

Stormwater Management Report

Applicant:

J.P. Morgan Chase Bank
10 Dearborn – 15th Floor
Chicago, IL 60603

Project Location:

1134 Main Street
Concord, MA



May 2020

Stormwater Management Report

Project Location:

Proposed J.P. Morgan Chase Bank
1134 Main Street
Concord, MA

Introduction

This narrative is provided to document compliance with Massachusetts Stormwater Management Guidelines. The following discussion describes the basis of design and decisions to include stormwater management elements into the design.

Components of Stormwater System Design

There are three primary components of an effective stormwater management plan. They are as follows:

- Site Planning
- Source Control and Pollution Prevention
- Structural Best Management Practices (“BMPs”)

The design for this project considers all three components. The Applicant wishes to maximize the re-use of existing drainage infrastructure at the site. The existing site conditions include an existing structure, parking areas and a system of catch basins, manholes and piping that convey flows of runoff to a drainage system in Main Street. Additionally, with the proposed redevelopment, we are reducing impervious area. The Applicant wishes to utilize these conditions as an advantage where possible and reductions in impervious area reduce flows of runoff generated at the project site.

This is a redevelopment project and the Applicant is reducing impervious area by approximately 300 SF across the site to reduce generation of stormwater runoff. This source control reduces stormwater volumes. The Applicant also is required to provide for spill control and operational pollution control and prevention plans to protect against adverse impacts.

Good housekeeping and source controls are considered as part of the project, in combination with structural BMPs to comply with the requirements of the Stormwater Management Guidelines. Seasonal Parking area sweeping shall be implemented by the Applicant to reduce sediment load and pollutant potential. Structural BMP’s include gas traps in the catch basin inlets (if not already installed).

Design Considerations

This analysis and design uses typical rainfall depths over a wide range of storm conditions to be consistent with State and Local Stormwater Management requirements.

For the purpose of this report, the following design conditions are used (TR-55 methodology – Type III storm distribution):

<u>Design Storm</u>	<u>Rainfall Depth</u>
2-yr.	3.23 inches
10-yr.	5.02 inches
100-yr.	7.87 inches

The proposed stormwater management system is designed to:

- Capture and treat the water quality volume specified in the standards,
- Provide protection of existing wetland areas and buffers.

Design Goals

The design goals for the stormwater management system proposed for this project include the following:

- Compliance with MassDEP Stormwater Management regulations (to the extent practicable), and local requirements (whichever is more restrictive)
- Enhance treatment of stormwater runoff in compliance with Stormwater Management regulations
- Reduce stormwater flows from the development site.

Pre-Development Conditions

The site is previously developed as a bank along with related parking, driveways and utilities. As described above, an existing drainage system network collects and conveys flows of from these improvements and discharges to a drainage system within Main Street.

The pre-development hydrologic analysis was performed using the existing conditions of the project site. Design storms evaluated include the 2-, 10-, and 100-year storm events. The topography generally and gradually drops from south to the north (away from Main Street). A system of catch basin inlets and piping discharges runoff proximal to the intersection of Baker Avenue and Main Street. This location is the logical design point for the purpose of analysis.

These conditions are illustrated on the accompanying site plans and with the Watershed mapping attached to this report. The Pre-Development Condition Watershed plan

identifies these design points along with catchment areas; their designations to correspond with the design computations; the overall flow paths attributed to those catchments; along with a data table to illustrate Times of Concentration, ground cover conditions, and other relevant data used in the hydrologic model.

Post-Development Conditions

The project site is proposed to be improved and re-developed to modernize the appearance and operation of the previously approved use with a new Facility Owner. Re-use of the existing (previously approved) drainage system will be maximized to limit disturbance and take advantage of existing site infrastructure.

General overland drainage flow patterns shall remain identical to the pre-development condition. Flows of runoff throughout the design watershed will continue to follow a south to north direction. Stormwater generated from the components of the proposed re-development shall be collected and treated prior to discharge. Where missing or broken, gas traps shall be provided, and where required to meet current standards.

Post-Development watershed mapping is also included as part of this report and includes the relevant data used in the analysis of the post-construction runoff conditions. Points of analysis in the post-developed conditions are identical to the locations identified in the pre-development conditions for direct comparison.

Selection of Best Management Practices (BMPs) and Treatment Trains

As part of the Site Planning and Source Control and Pollution Prevention process for Stormwater Management, existing site conditions and proposed uses are evaluated to determine BMP's for a given site.

The proposed stormwater management system consists of treatment trains of structural stormwater BMPs that consist of deep sump catch basins w/hoods; combined with pavement/parking area sweeping on a seasonal basis as part of the long-term Operation and Maintenance program to be instituted by the developer. Impervious area reductions reduce stormwater generation rates

These treatment trains serve to sufficiently treat, and attenuate peak stormwater discharge rates, in compliance with redevelopment provisions in the most current MassDEP Stormwater Standards and local requirements.

