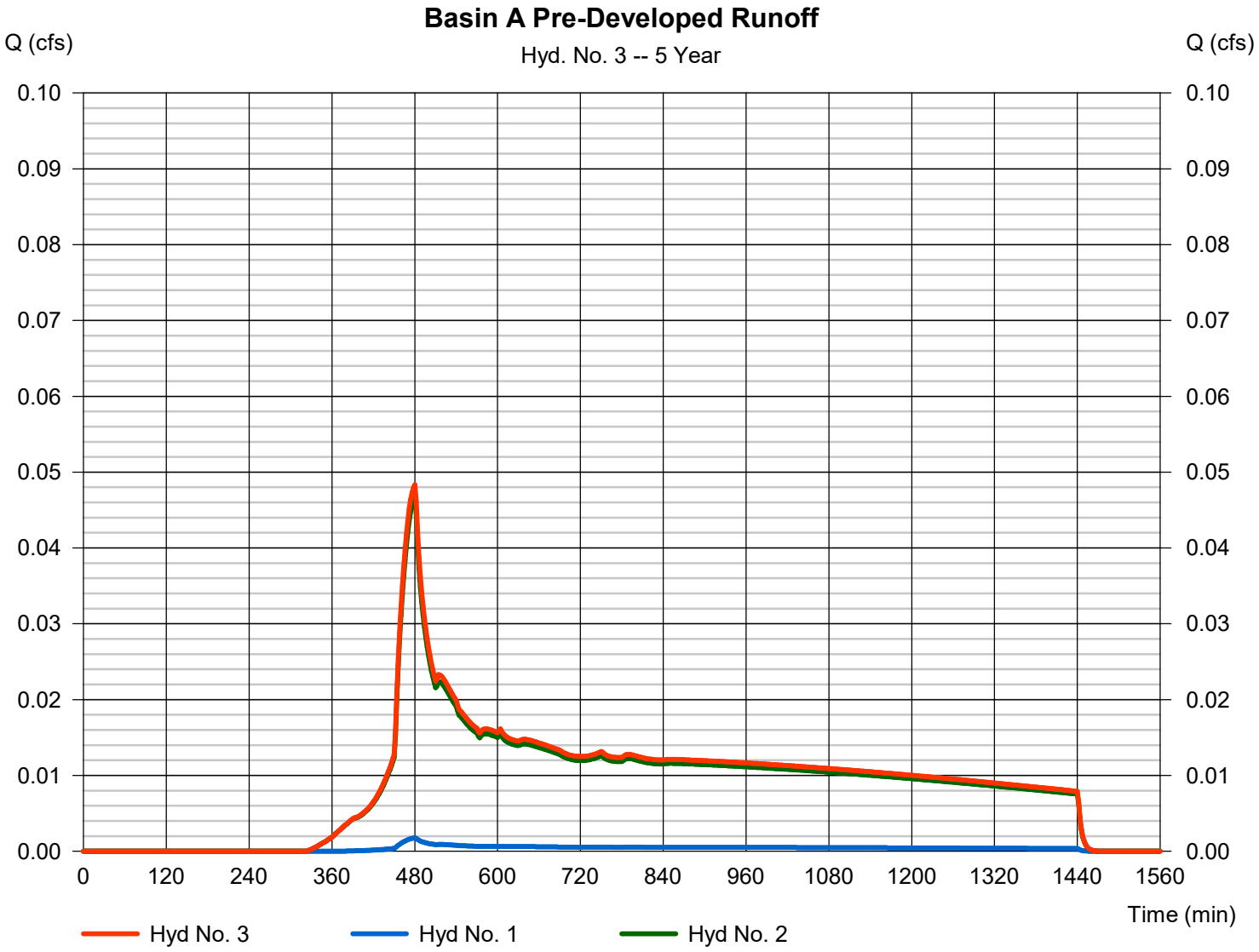


Hydrograph Report

Hyd. No. 3

Basin A Pre-Developed Runoff

Hydrograph type	=	Combine	Peak discharge	=	0.048 cfs
Storm frequency	=	5 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	822 cuft
Inflow hyds.	=	1, 2	Contrib. drain. area	=	0.181 ac

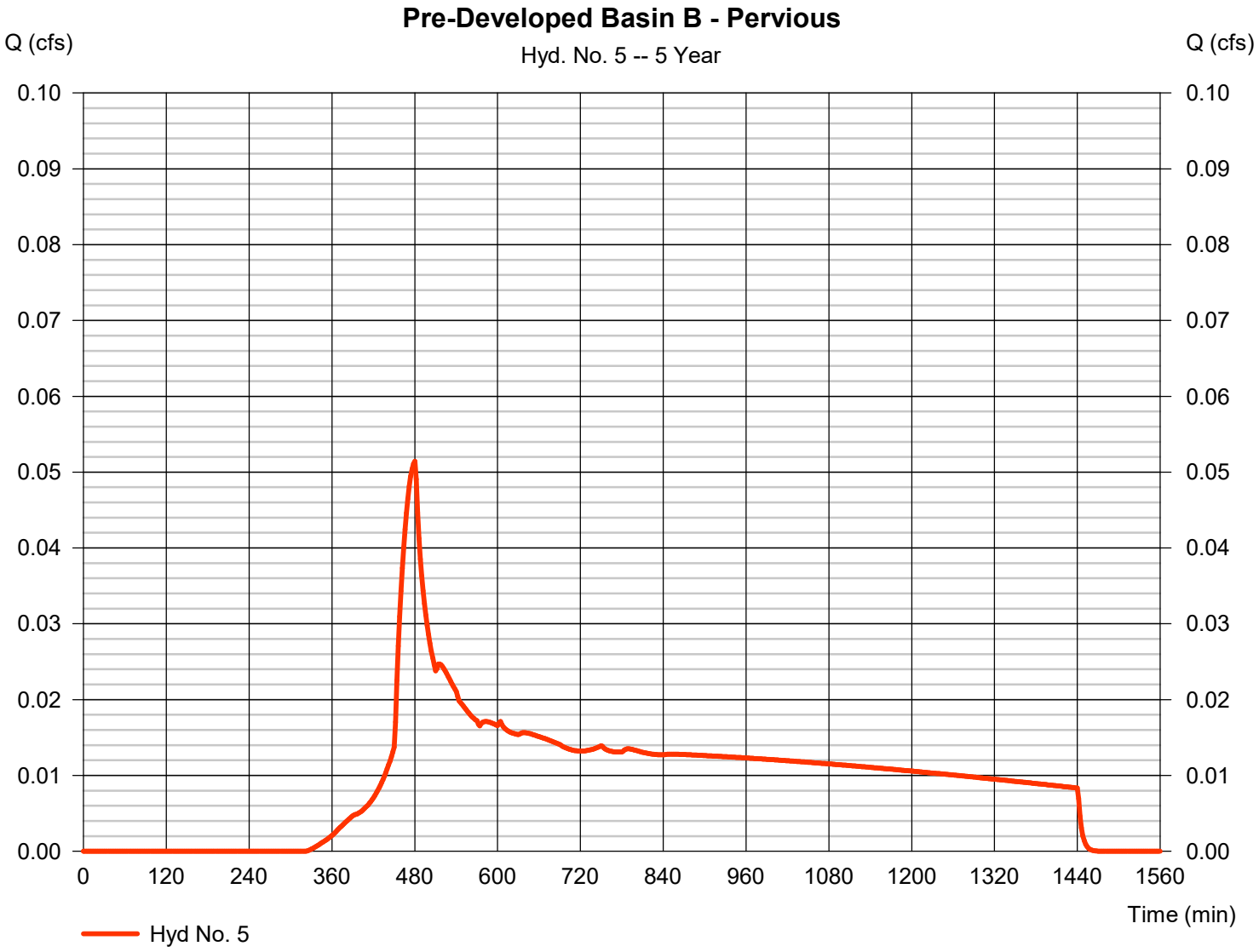


Hydrograph Report

Hyd. No. 5

Pre-Developed Basin B - Pervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.051 cfs
Storm frequency	= 5 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 870 cuft
Drainage area	= 0.190 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.10 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

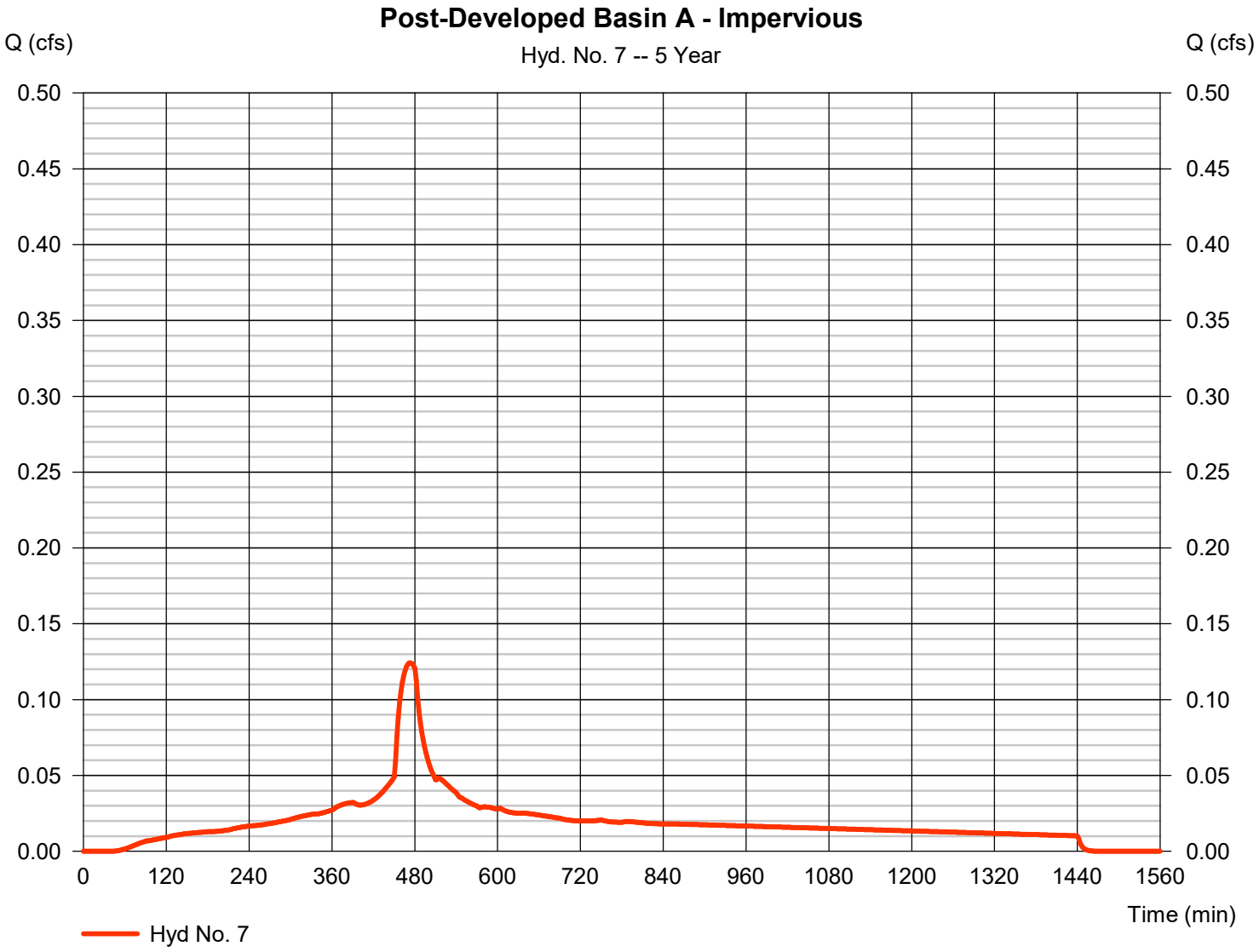


Hydrograph Report

Hyd. No. 7

Post-Developed Basin A - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.124 cfs
Storm frequency	=	5 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	1,791 cuft
Drainage area	=	0.172 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.10 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

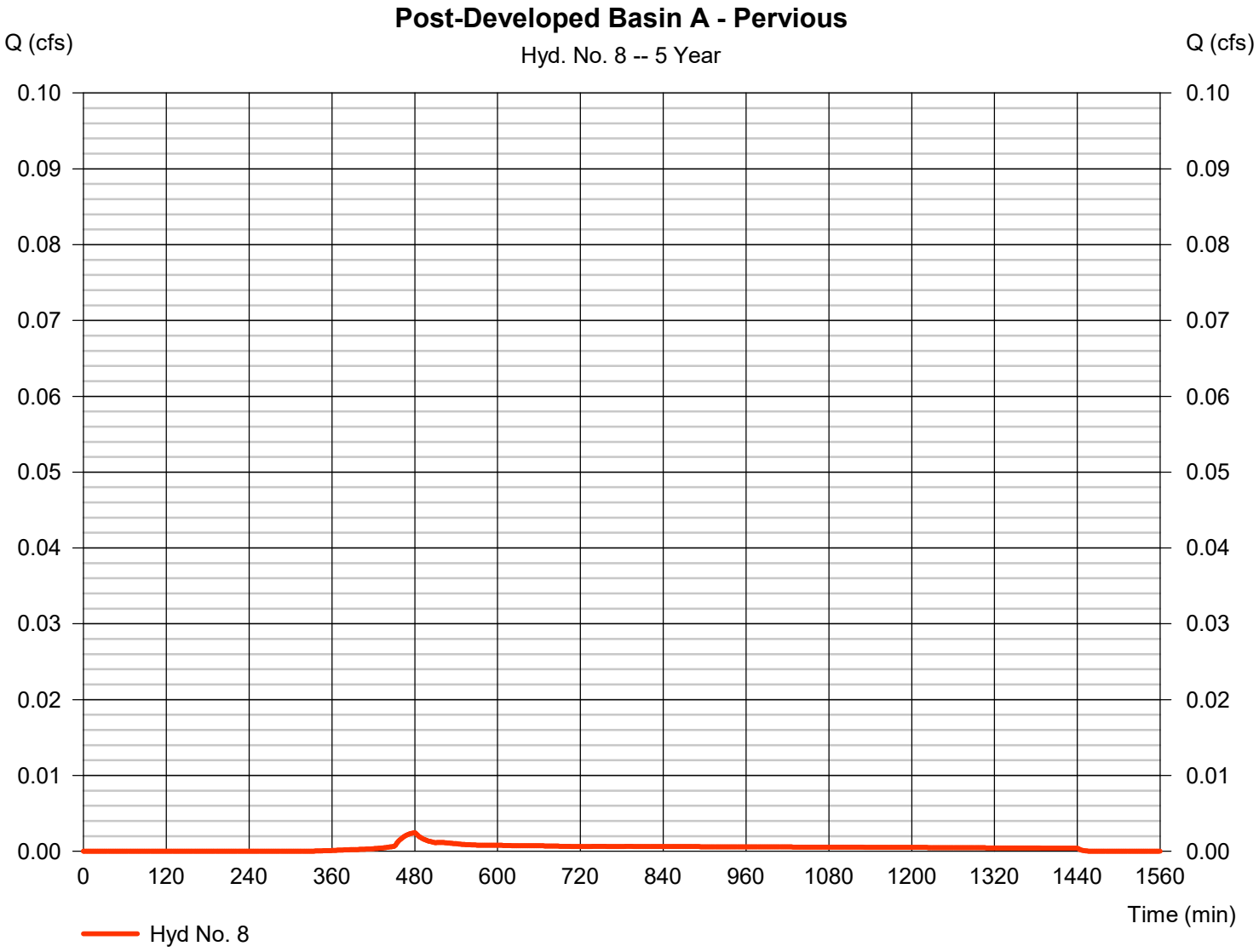


Hydrograph Report

Hyd. No. 8

Post-Developed Basin A - Pervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.002 cfs
Storm frequency	=	5 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	41 cuft
Drainage area	=	0.009 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.10 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