Stormwater Management Standards Summary

The Stormwater Management Standards are identified below with a brief description, and a compliance statement for each standard appears in italics.

Standard 1: No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Treatment systems are an integral part of the project design. Stormwater discharges are treated and conveyed to existing drainage systems with treatment levels in compliance with the Stormwater Management Standards.

Standard 2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The proposed stormwater management system is designed to meet or reduce post-construction runoff rates to be at or pre-construction runoff rates.

Stormwater Summary – (Development Site)

Total Site		
Design	Pre-Development	Post-Development
Storm	Flow (cfs)	Flow (cfs)
2-Yr.	1.07	1.06
10-Yr.	1.72	1.71
100-Yr.	2.75	2.74

Standard 3: Recharge

The Applicant is proposing to take advantage of the Redevelopment provision, increased pervious area assists in enhancing potential for recharge. In this manner, the Recharge component of the design complies with State and local stormwater requirements.

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). The required water quality volume, the runoff volume requiring TSS treatment, is calculated as follows:

The required water quality volume equals 1.0 inch of runoff times the total impervious area of the post-development project site if the discharge occurs:

- From a land use with a higher potential pollutant load (LUHPPL);

- Within an area with a rapid infiltration rate (greater than 2.4 inches per hour);
- Within a Zone II or Interim Wellhead Protection Area;

OR, near or to any of the following critical areas:

- Outstanding Resource Waters,
- Special Resource Waters,
- Bathing beaches,
- Shellfish growing areas,
- Cold-water fisheries.

The required water quality volume equals 0.5 inches of runoff times the total impervious area of the post-development site for all other discharges.

Therefore, the required water quality volume (0.5-in. over the project impervious area) is used for this project. With status as a redevelopment project, and the proposed stormwater quality improvements (i.e. parking area sweeping, gas traps in the catch basins) the intent of the standard is satisfied.

Standard 5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The proposed use is not considered a land use with higher pollutant load (LUHPPL), and is therefore not applicable.

Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department.

Groundwater Protection zones or other critical areas are not located on or near the project site, and the Applicant has met treatment goals and incorporated good housekeeping, and structural treatment components and BMP's to the extent practicable consistent with this standard.

Standard 7: A redevelopment project is required to meet certain Stormwater Management Standards only to the maximum extent practicable.

The project meets the re-development standard and complies to the maximum practicable extent.

Standard 8: Construction Period Erosion and Sedimentation Control.

The Applicant is providing an Erosion and Sedimentation Control Plan as part of the submittal package for this project.

Standard 9: Operation and Maintenance (O&M) Plan.

The Applicant is providing an O&M plan as part of the submittal package for this project.

Standard 10: Illicit Discharges.

Illicit discharges to the stormwater management system are prohibited. A statement shall be provided prior to approval.

Conclusion

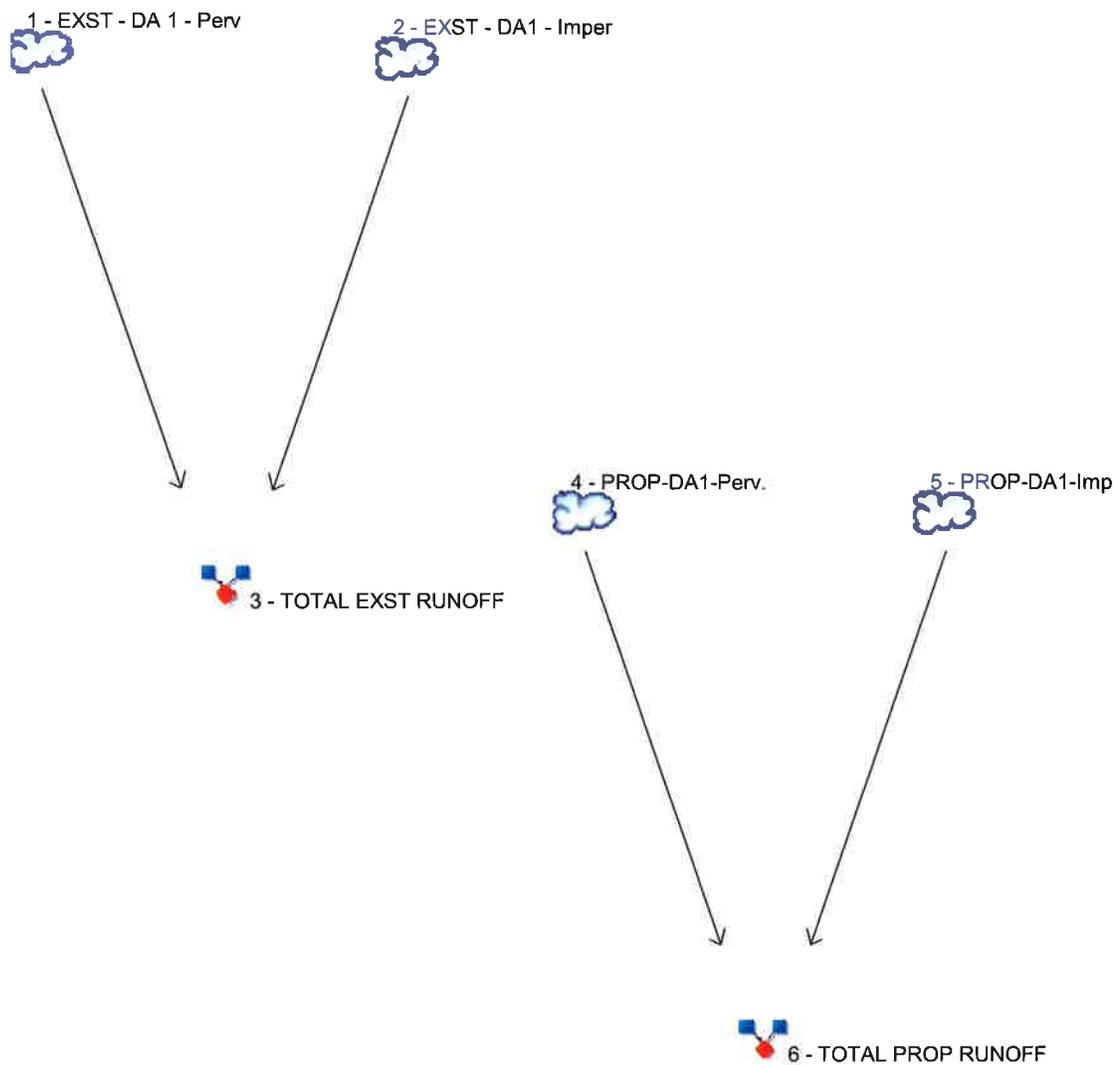
Information in and referenced in this report indicates that the programmatic and structural BMPs document compliance with Massachusetts Stormwater Management guidelines. Additionally, all the design goals are met to reduce off-site flows of runoff at project completion.

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Watershed Model Schematic

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Legend

Hyd.	Origin	Description
1	SCS Runoff	EXST - DA 1 - Perv
2	SCS Runoff	EXST - DA1 - Imper
3	Combine	TOTAL EXST RUNOFF
4	SCS Runoff	PROP-DA1-Perv.
5	SCS Runoff	PROP-DA1-Imp
6	Combine	TOTAL PROP RUNOFF

Hydrograph Return Period Recap

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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	-----	-----	0.132	-----	-----	0.252	0.329	0.385	0.446	EXST - DA 1 - Perv
2	SCS Runoff	-----	-----	0.934	-----	-----	1.463	1.792	2.036	2.301	EXST - DA1 - Imper
3	Combine	1, 2	-----	1.066	-----	-----	1.715	2.121	2.421	2.747	TOTAL EXST RUNOFF
4	SCS Runoff	-----	-----	0.144	-----	-----	0.274	0.357	0.419	0.486	PROP-DA1-Perv.
5	SCS Runoff	-----	-----	0.916	-----	-----	1.434	1.757	1.997	2.256	PROP-DA1-Imp
6	Combine	4, 5	-----	1.060	-----	-----	1.709	2.115	2.416	2.742	TOTAL PROP RUNOFF

Hydrograph Summary Report

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Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.132	2	724	395	-----	-----	-----	EXST - DA 1 - Perv
2	SCS Runoff	0.934	2	724	3,152	-----	-----	-----	EXST - DA1 - Imper
3	Combine	1.066	2	724	3,547	1, 2	-----	-----	TOTAL EXST RUNOFF
4	SCS Runoff	0.144	2	724	430	-----	-----	-----	PROP-DA1-Perv.
5	SCS Runoff	0.916	2	724	3,091	-----	-----	-----	PROP-DA1-Imp
6	Combine	1.060	2	724	3,521	4, 5	-----	-----	TOTAL PROP RUNOFF
Hydraulic Calcs..gpw					Return Period: 2 Year			Friday, 05 / 8 / 2020	