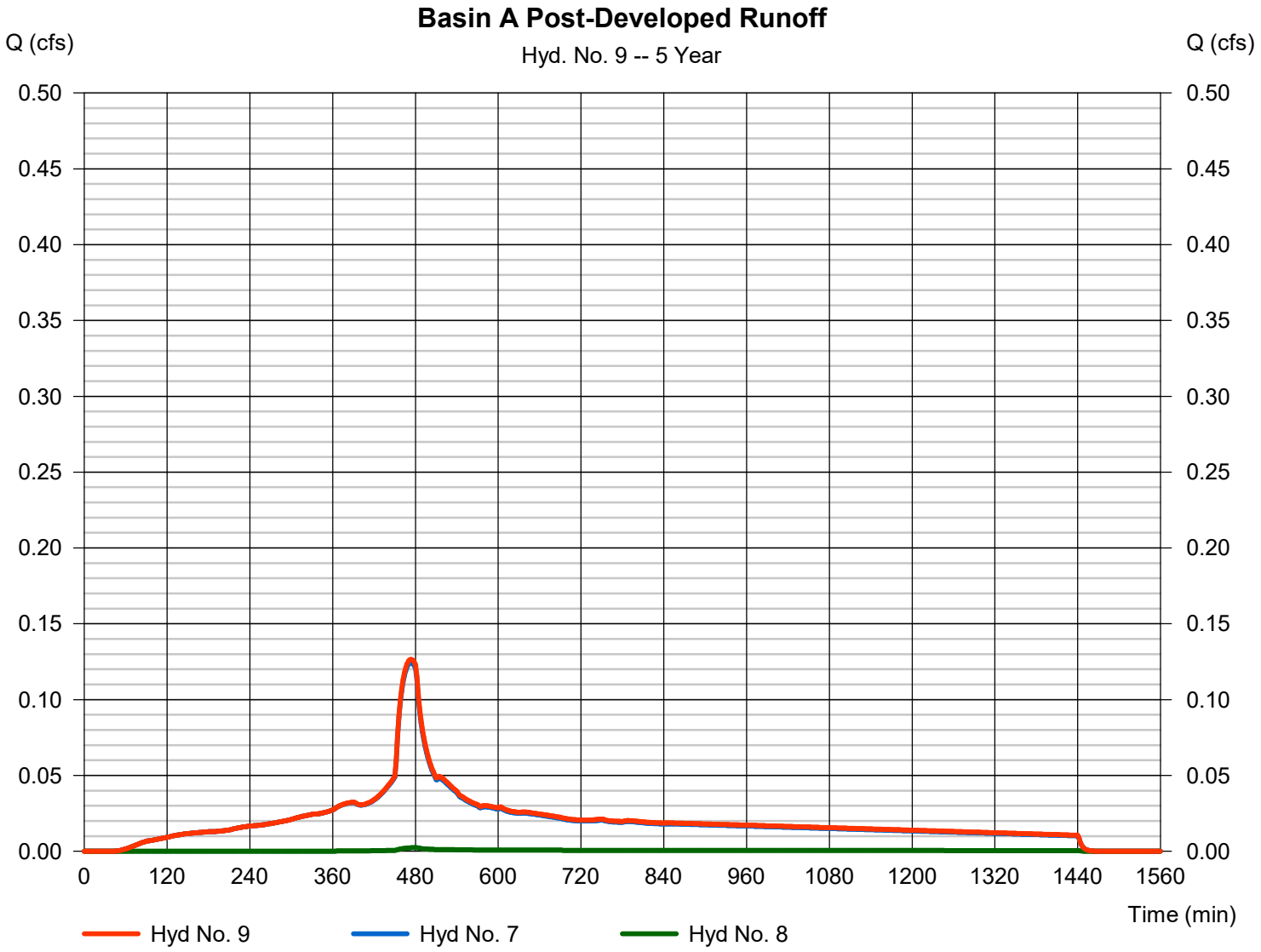


Hydrograph Report

Hyd. No. 9

Basin A Post-Developed Runoff

Hydrograph type	= Combine	Peak discharge	= 0.127 cfs
Storm frequency	= 5 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 1,832 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.181 ac

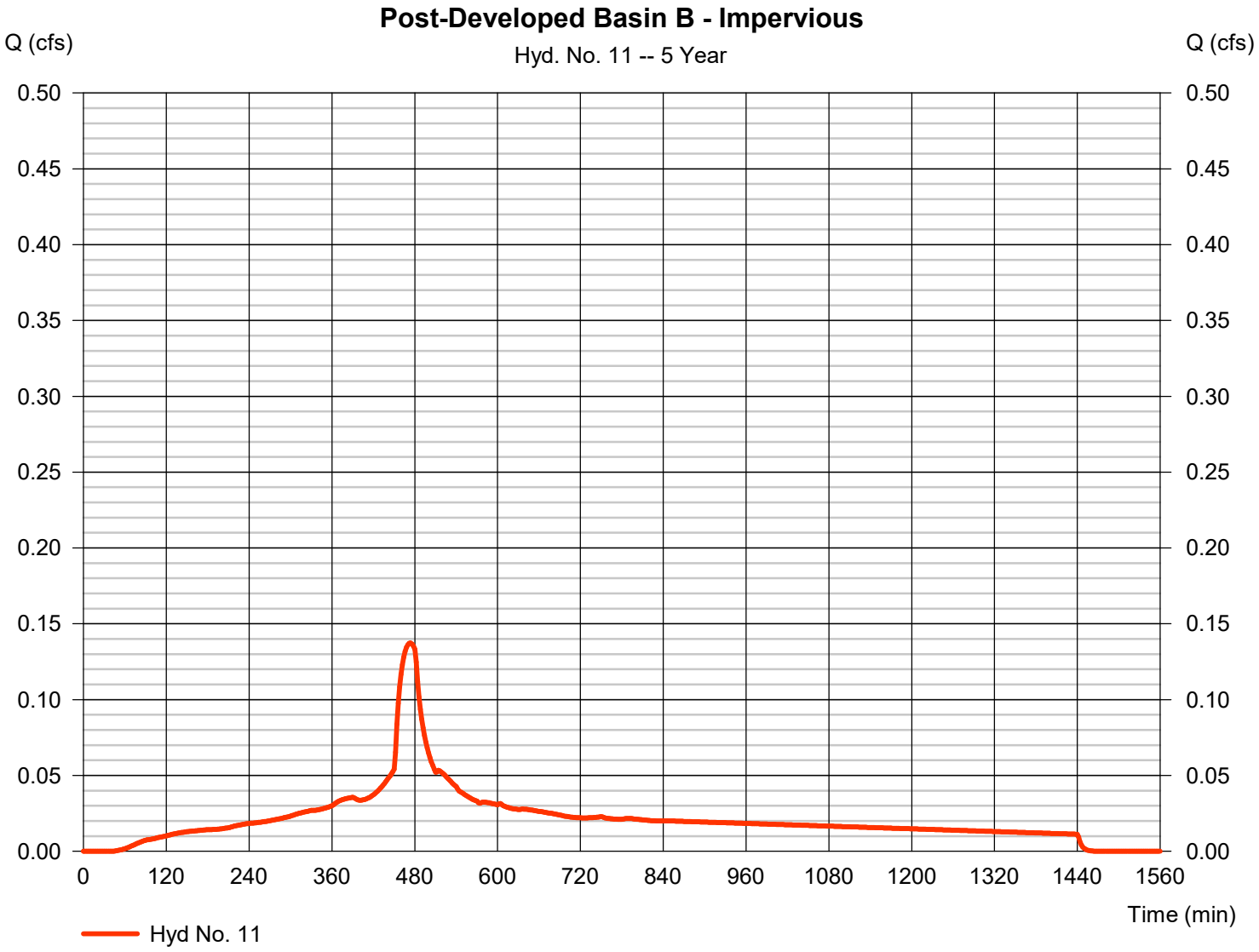


Hydrograph Report

Hyd. No. 11

Post-Developed Basin B - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.137 cfs
Storm frequency	=	5 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	1,978 cuft
Drainage area	=	0.190 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.10 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

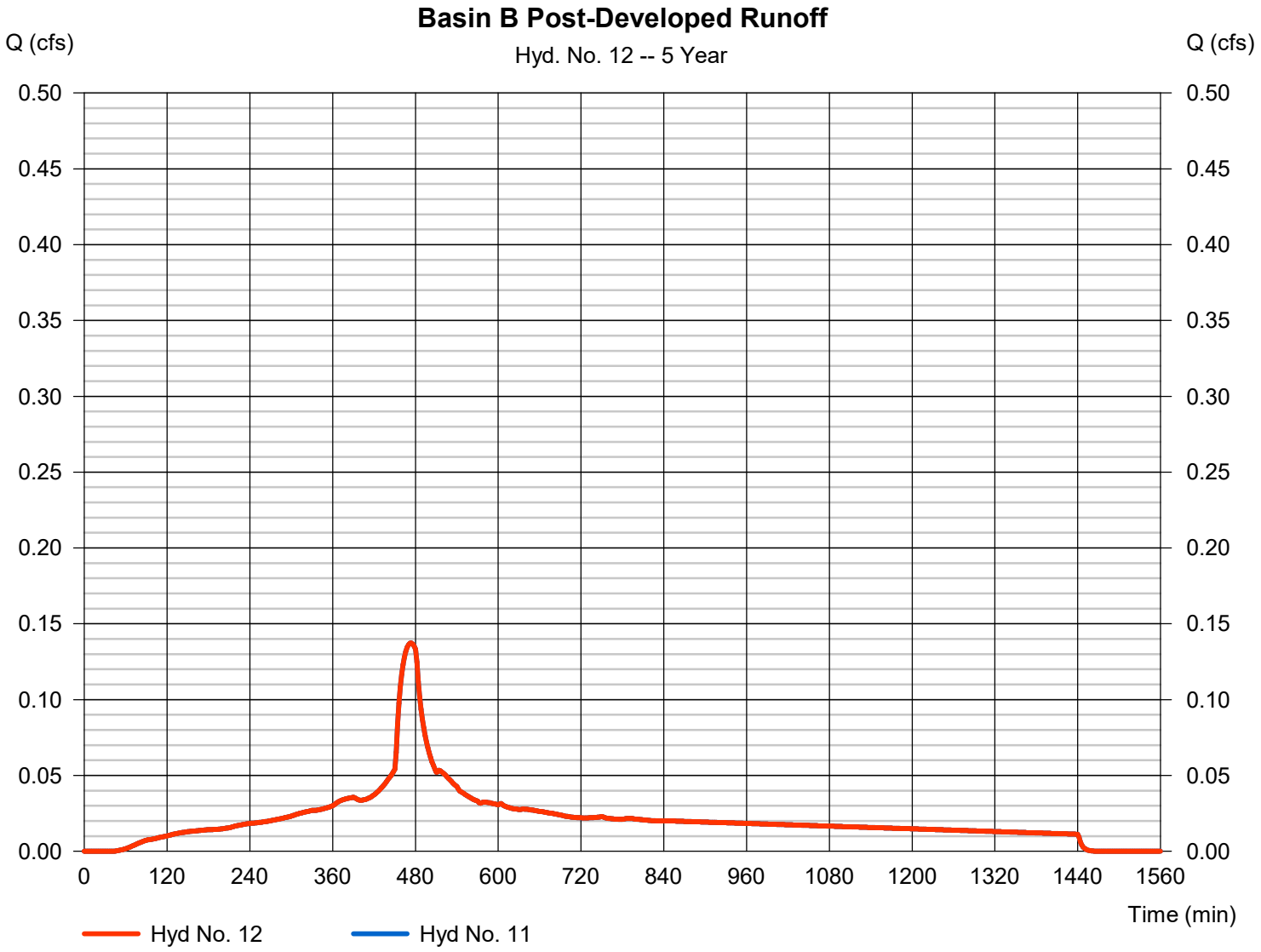


Hydrograph Report

Hyd. No. 12

Basin B Post-Developed Runoff

Hydrograph type	= Combine	Peak discharge	= 0.137 cfs
Storm frequency	= 5 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 1,978 cuft
Inflow hyds.	= 11	Contrib. drain. area	= 0.190 ac



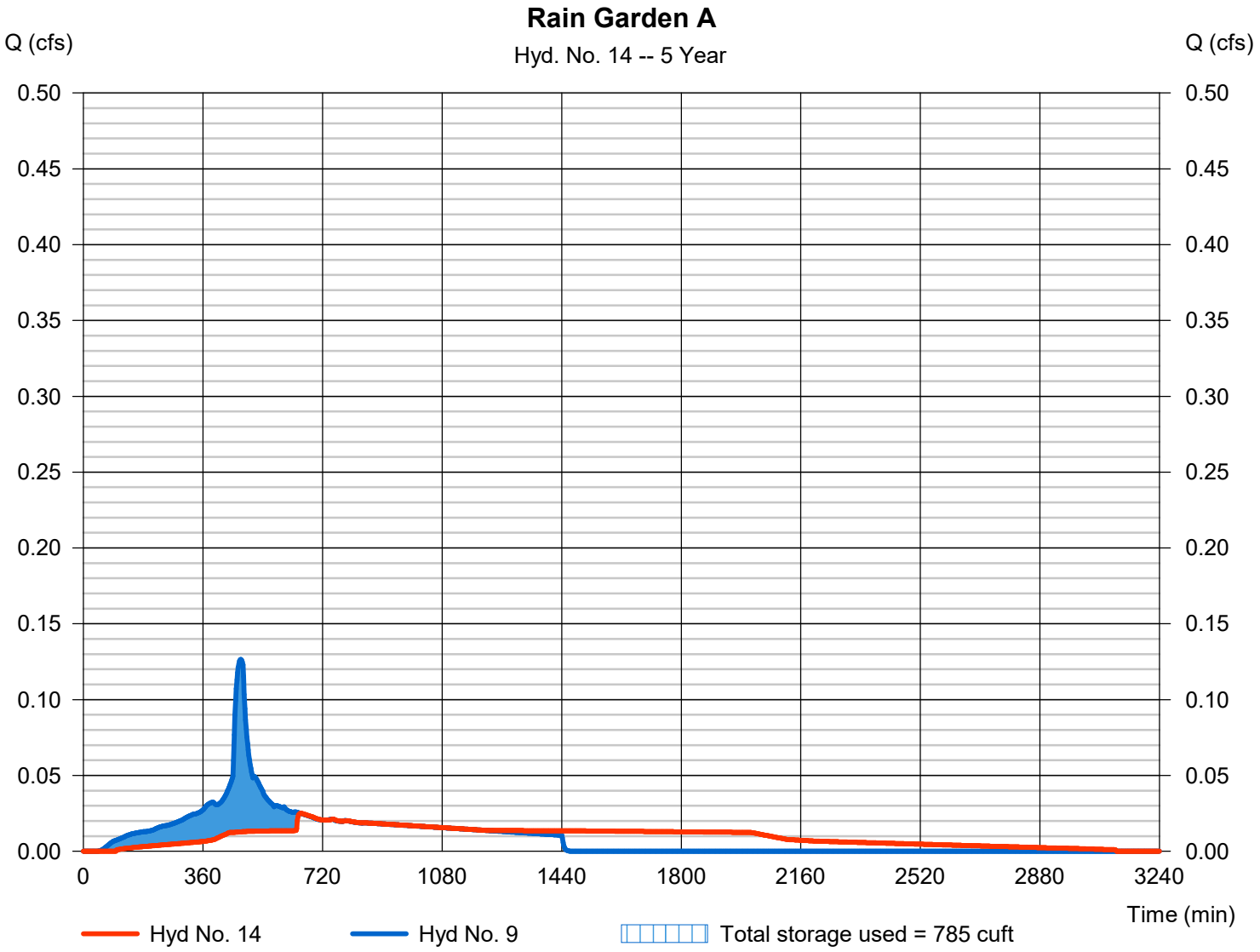
Hydrograph Report

Hyd. No. 14

Rain Garden A

Hydrograph type	=	Reservoir	Peak discharge	=	0.025 cfs
Storm frequency	=	5 yrs	Time to peak	=	654 min
Time interval	=	2 min	Hyd. volume	=	1,820 cuft
Inflow hyd. No.	=	9 - Basin A Post-Developed Runoff	Max. Elevation	=	189.50 ft
Reservoir name	=	Rain Garden A	Max. Storage	=	785 cuft

Storage Indication method used. Outflow includes exfiltration.



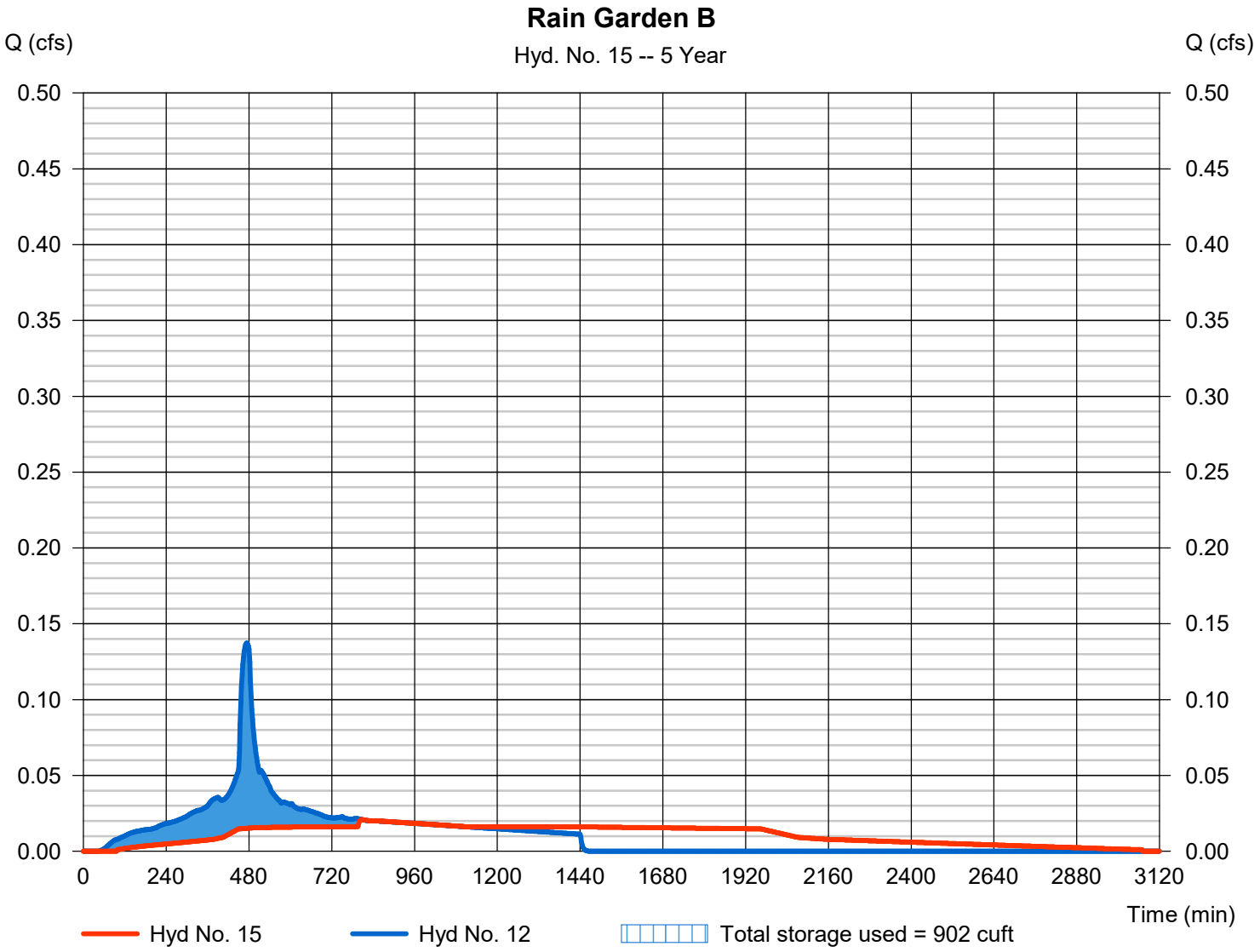
Hydrograph Report

Hyd. No. 15

Rain Garden B

Hydrograph type	=	Reservoir	Peak discharge	=	0.021 cfs
Storm frequency	=	5 yrs	Time to peak	=	808 min
Time interval	=	2 min	Hyd. volume	=	1,966 cuft
Inflow hyd. No.	=	12 - Basin B Post-Developed Runoff	Max. Elevation	=	180.50 ft
Reservoir name	=	Rain Garden B	Max. Storage	=	902 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Summary Report

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

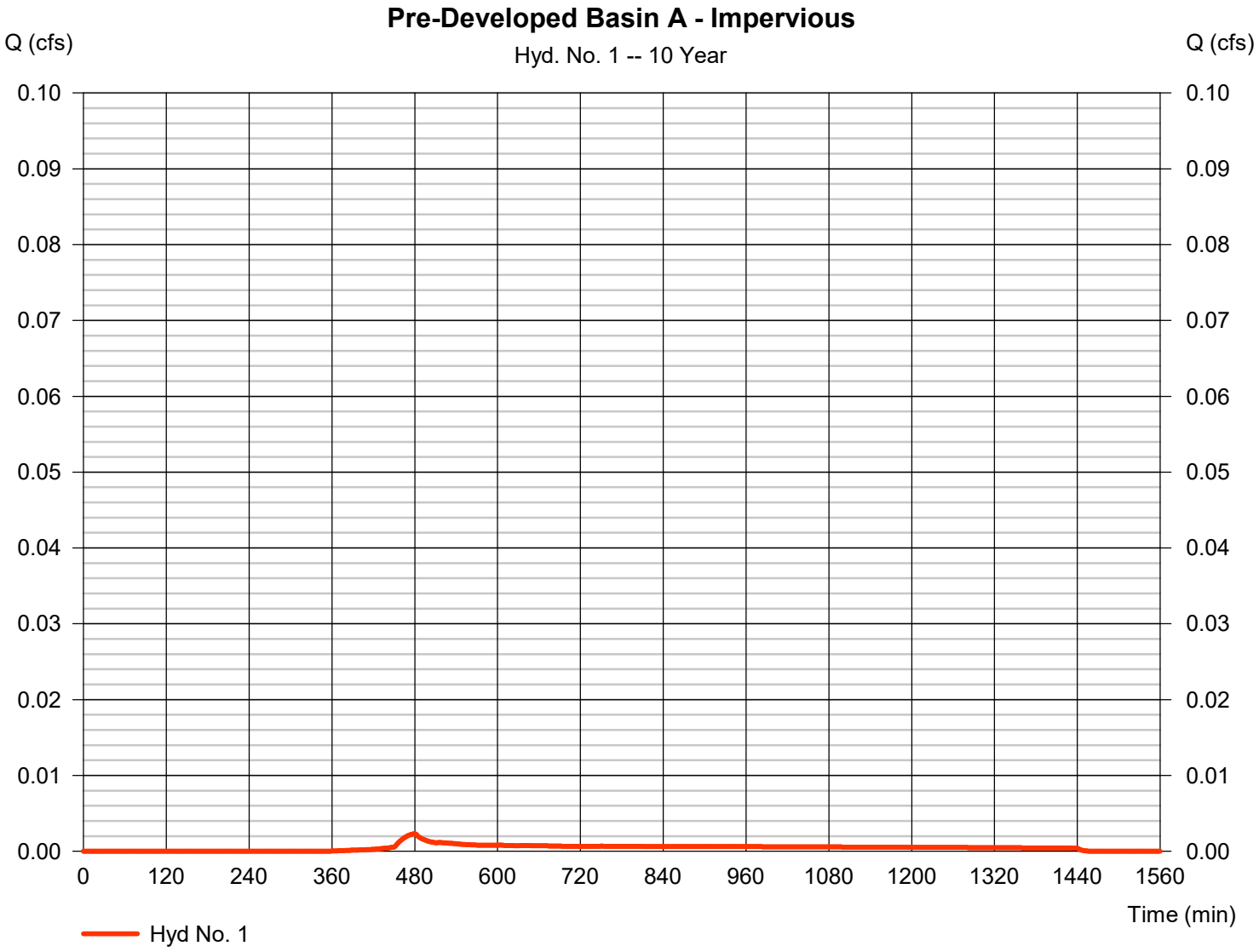
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.002	2	480	41	------	------	------	Pre-Developed Basin A - Impervious
2	SBUH Runoff	0.059	2	480	954	------	------	------	Pre-Developed Basin A - Pervious
3	Combine	0.061	2	480	995	1, 2	------	------	Basin A Pre-Developed Runoff
5	SBUH Runoff	0.065	2	480	1,053	------	------	------	Pre-Developed Basin B - Pervious
7	SBUH Runoff	0.139	2	474	2,008	------	------	------	Post-Developed Basin A - Impervious
8	SBUH Runoff	0.003	2	480	50	------	------	------	Post-Developed Basin A - Pervious
9	Combine	0.142	2	474	2,058	7, 8	------	------	Basin A Post-Developed Runoff
11	SBUH Runoff	0.153	2	474	2,219	------	------	------	Post-Developed Basin B - Impervious
12	Combine	0.153	2	474	2,219	11	------	------	Basin B Post-Developed Runoff
14	Reservoir	0.039	2	552	2,046	9	189.51	787	Rain Garden A
15	Reservoir	0.035	2	606	2,206	12	180.50	905	Rain Garden B

Hydrograph Report

Hyd. No. 1

Pre-Developed Basin A - Impervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 10 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 41 cuft
Drainage area	= 0.009 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

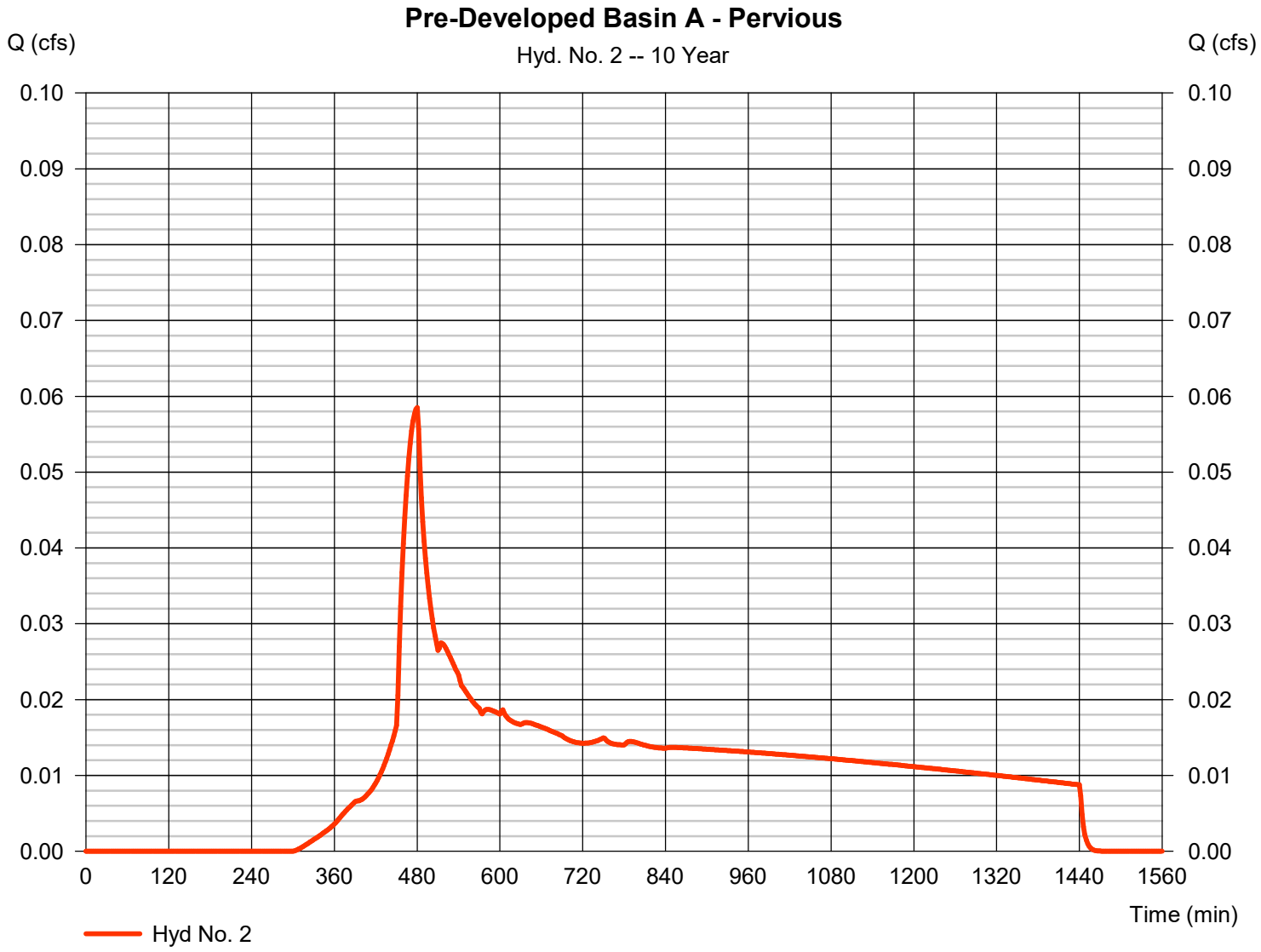


Hydrograph Report

Hyd. No. 2

Pre-Developed Basin A - Pervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.059 cfs
Storm frequency	=	10 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	954 cuft
Drainage area	=	0.172 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.45 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

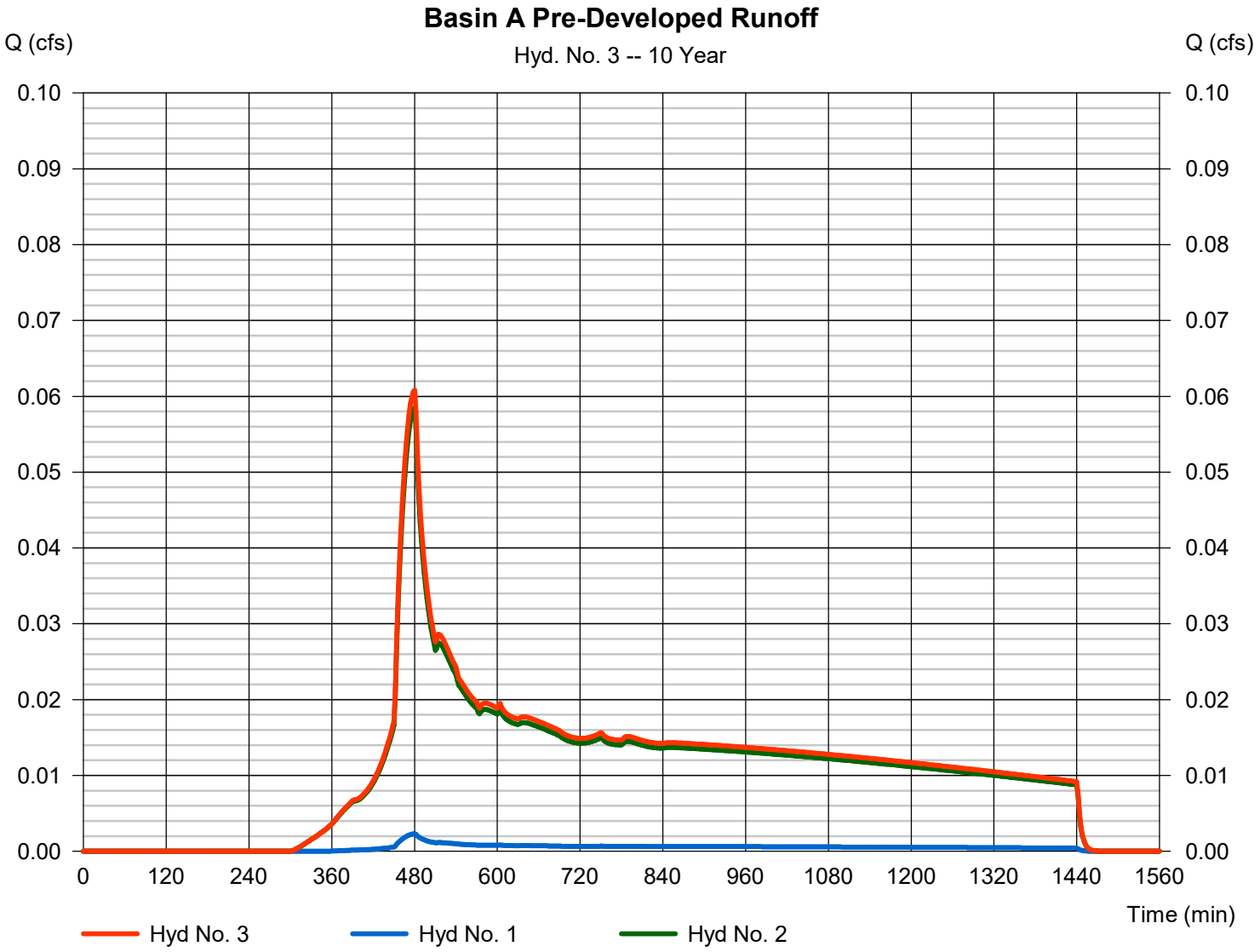


Hydrograph Report

Hyd. No. 3

Basin A Pre-Developed Runoff

Hydrograph type	= Combine	Peak discharge	= 0.061 cfs
Storm frequency	= 10 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 995 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.181 ac

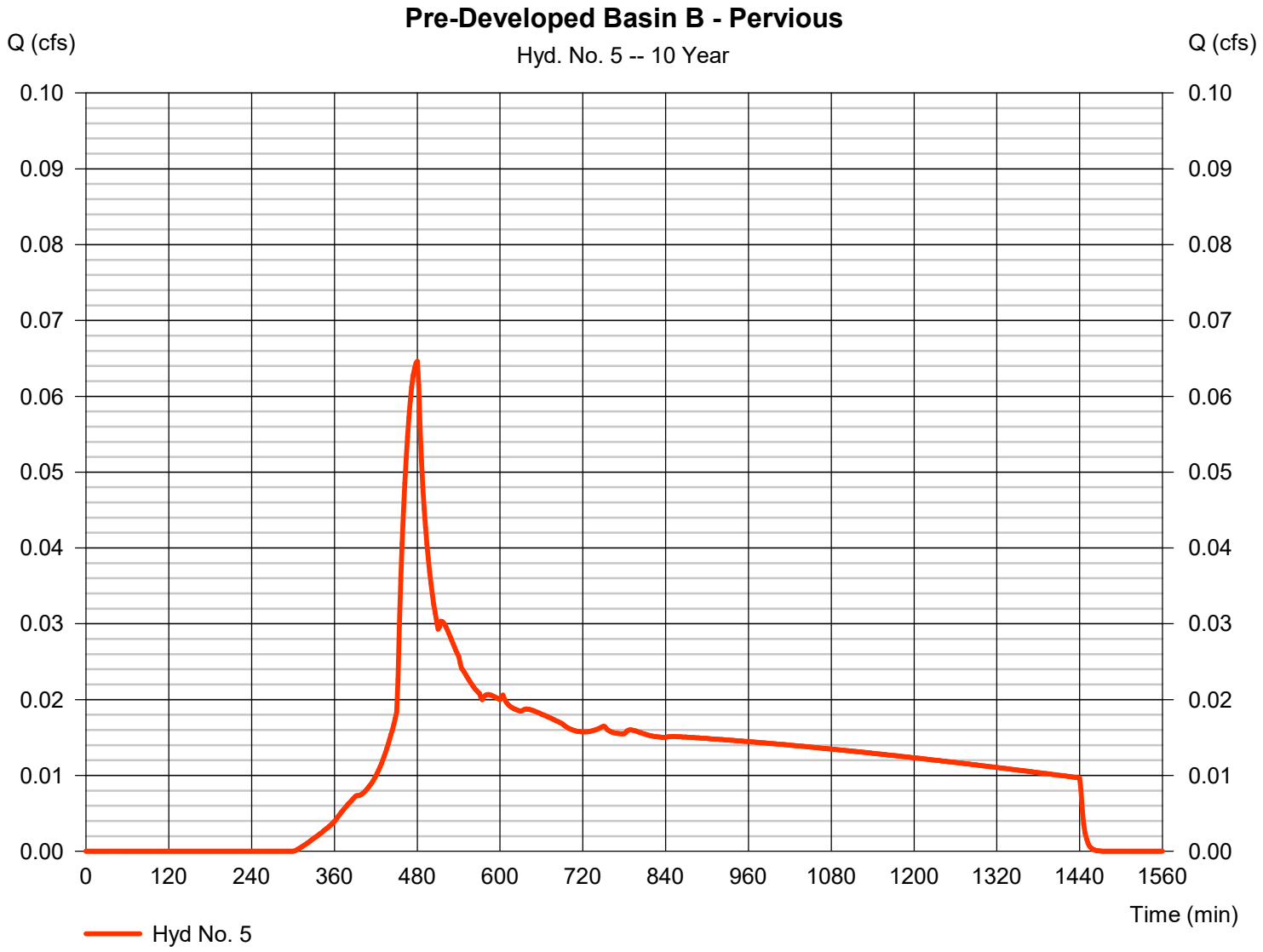


Hydrograph Report

Hyd. No. 5

Pre-Developed Basin B - Pervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.065 cfs
Storm frequency	= 10 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 1,053 cuft
Drainage area	= 0.190 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