Hydrograph Report

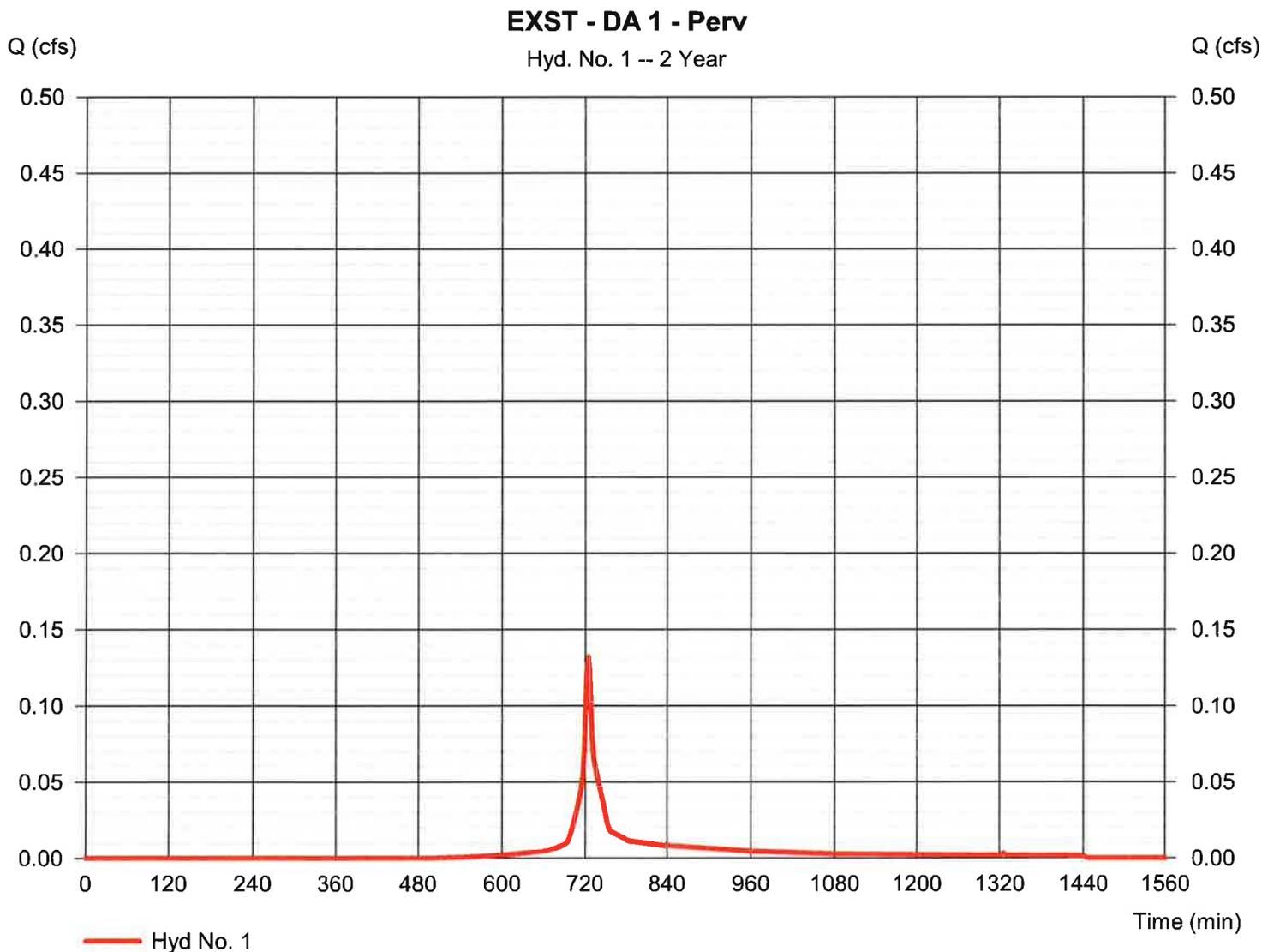
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Hyd. No. 1

EXST - DA 1 - Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.132 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 395 cuft
Drainage area	= 0.068 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

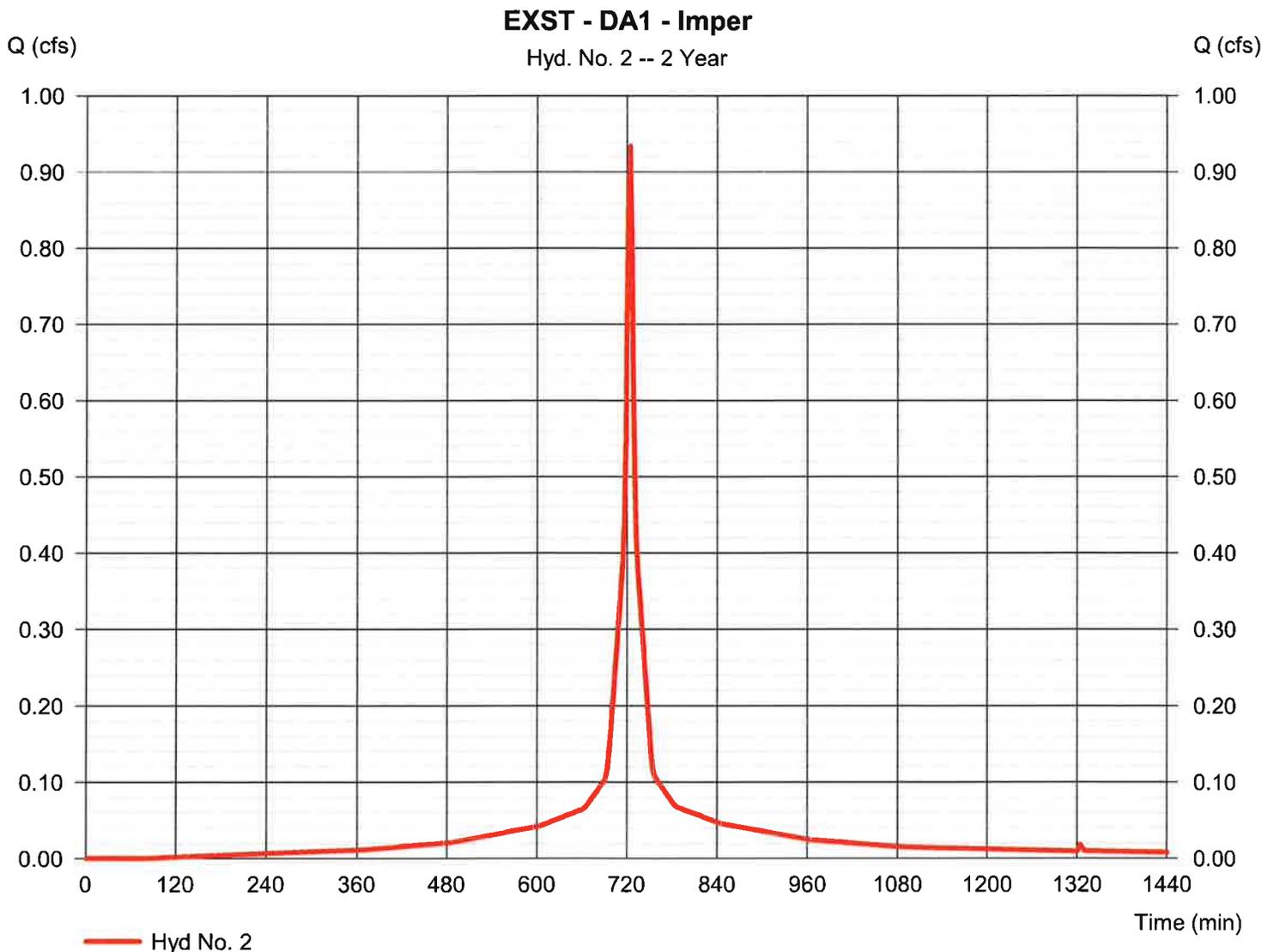
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Hyd. No. 2

EXST - DA1 - Imper

Hydrograph type	= SCS Runoff	Peak discharge	= 0.934 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 3,152 cuft
Drainage area	= 0.309 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