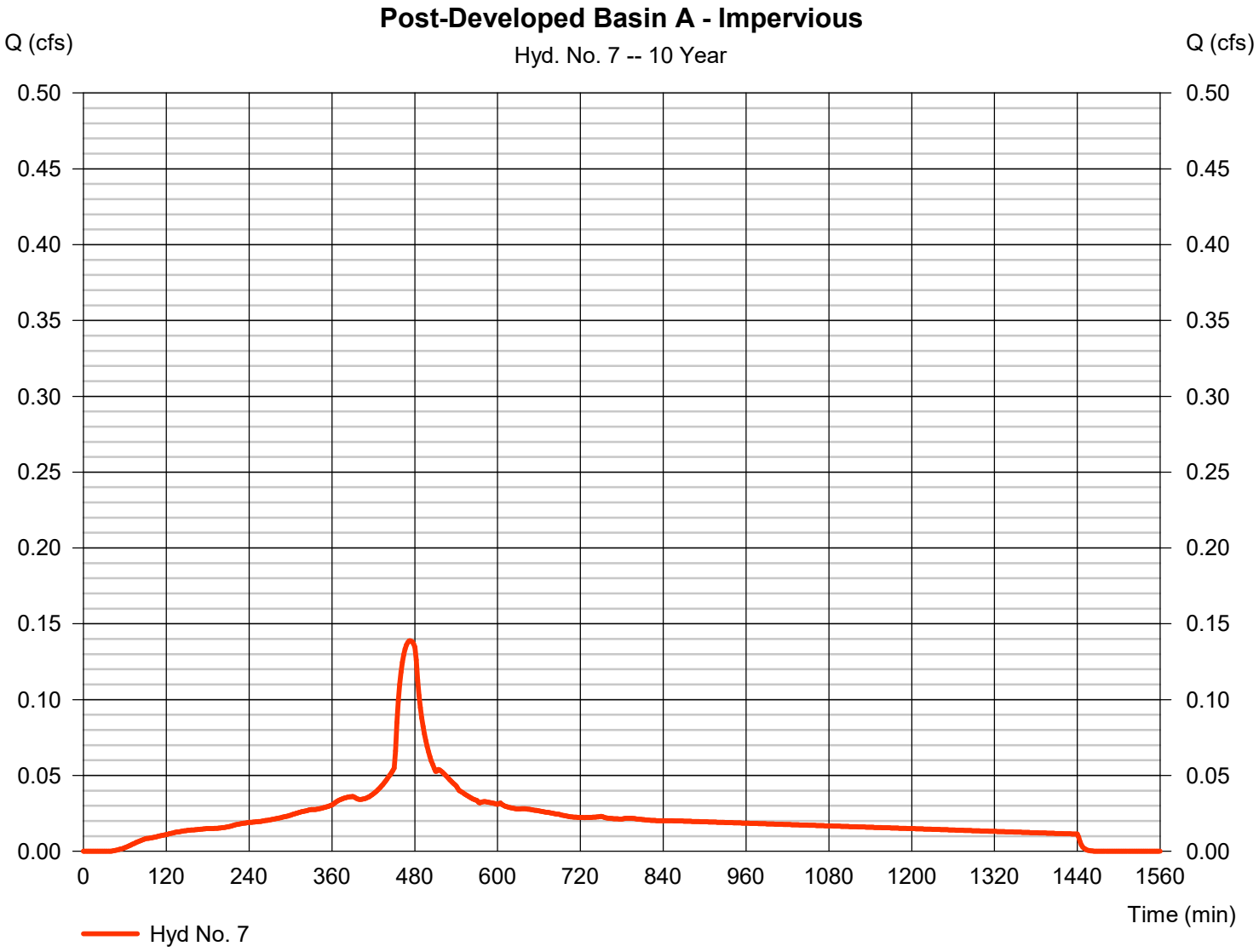


Hydrograph Report

Hyd. No. 7

Post-Developed Basin A - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.139 cfs
Storm frequency	=	10 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	2,008 cuft
Drainage area	=	0.172 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.45 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

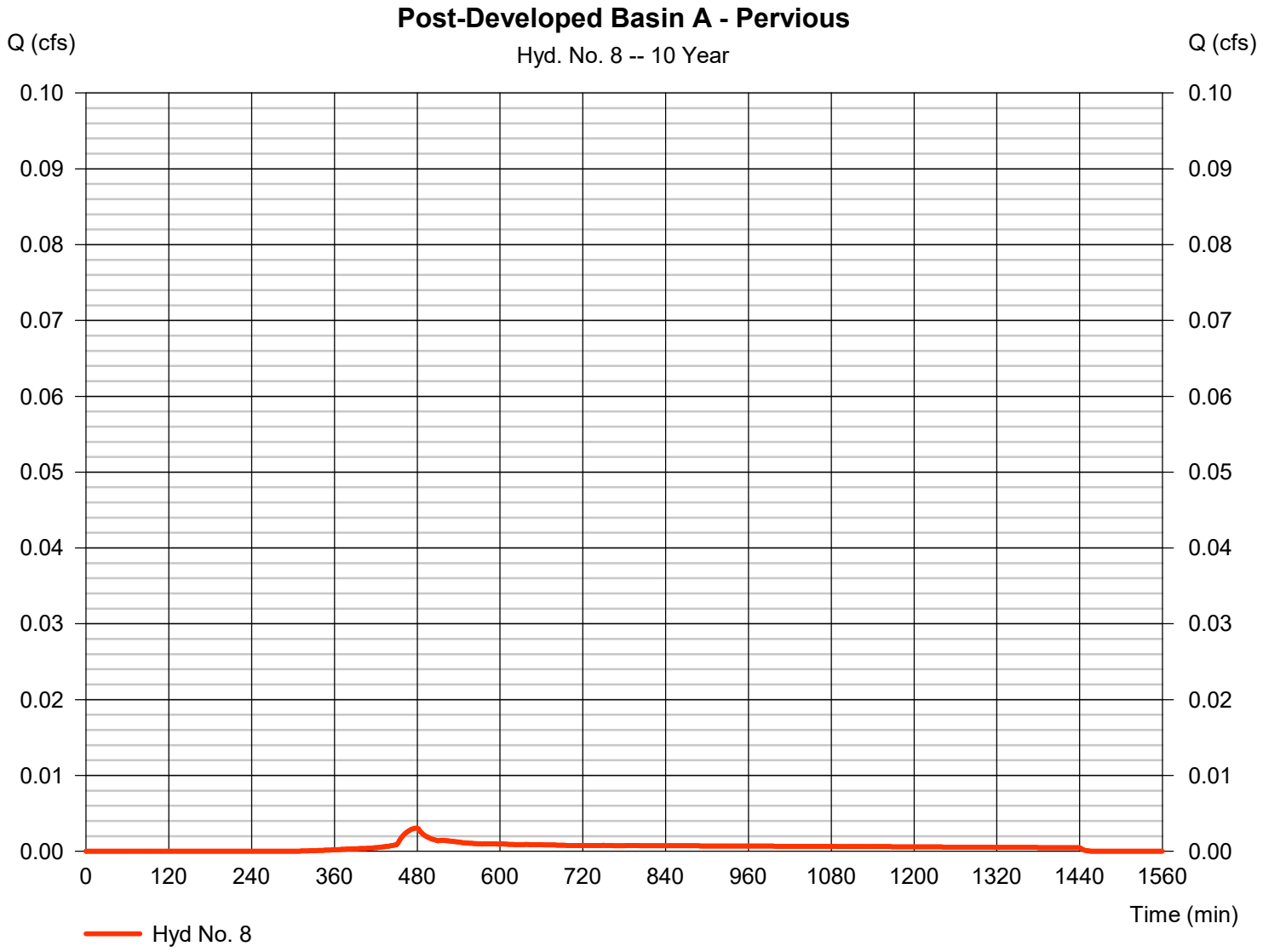


Hydrograph Report

Hyd. No. 8

Post-Developed Basin A - Pervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.003 cfs
Storm frequency	= 10 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 50 cuft
Drainage area	= 0.009 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.45 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

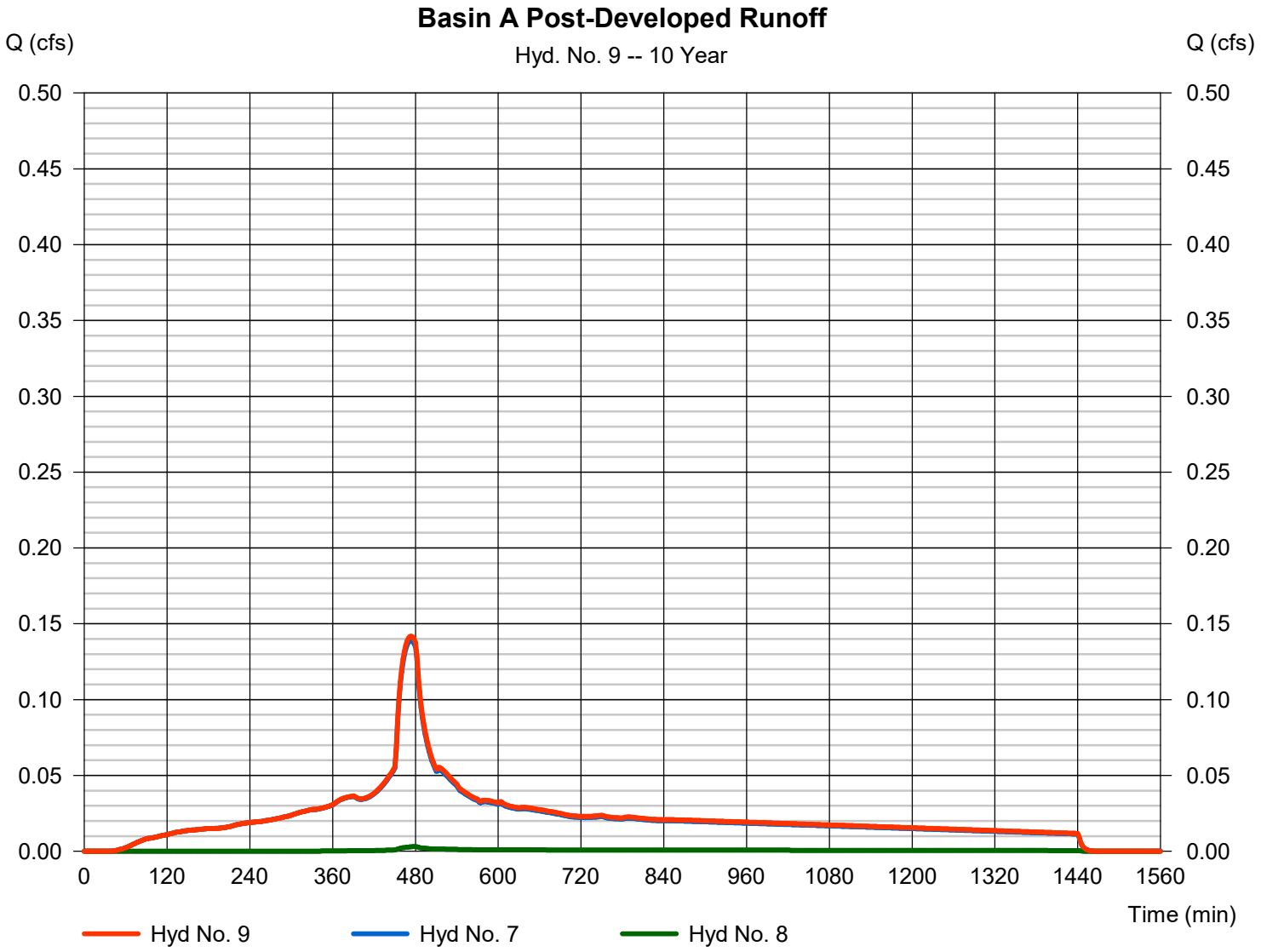


Hydrograph Report

Hyd. No. 9

Basin A Post-Developed Runoff

Hydrograph type	= Combine	Peak discharge	= 0.142 cfs
Storm frequency	= 10 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 2,058 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.181 ac

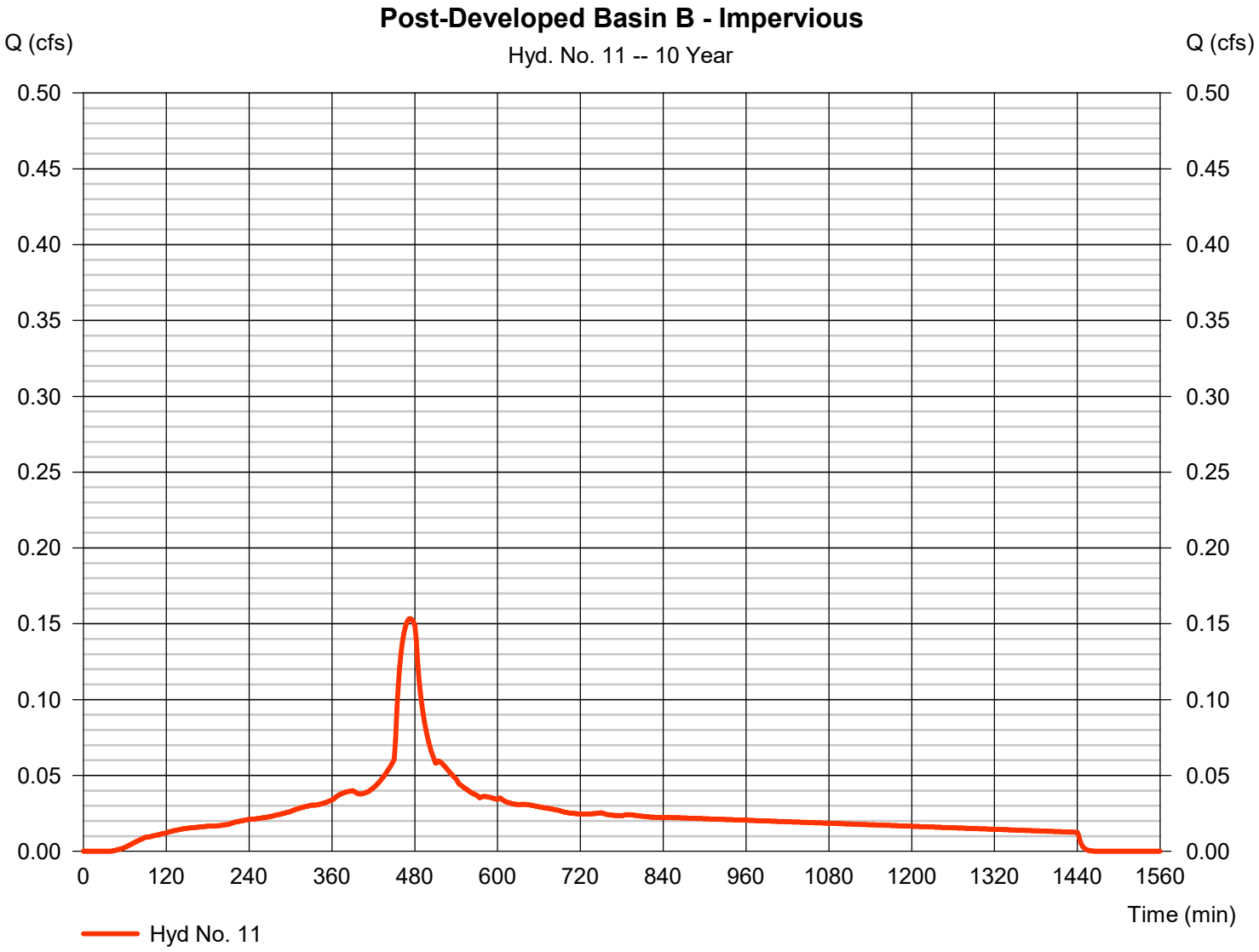


Hydrograph Report

Hyd. No. 11

Post-Developed Basin B - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.153 cfs
Storm frequency	=	10 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	2,219 cuft
Drainage area	=	0.190 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.45 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

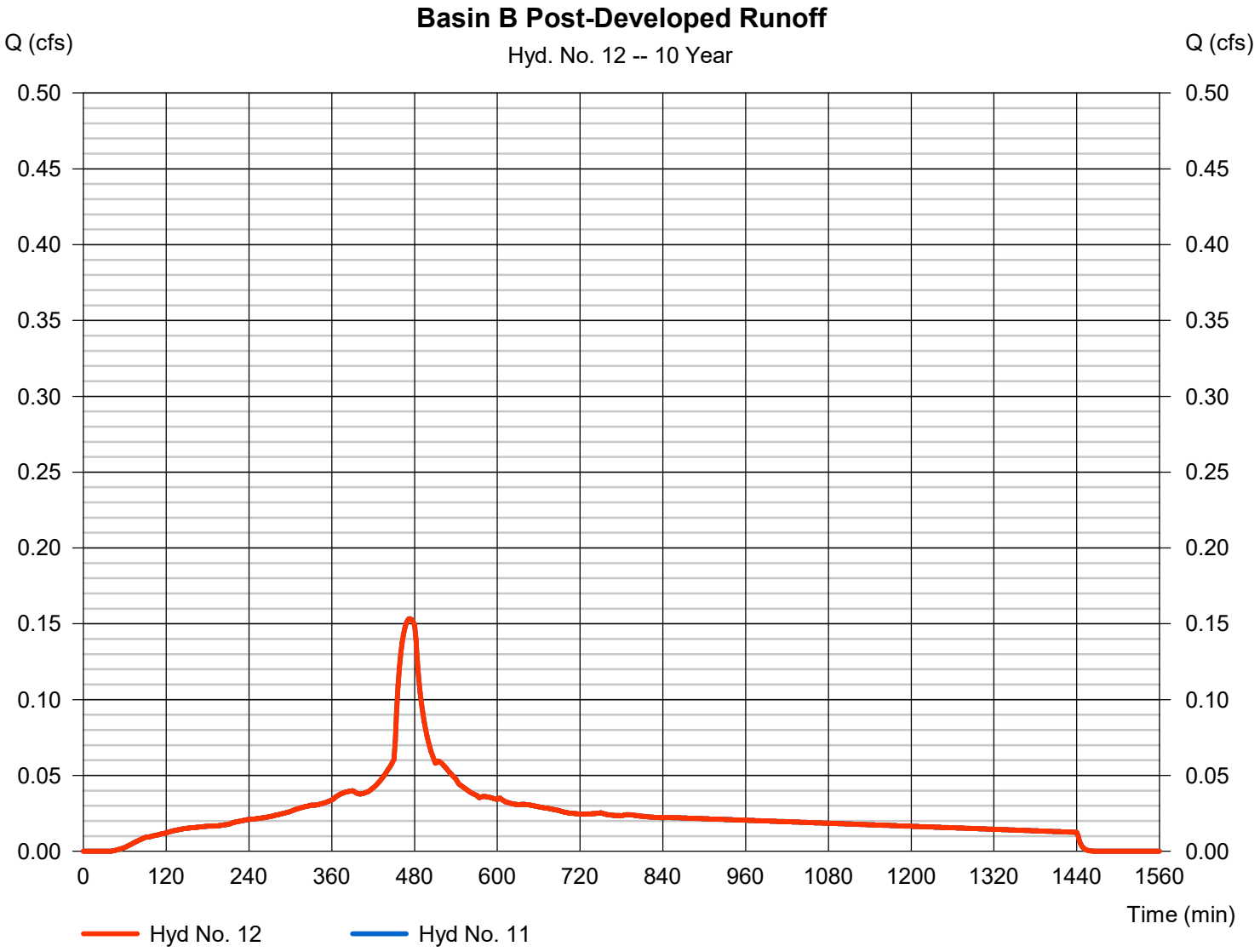


Hydrograph Report

Hyd. No. 12

Basin B Post-Developed Runoff

Hydrograph type	=	Combine	Peak discharge	=	0.153 cfs
Storm frequency	=	10 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	2,219 cuft
Inflow hyds.	=	11	Contrib. drain. area	=	0.190 ac



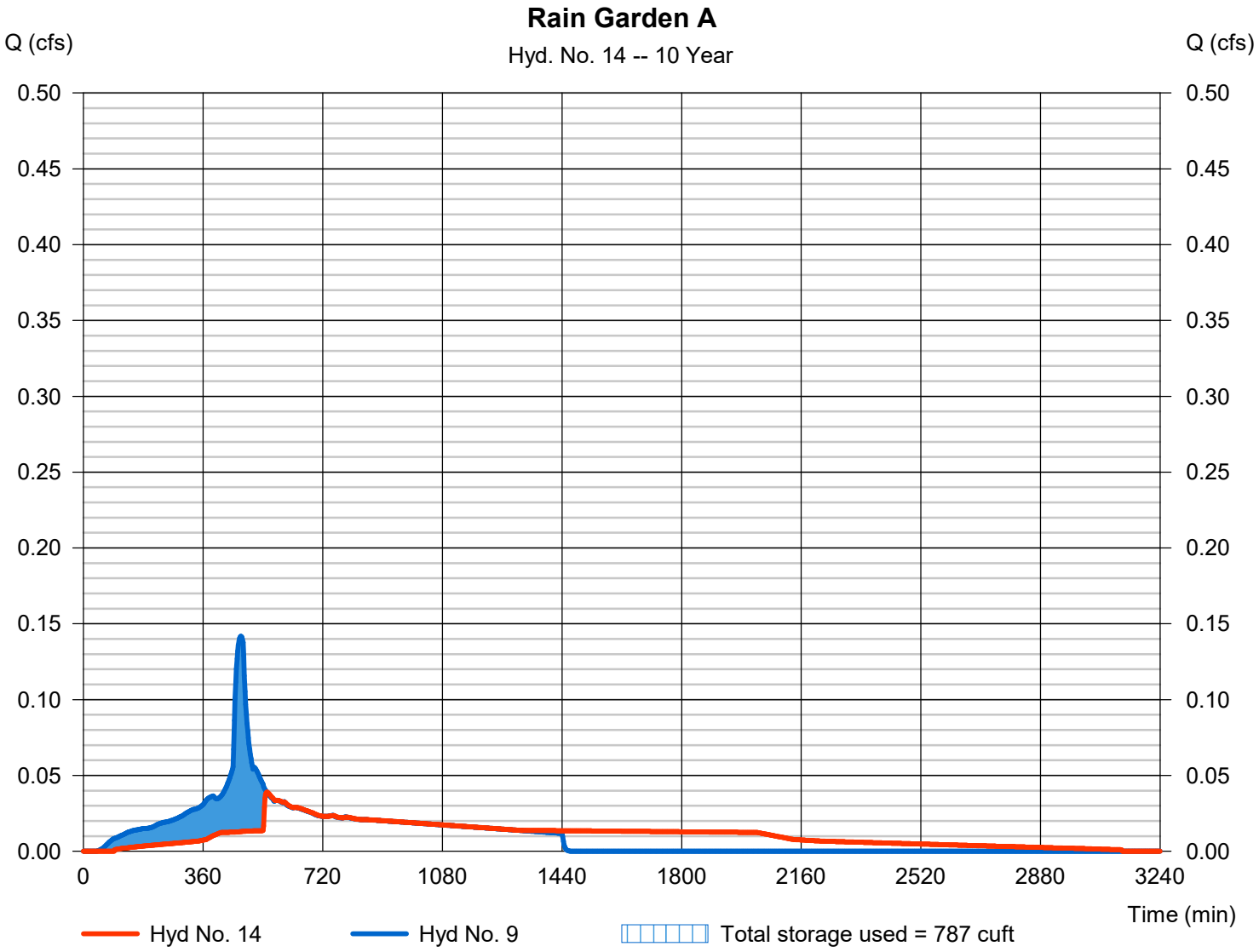
Hydrograph Report

Hyd. No. 14

Rain Garden A

Hydrograph type	=	Reservoir	Peak discharge	=	0.039 cfs
Storm frequency	=	10 yrs	Time to peak	=	552 min
Time interval	=	2 min	Hyd. volume	=	2,046 cuft
Inflow hyd. No.	=	9 - Basin A Post-Developed Runoff	Max. Elevation	=	189.51 ft
Reservoir name	=	Rain Garden A	Max. Storage	=	787 cuft

Storage Indication method used. Outflow includes exfiltration.



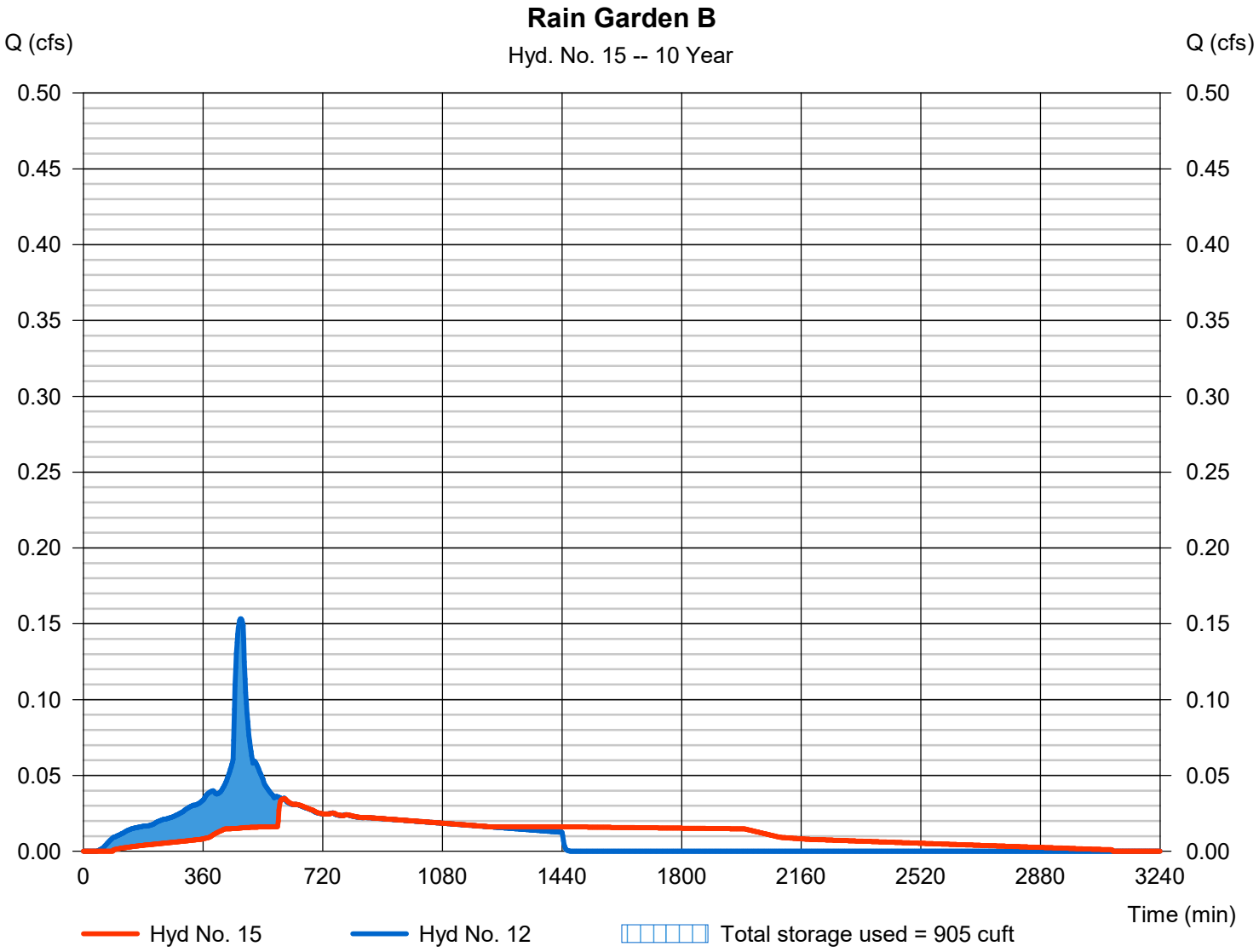
Hydrograph Report

Hyd. No. 15

Rain Garden B

Hydrograph type	=	Reservoir	Peak discharge	=	0.035 cfs
Storm frequency	=	10 yrs	Time to peak	=	606 min
Time interval	=	2 min	Hyd. volume	=	2,206 cuft
Inflow hyd. No.	=	12 - Basin B Post-Developed Runoff	Max. Elevation	=	180.50 ft
Reservoir name	=	Rain Garden B	Max. Storage	=	905 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Summary Report

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

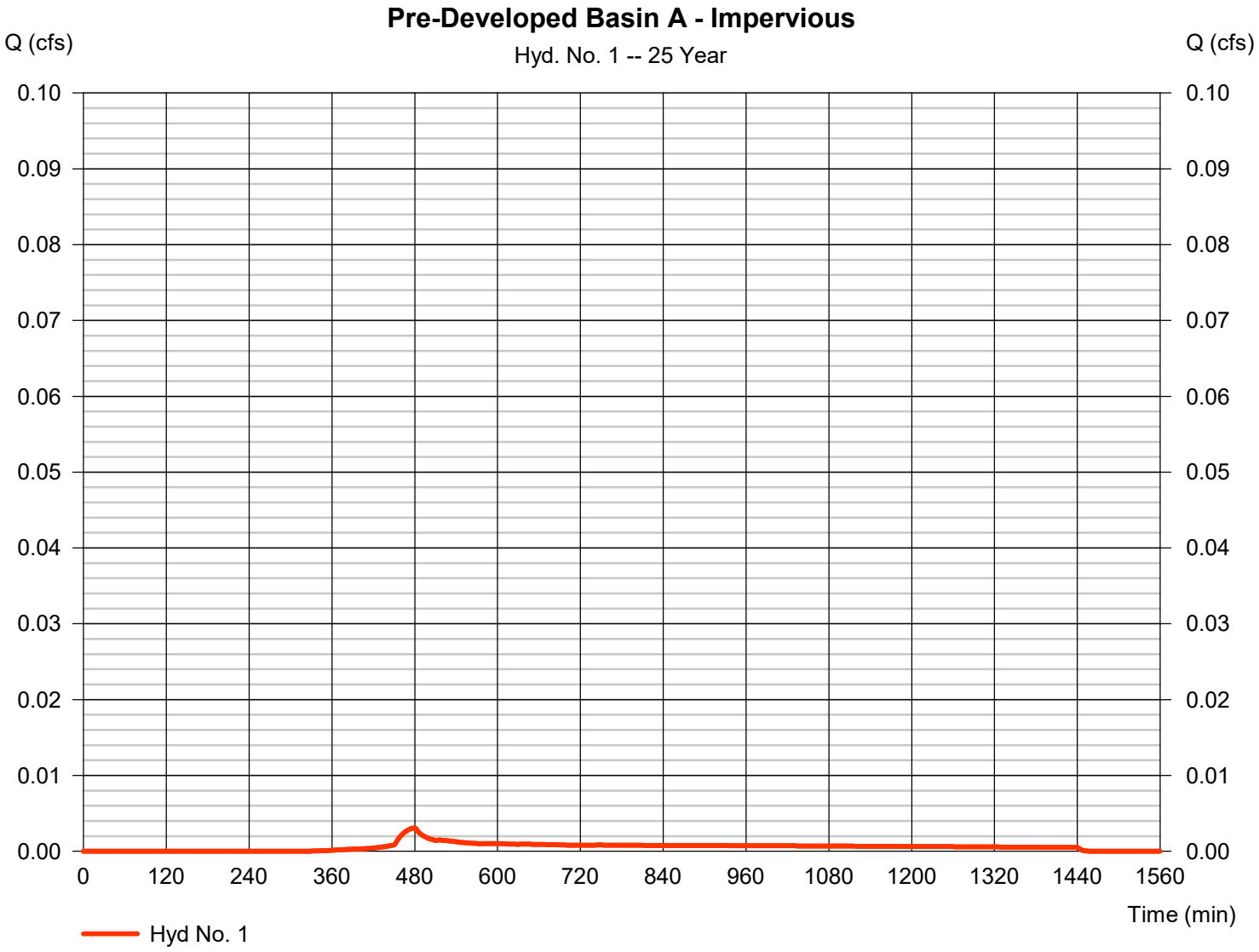
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.003	2	480	52	------	------	------	Pre-Developed Basin A - Impervious
2	SBUH Runoff	0.075	2	480	1,175	------	------	------	Pre-Developed Basin A - Pervious
3	Combine	0.078	2	480	1,227	1, 2	------	------	Basin A Pre-Developed Runoff
5	SBUH Runoff	0.082	2	480	1,298	------	------	------	Pre-Developed Basin B - Pervious
7	SBUH Runoff	0.158	2	474	2,289	------	------	------	Post-Developed Basin A - Impervious
8	SBUH Runoff	0.004	2	480	62	------	------	------	Post-Developed Basin A - Pervious
9	Combine	0.161	2	474	2,350	7, 8	------	------	Basin A Post-Developed Runoff
11	SBUH Runoff	0.174	2	474	2,528	------	------	------	Post-Developed Basin B - Impervious
12	Combine	0.174	2	474	2,528	11	------	------	Basin B Post-Developed Runoff
14	Reservoir	0.068	2	504	2,338	9	189.51	793	Rain Garden A
15	Reservoir	0.062	2	526	2,516	12	180.51	911	Rain Garden B

Hydrograph Report

Hyd. No. 1

Pre-Developed Basin A - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.003 cfs
Storm frequency	=	25 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	52 cuft
Drainage area	=	0.009 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.90 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