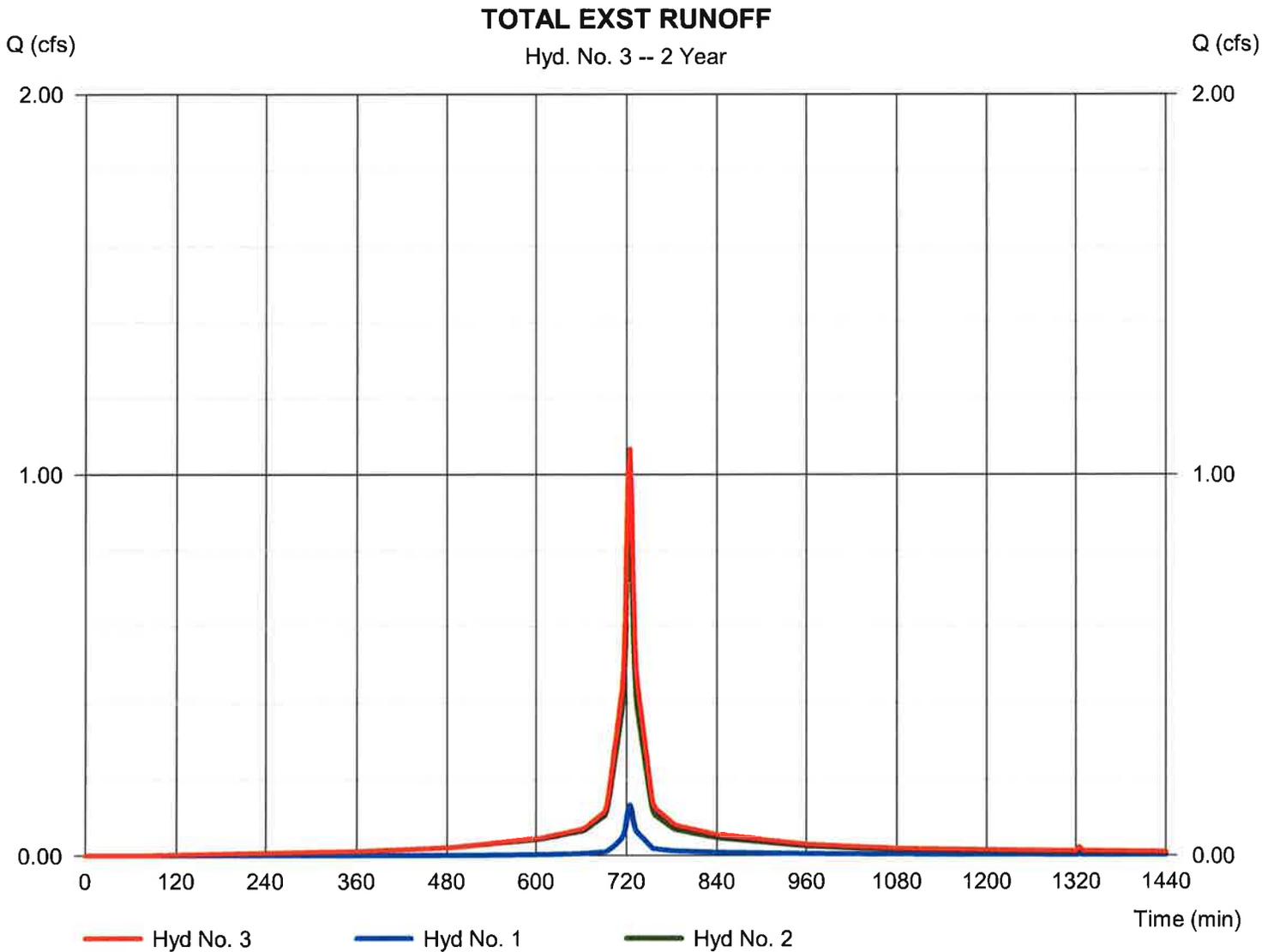
Hydrograph Report

Hyd. No. 3

TOTAL EXST RUNOFF

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 1.066 cfs
Time to peak = 724 min
Hyd. volume = 3,547 cuft
Contrib. drain. area = 0.377 ac



Hydrograph Report

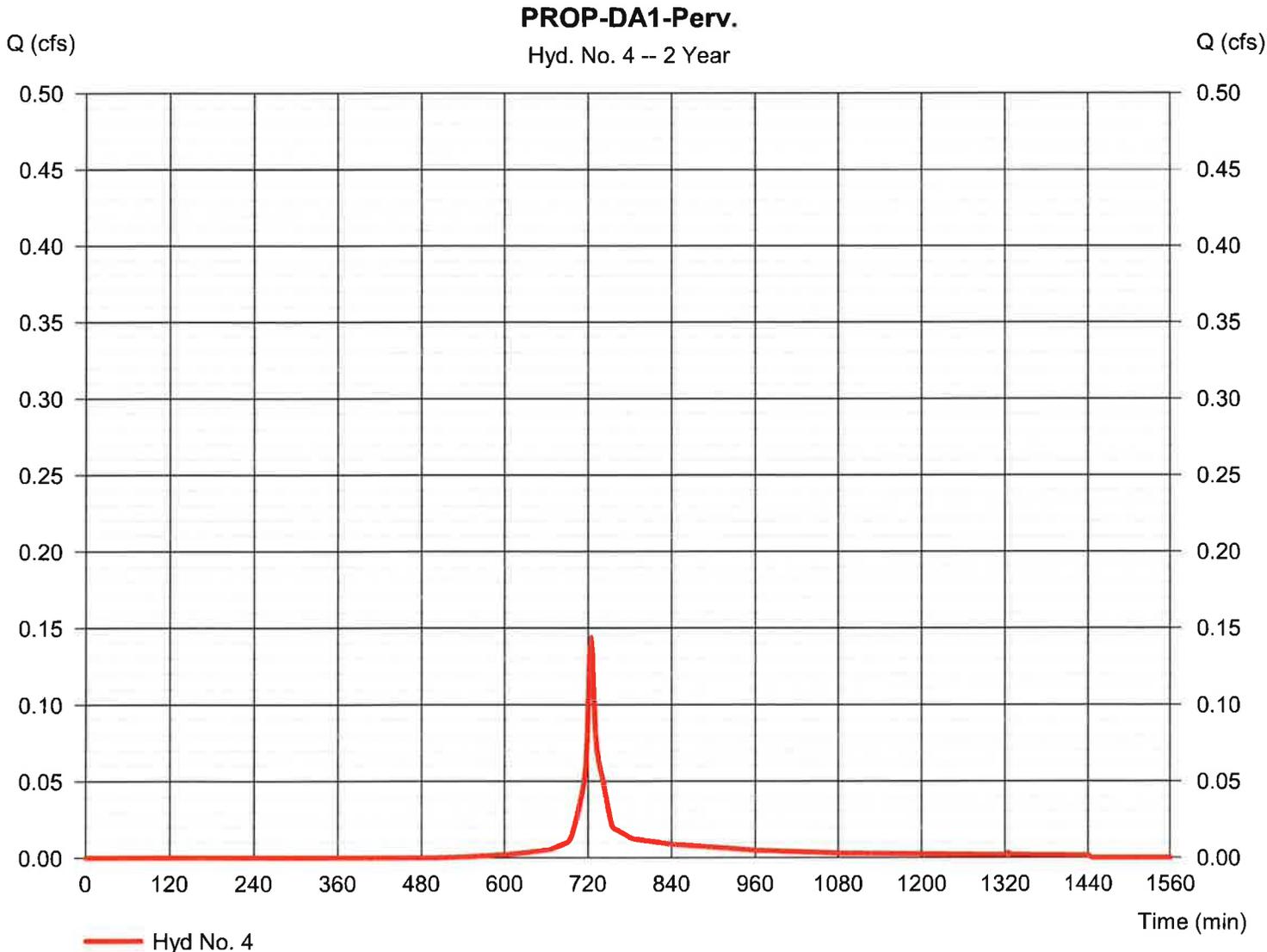
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Friday, 05 / 8 / 2020

Hyd. No. 4

PROP-DA1-Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.144 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 430 cuft
Drainage area	= 0.074 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

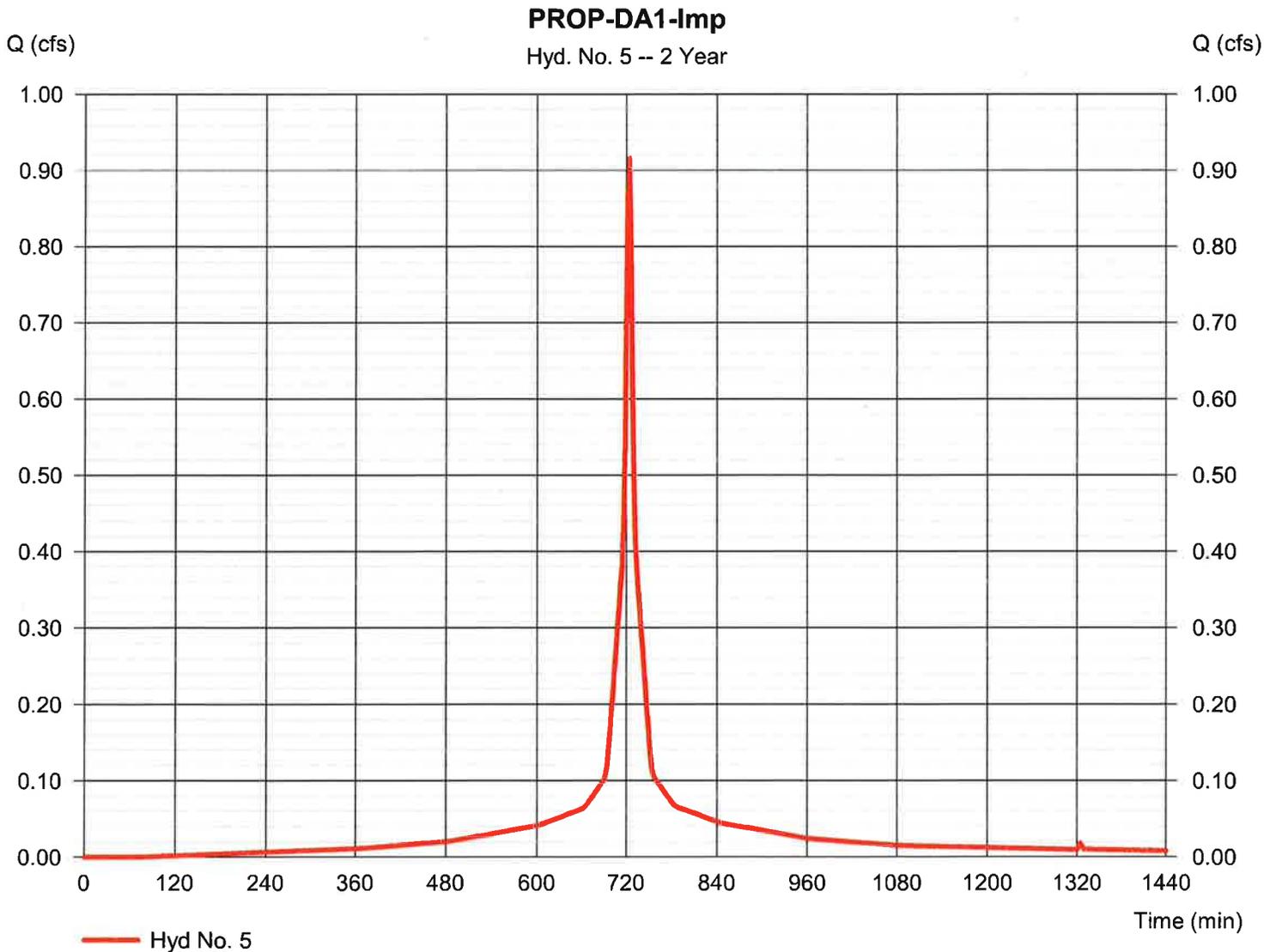
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Hyd. No. 5