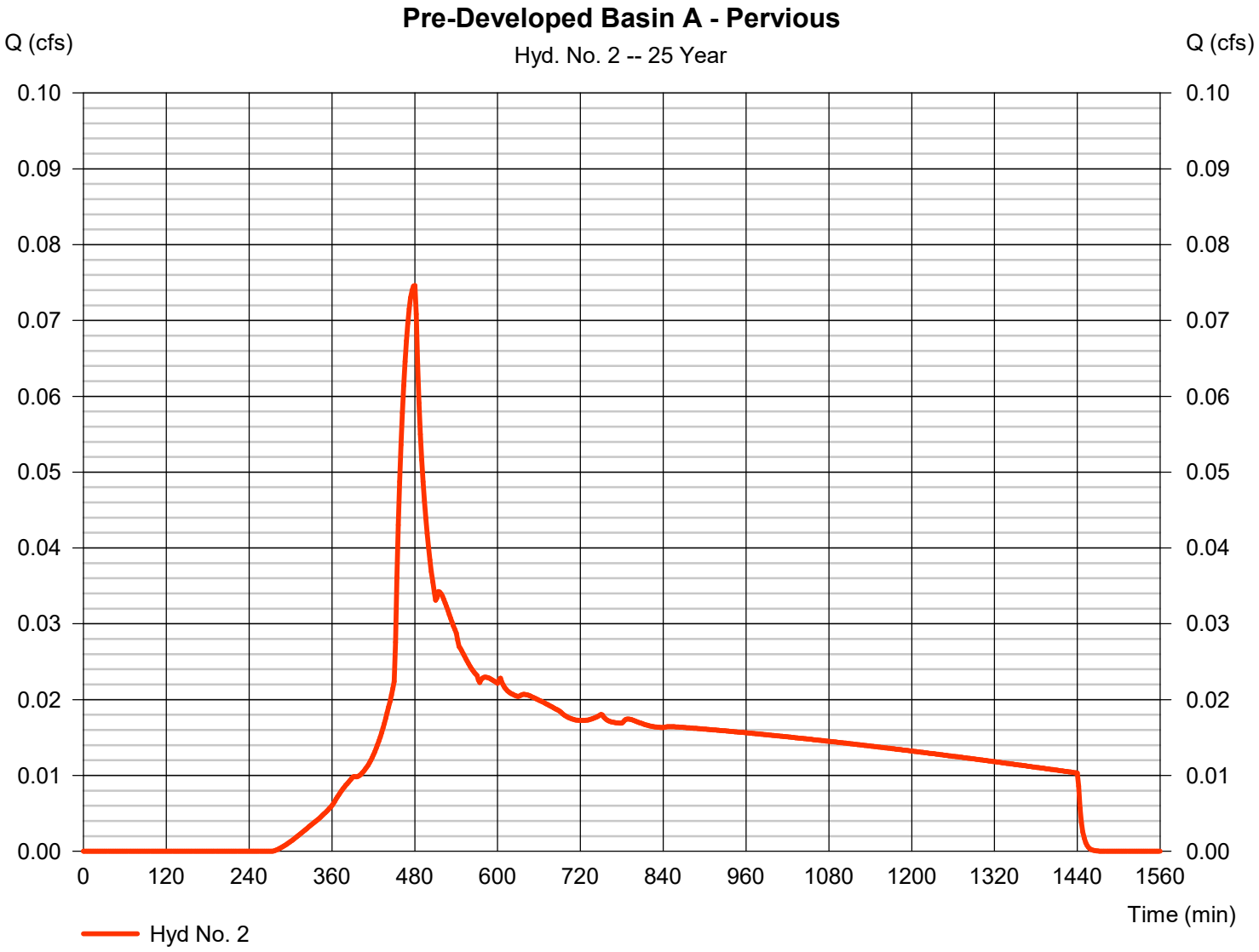


Hydrograph Report

Hyd. No. 2

Pre-Developed Basin A - Pervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.075 cfs
Storm frequency	=	25 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	1,175 cuft
Drainage area	=	0.172 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.90 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

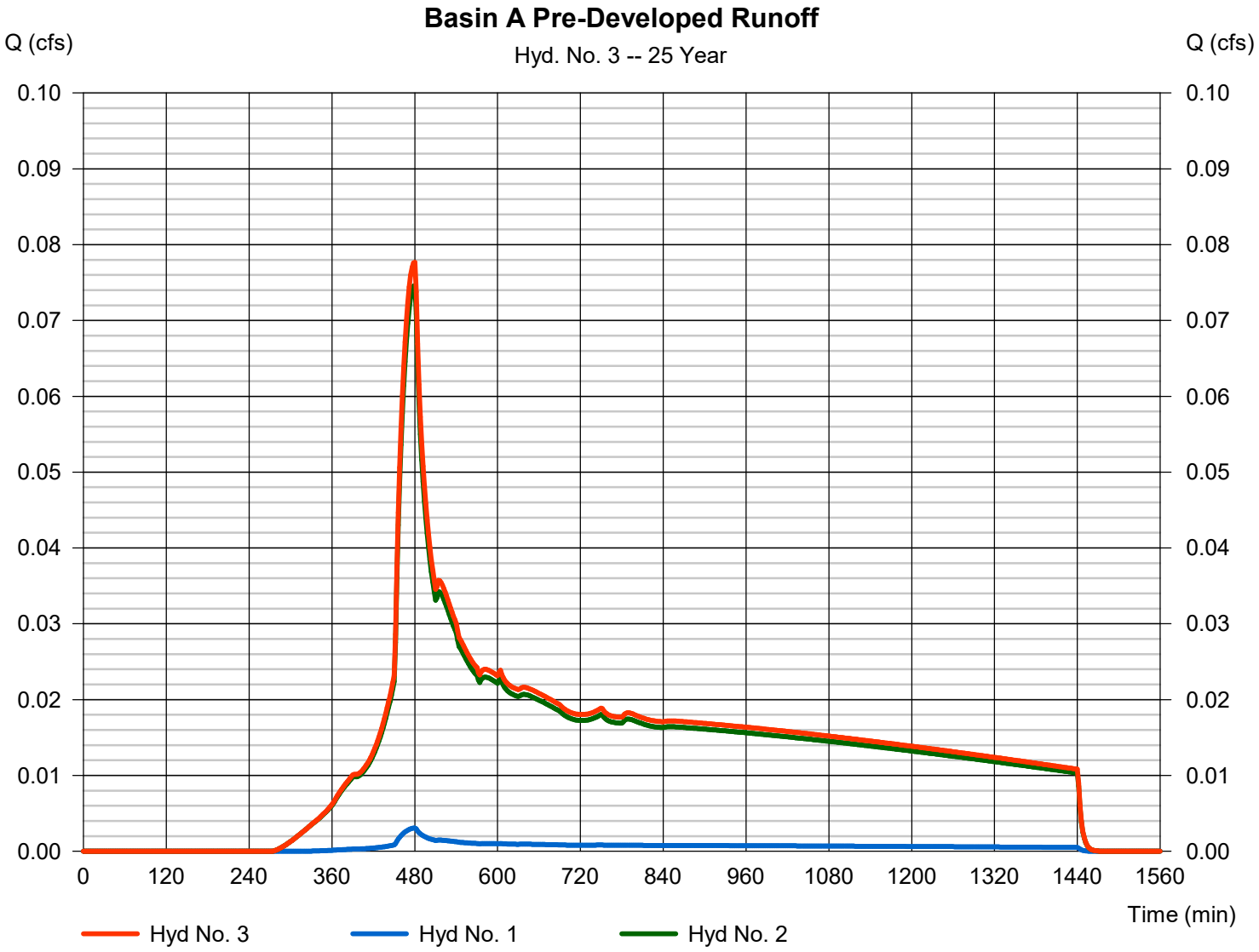


Hydrograph Report

Hyd. No. 3

Basin A Pre-Developed Runoff

Hydrograph type	=	Combine	Peak discharge	=	0.078 cfs
Storm frequency	=	25 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	1,227 cuft
Inflow hyds.	=	1, 2	Contrib. drain. area	=	0.181 ac

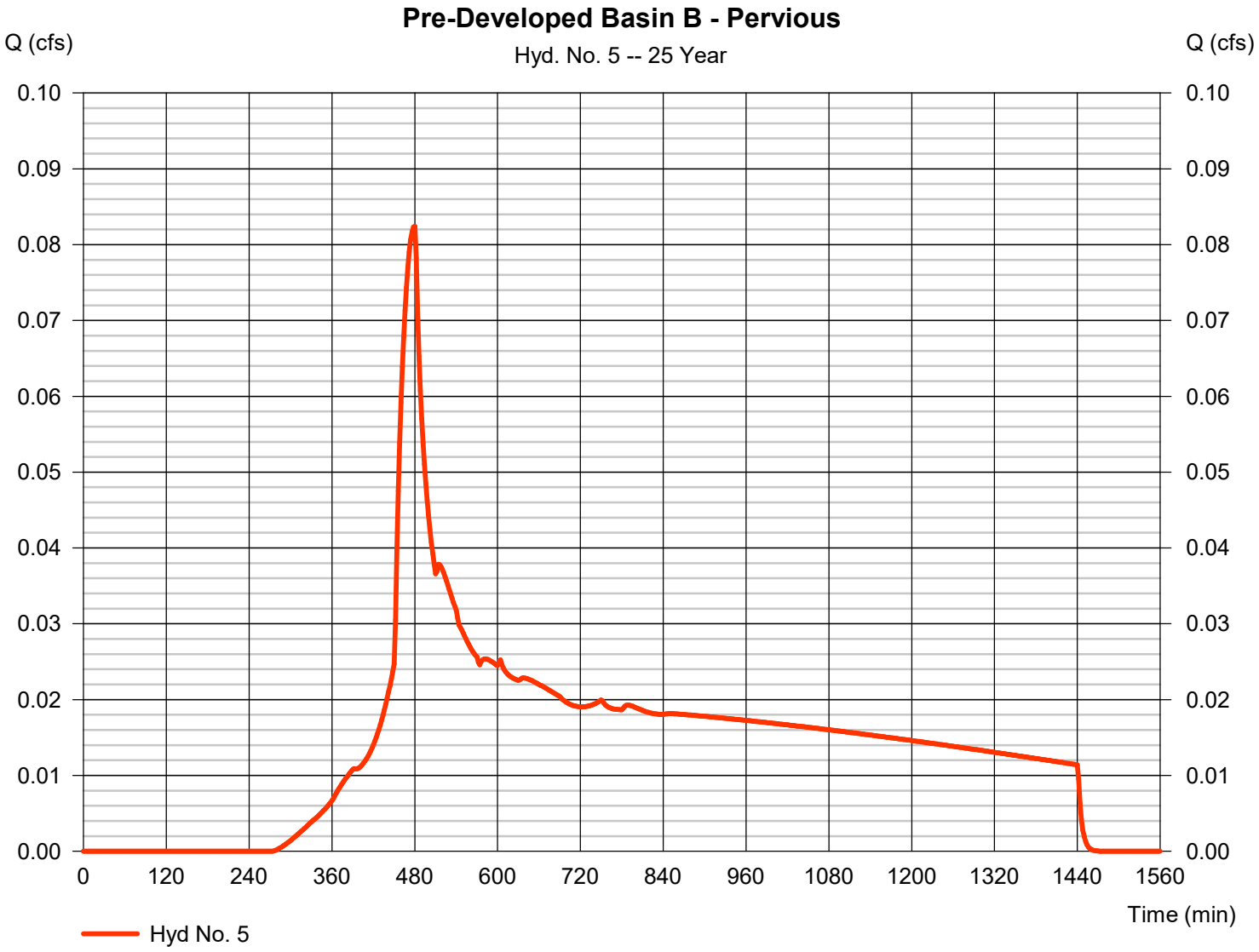


Hydrograph Report

Hyd. No. 5

Pre-Developed Basin B - Pervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.082 cfs
Storm frequency	=	25 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	1,298 cuft
Drainage area	=	0.190 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.90 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

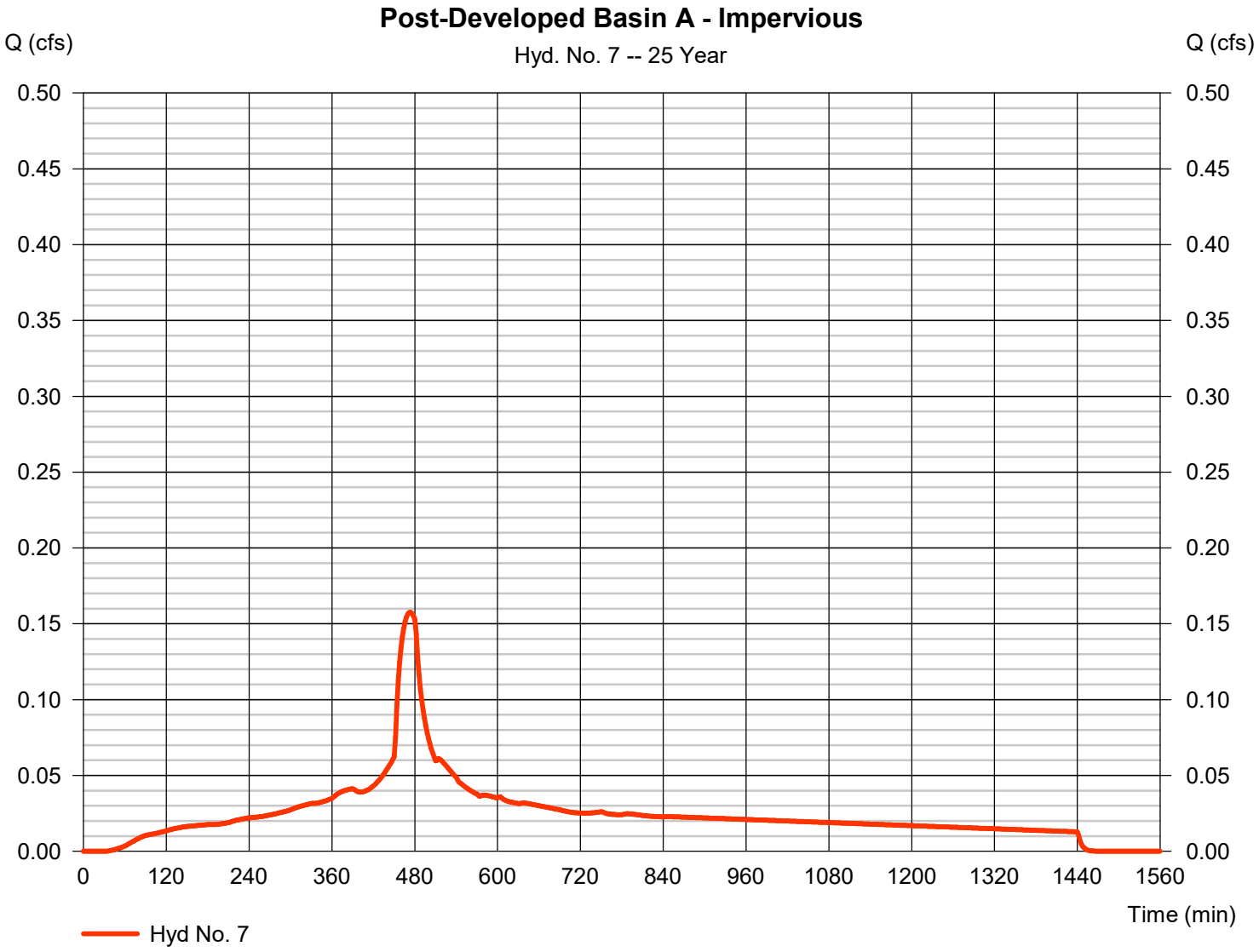


Hydrograph Report

Hyd. No. 7

Post-Developed Basin A - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.158 cfs
Storm frequency	=	25 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	2,289 cuft
Drainage area	=	0.172 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.90 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

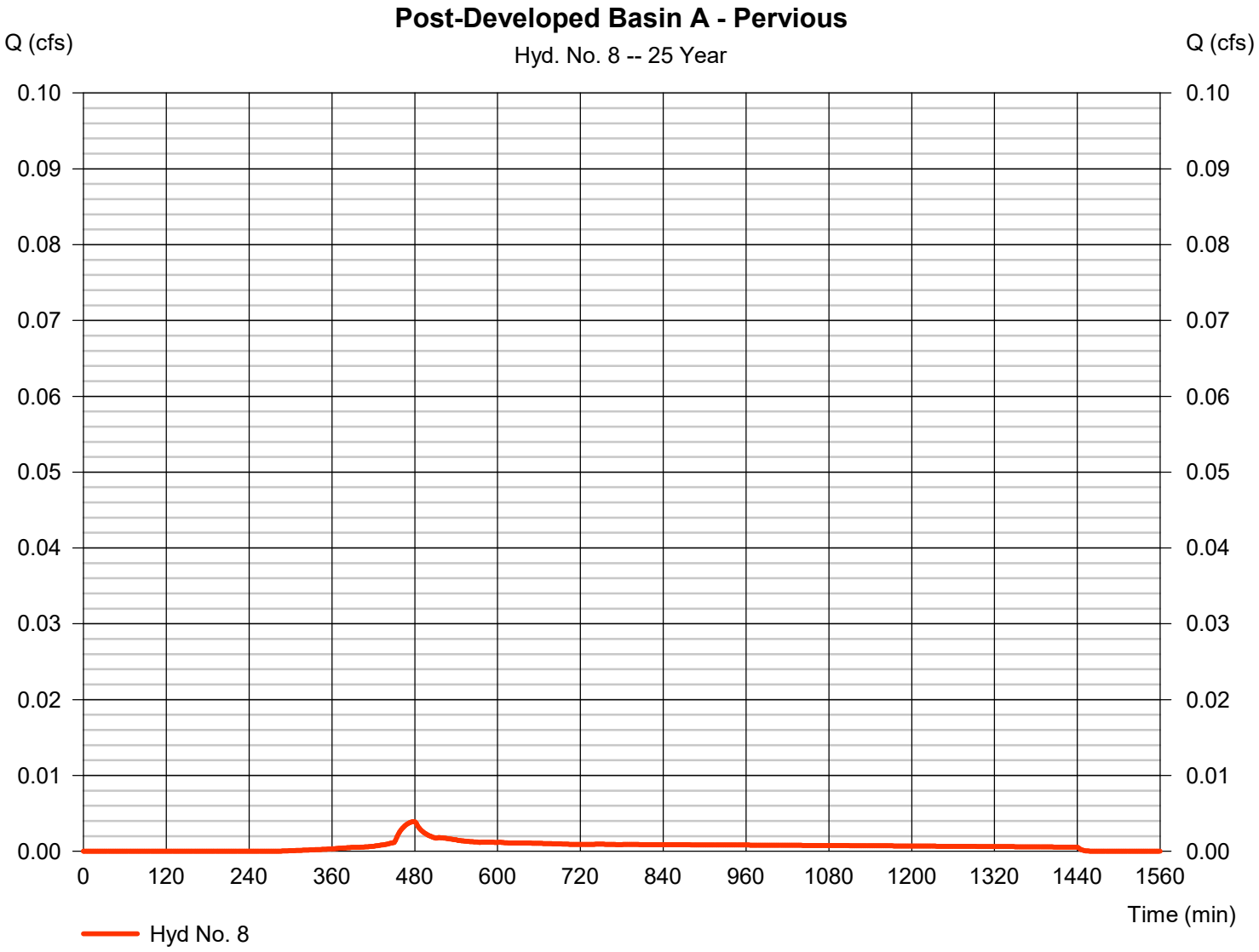


Hydrograph Report

Hyd. No. 8

Post-Developed Basin A - Pervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.004 cfs
Storm frequency	=	25 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	62 cuft
Drainage area	=	0.009 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.90 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

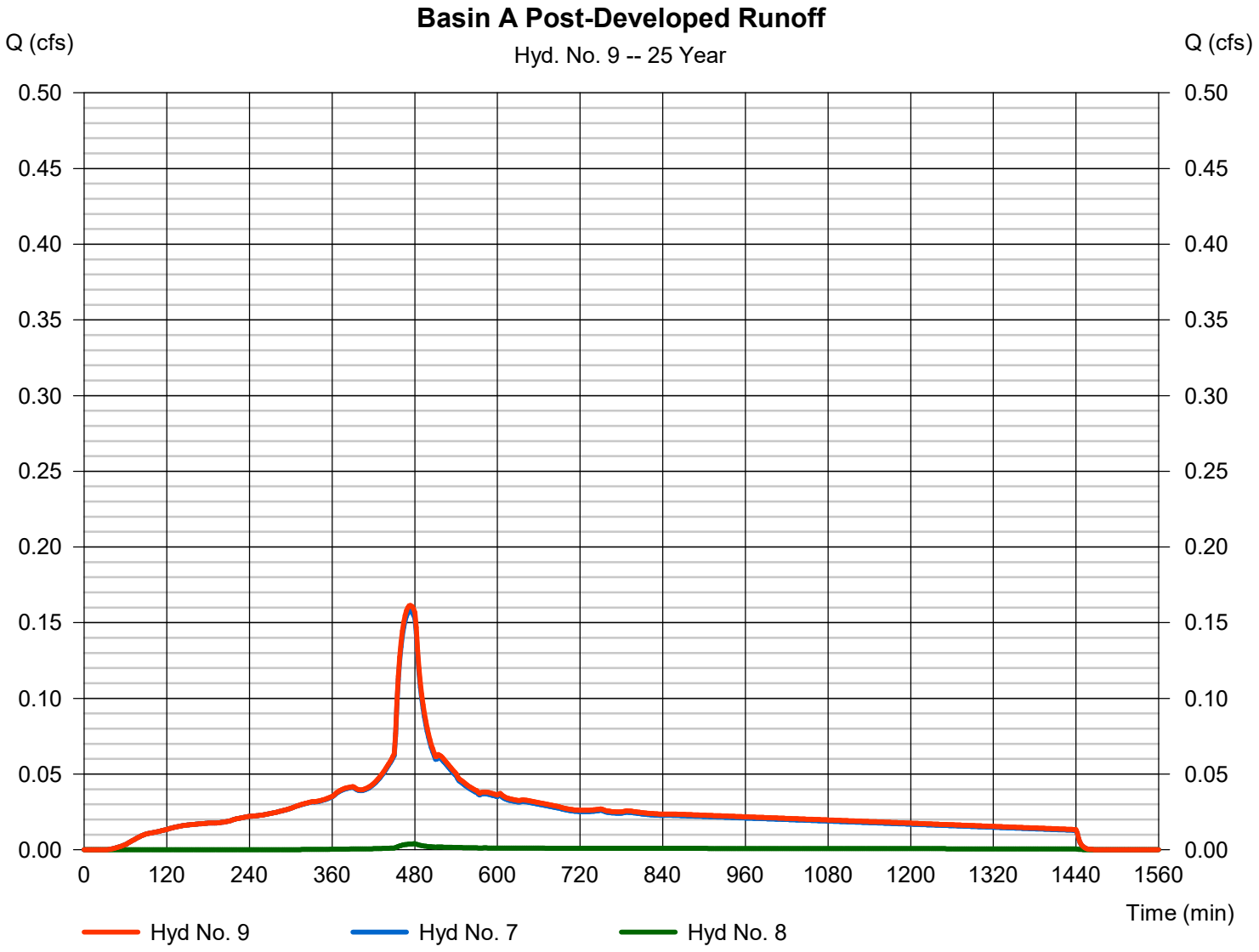


Hydrograph Report

Hyd. No. 9

Basin A Post-Developed Runoff

Hydrograph type	=	Combine	Peak discharge	=	0.161 cfs
Storm frequency	=	25 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	2,350 cuft
Inflow hyds.	=	7, 8	Contrib. drain. area	=	0.181 ac

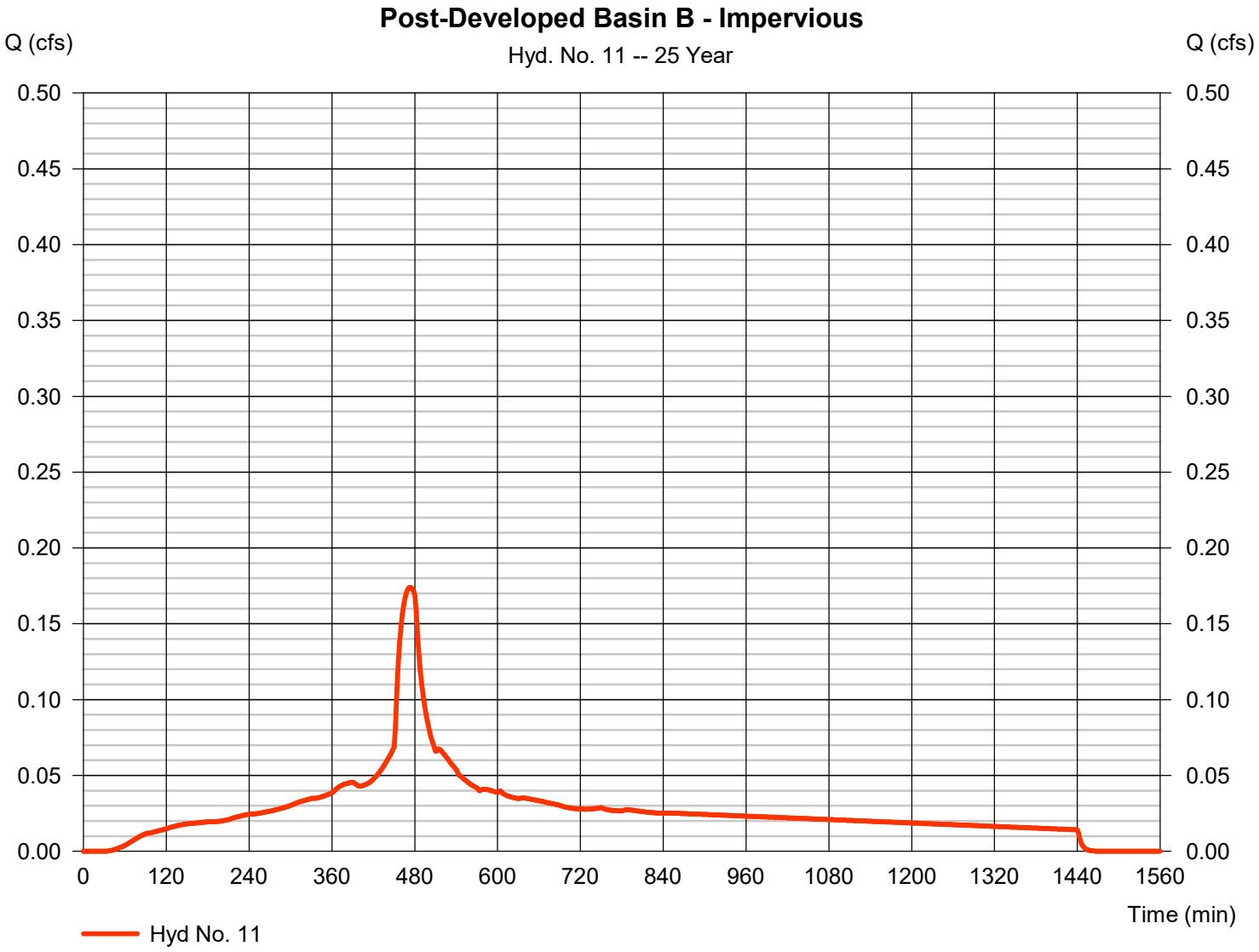


Hydrograph Report

Hyd. No. 11

Post-Developed Basin B - Impervious

Hydrograph type	=	SBUH Runoff	Peak discharge	=	0.174 cfs
Storm frequency	=	25 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	2,528 cuft
Drainage area	=	0.190 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.90 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

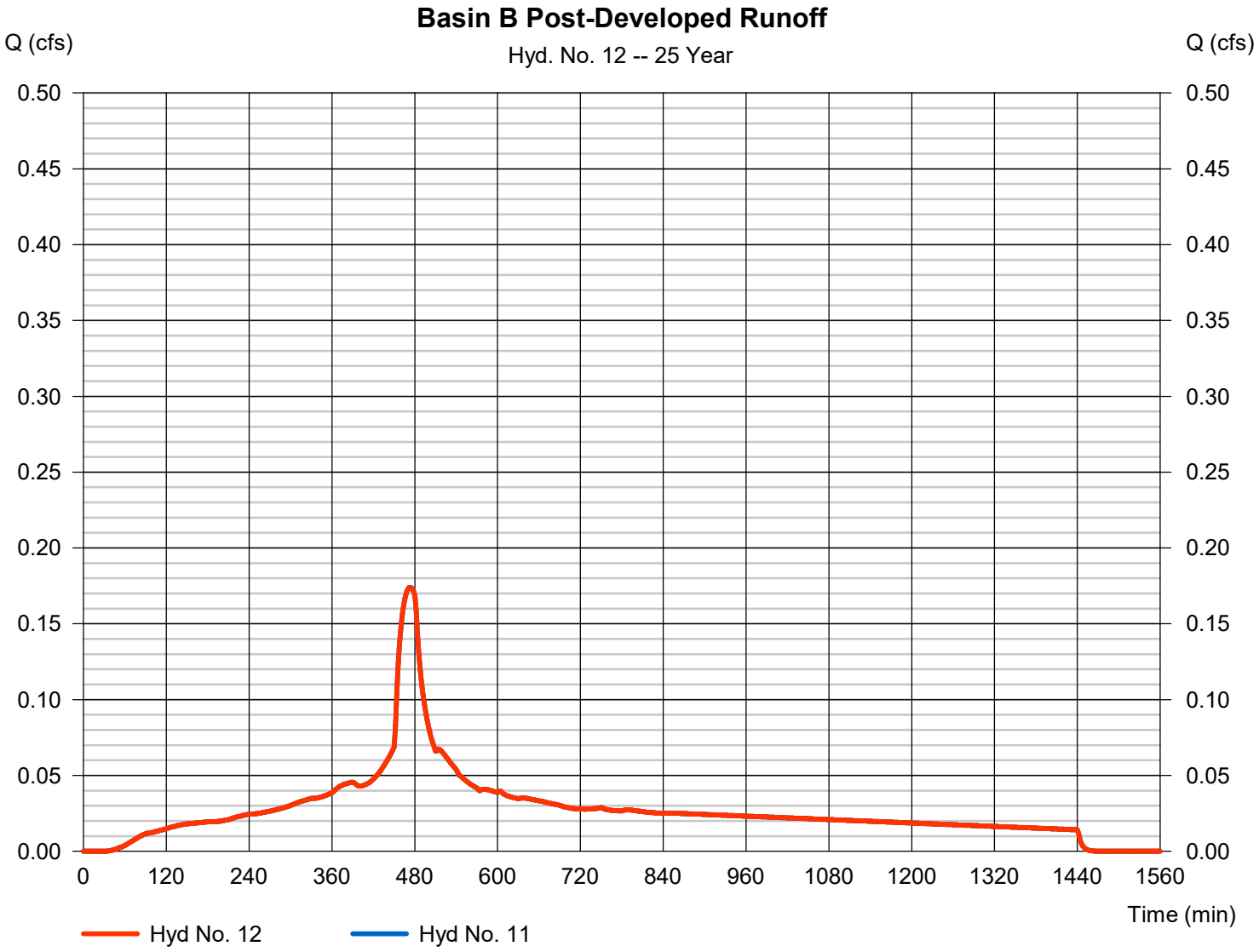


Hydrograph Report

Hyd. No. 12

Basin B Post-Developed Runoff

Hydrograph type	=	Combine	Peak discharge	=	0.174 cfs
Storm frequency	=	25 yrs	Time to peak	=	474 min
Time interval	=	2 min	Hyd. volume	=	2,528 cuft
Inflow hyds.	=	11	Contrib. drain. area	=	0.190 ac



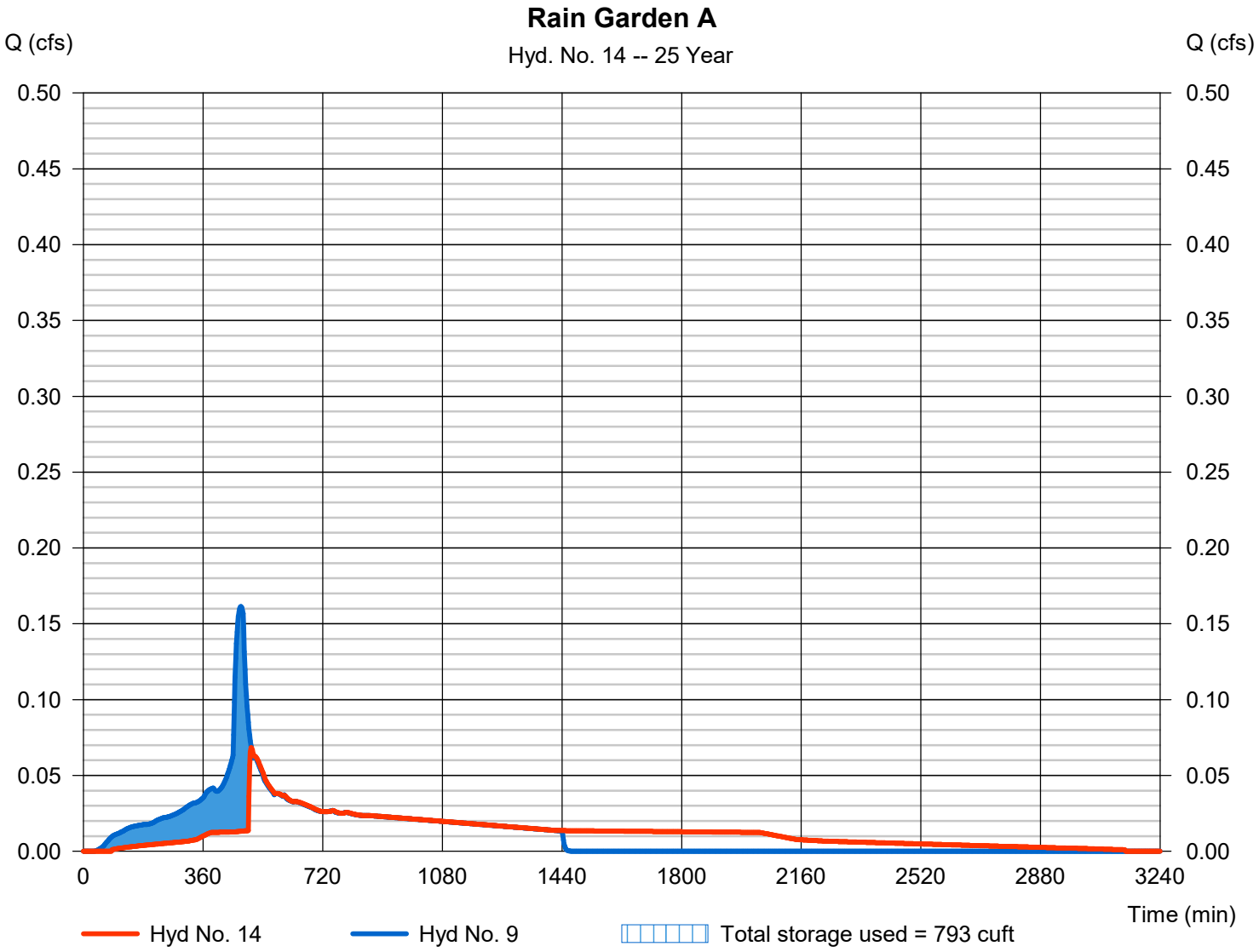
Hydrograph Report

Hyd. No. 14

Rain Garden A

Hydrograph type	=	Reservoir	Peak discharge	=	0.068 cfs
Storm frequency	=	25 yrs	Time to peak	=	504 min
Time interval	=	2 min	Hyd. volume	=	2,338 cuft
Inflow hyd. No.	=	9 - Basin A Post-Developed Runoff	Max. Elevation	=	189.51 ft
Reservoir name	=	Rain Garden A	Max. Storage	=	793 cuft

Storage Indication method used. Outflow includes exfiltration.



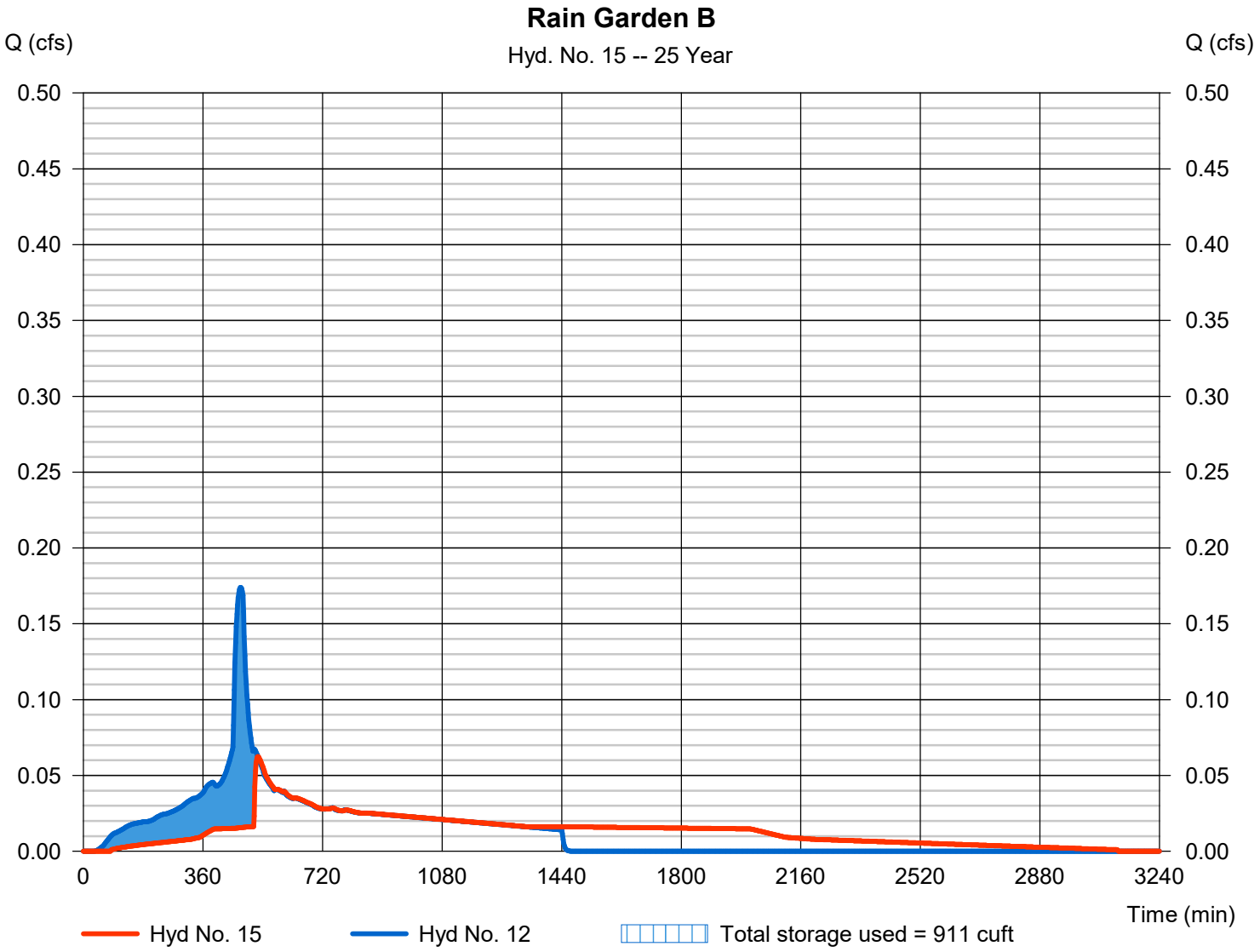
Hydrograph Report

Hyd. No. 15

Rain Garden B

Hydrograph type	=	Reservoir	Peak discharge	=	0.062 cfs
Storm frequency	=	25 yrs	Time to peak	=	526 min
Time interval	=	2 min	Hyd. volume	=	2,516 cuft
Inflow hyd. No.	=	12 - Basin B Post-Developed Runoff	Max. Elevation	=	180.51 ft
Reservoir name	=	Rain Garden B	Max. Storage	=	911 cuft

Storage Indication method used. Outflow includes exfiltration.



Appendix E – Conveyance Calculations

Greenway ES Portables

Pipe Capacity Calculations

Sewer Pipes

CIVIL TOOLS PRO
English Units
02-29-2024 09:09:50

Results

Flow (cfs)	Diameter (in)	Manning's N	Slope (%)	Velocity (fps)	
6.48	8.00	0.013	28.72	18.55	PIPE 1
2.01	8.00	0.013	2.76	5.75	PIPE 2 - EX. 8"
1.80	8.00	0.013	2.21	5.15	PIPE 3

Appendix F – Downstream Analysis

Hydraflow Table of Contents

25 - Year

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	6.884	2	480	116,334	------	------	------	Tributary Basin A
2	SBUH Runoff	7.867	2	480	130,339	------	------	------	Tributary Basin B
3	Combine	14.75	2	480	246,673	1, 2	------	------	Tributary Area

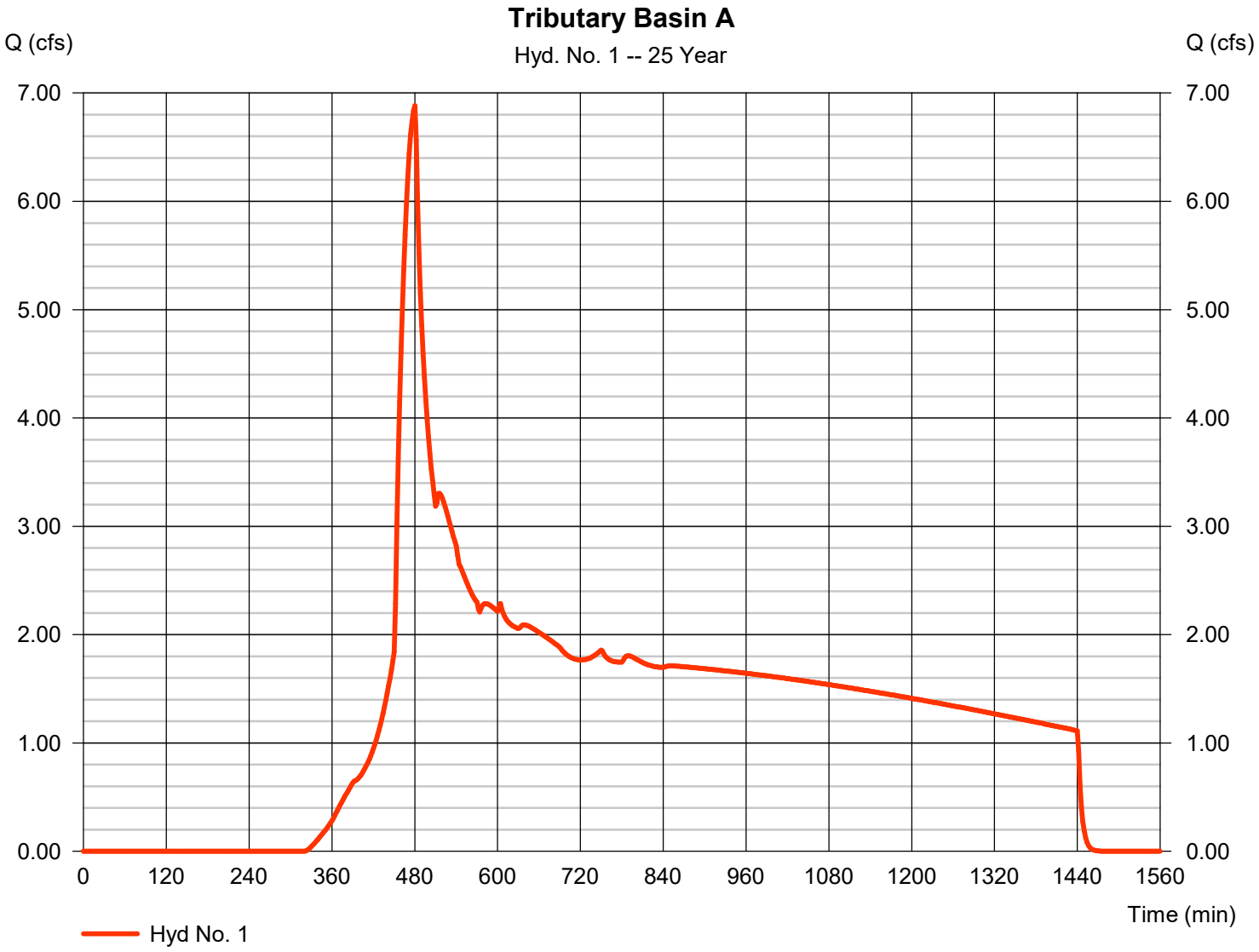
Hydrograph Report

Hyd. No. 1

Tributary Basin A

Hydrograph type	= SBUH Runoff	Peak discharge	= 6.884 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 116,334 cuft
Drainage area	= 20.130 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(15.100 x 75) + (5.030 x 79)] / 20.130



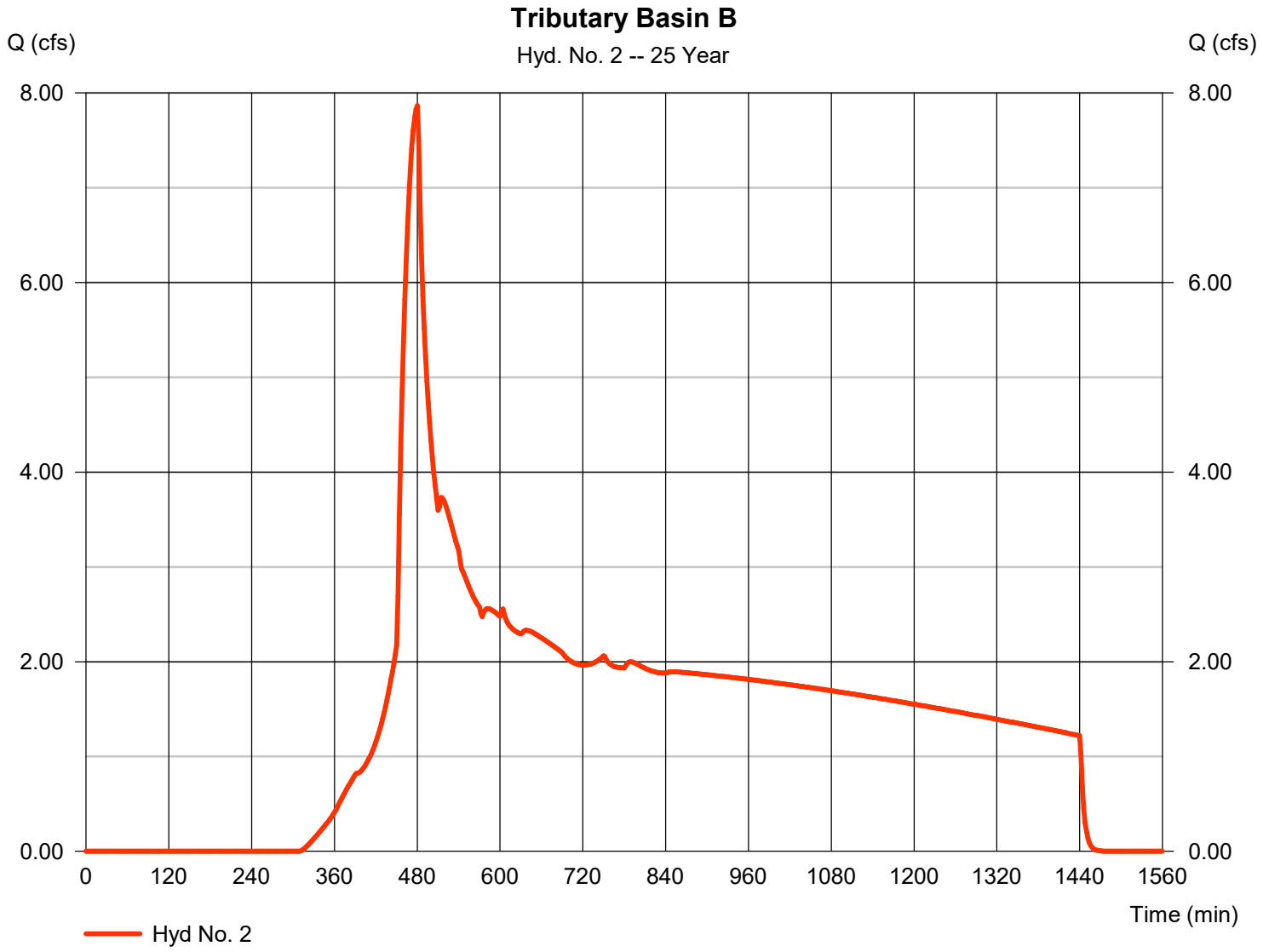
Hydrograph Report

Hyd. No. 2

Tributary Basin B

Hydrograph type	=	SBUH Runoff	Peak discharge	=	7.867 cfs
Storm frequency	=	25 yrs	Time to peak	=	480 min
Time interval	=	2 min	Hyd. volume	=	130,339 cuft
Drainage area	=	21.600 ac	Curve number	=	76*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.90 in	Distribution	=	Type IA
Storm duration	=	24 hrs	Shape factor	=	n/a

* Composite (Area/CN) = [(16.200 x 75) + (5.400 x 79)] / 21.600

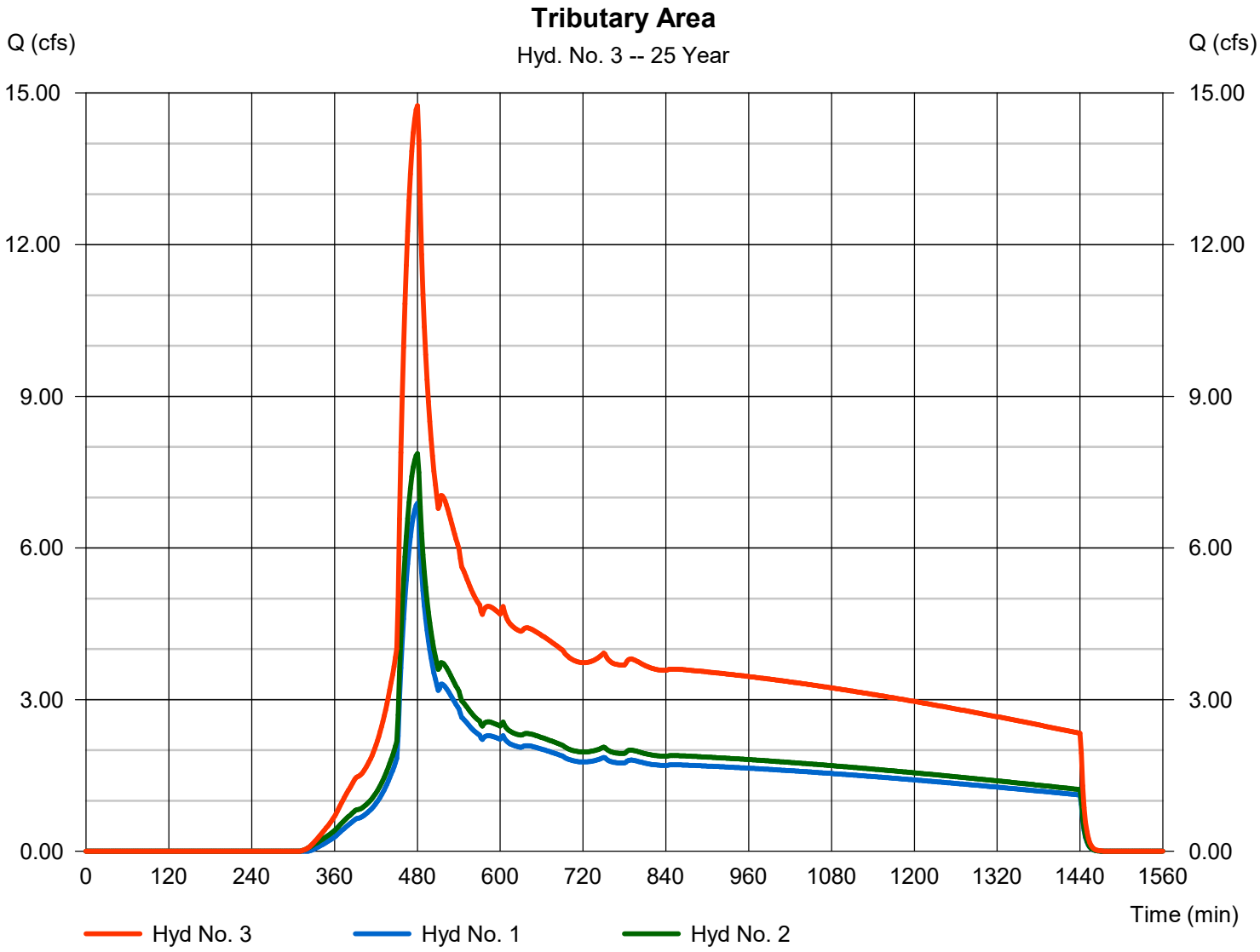


Hydrograph Report

Hyd. No. 3

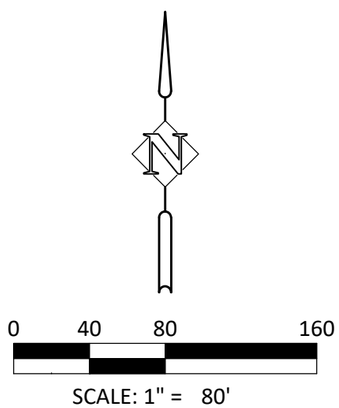
Tributary Area

Hydrograph type	= Combine	Peak discharge	= 14.75 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 246,673 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 41.730 ac



PIPE CONVEYANCE TABLE

PIPE	CAPACITY (CFS)	CONTRIBUTING BASINS	25-YEAR STORM FLOW RATE (CFS)
1	6.48	BASIN A	0.161
2	2.01	BASIN A	0.161
3	1.80	BASIN B	0.174



SCALE: 1" = 80'

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR
DRAWN: HHPR
CHECKED: HHPR
DATE: 02/29/2024

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

PIPE CONVEYANCE MAP

GREENWAY PORTABLES

BEAVERTON, OR

SHEET NO. FIG. 4

JOB NO. BSD-122

P:\01-Portland\BSD (Beaverton School District)\BSD-122 (Greenway Portables)\BSD122-DOCS\Reports\Stormwater\Figures\ FIG. 4 - CONVEYANCE MAP.dwg