PROP-DA1-Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.916 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 3,091 cuft
Drainage area	= 0.303 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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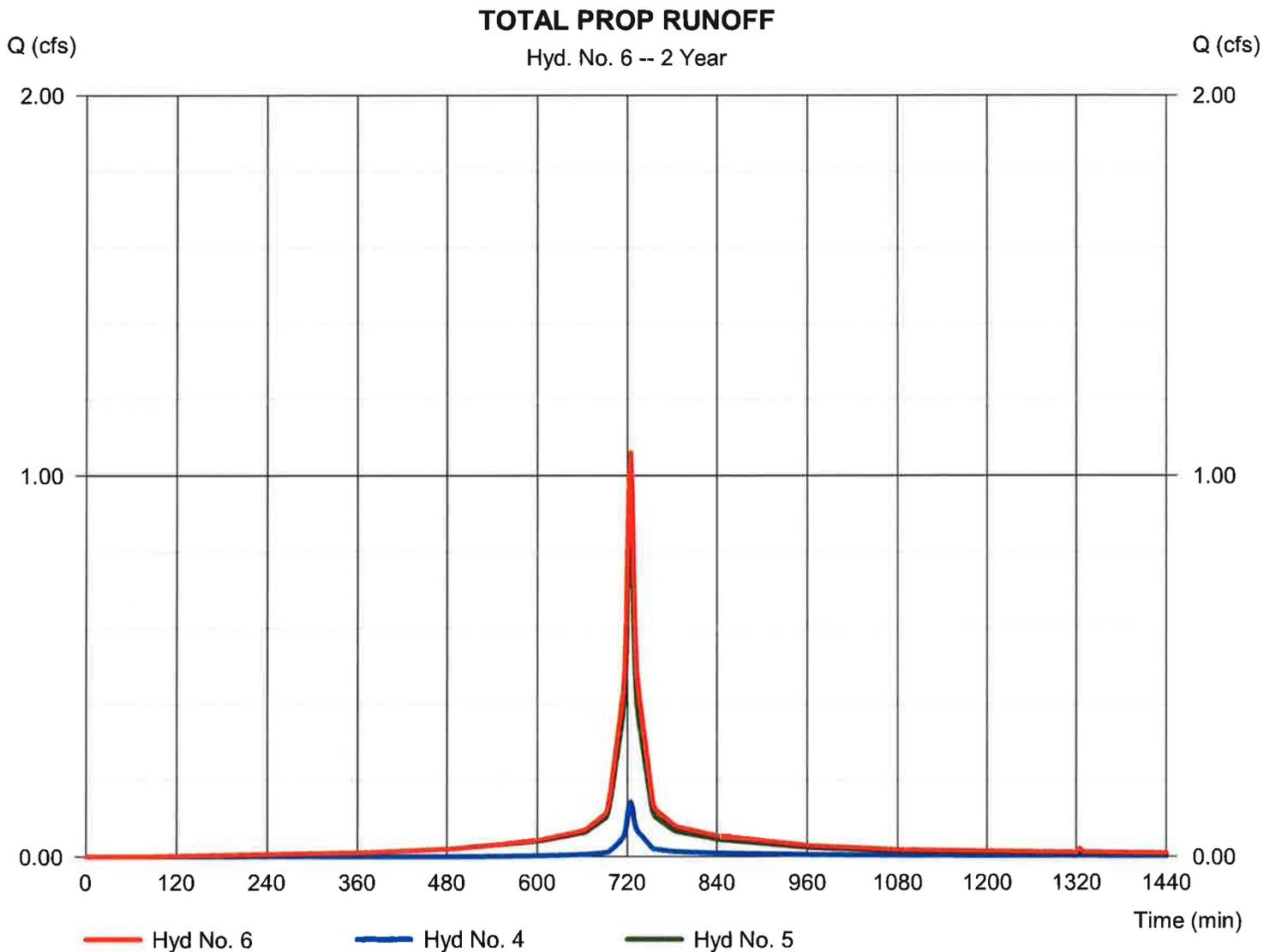
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Hyd. No. 6

TOTAL PROP RUNOFF

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 4, 5

Peak discharge = 1.060 cfs
 Time to peak = 724 min
 Hyd. volume = 3,521 cuft
 Contrib. drain. area = 0.377 ac



Hydrograph Summary Report

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Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.252	2	724	761	-----	-----	-----	EXST - DA 1 - Perv
2	SCS Runoff	1.463	2	724	5,030	-----	-----	-----	EXST - DA1 - Imper
3	Combine	1.715	2	724	5,791	1, 2	-----	-----	TOTAL EXST RUNOFF
4	SCS Runoff	0.274	2	724	828	-----	-----	-----	PROP-DA1-Perv.
5	SCS Runoff	1.434	2	724	4,932	-----	-----	-----	PROP-DA1-Imp
6	Combine	1.709	2	724	5,760	4, 5	-----	-----	TOTAL PROP RUNOFF
Hydraulic Calcs..gpw					Return Period: 10 Year			Friday, 05 / 8 / 2020	

Hydrograph Report

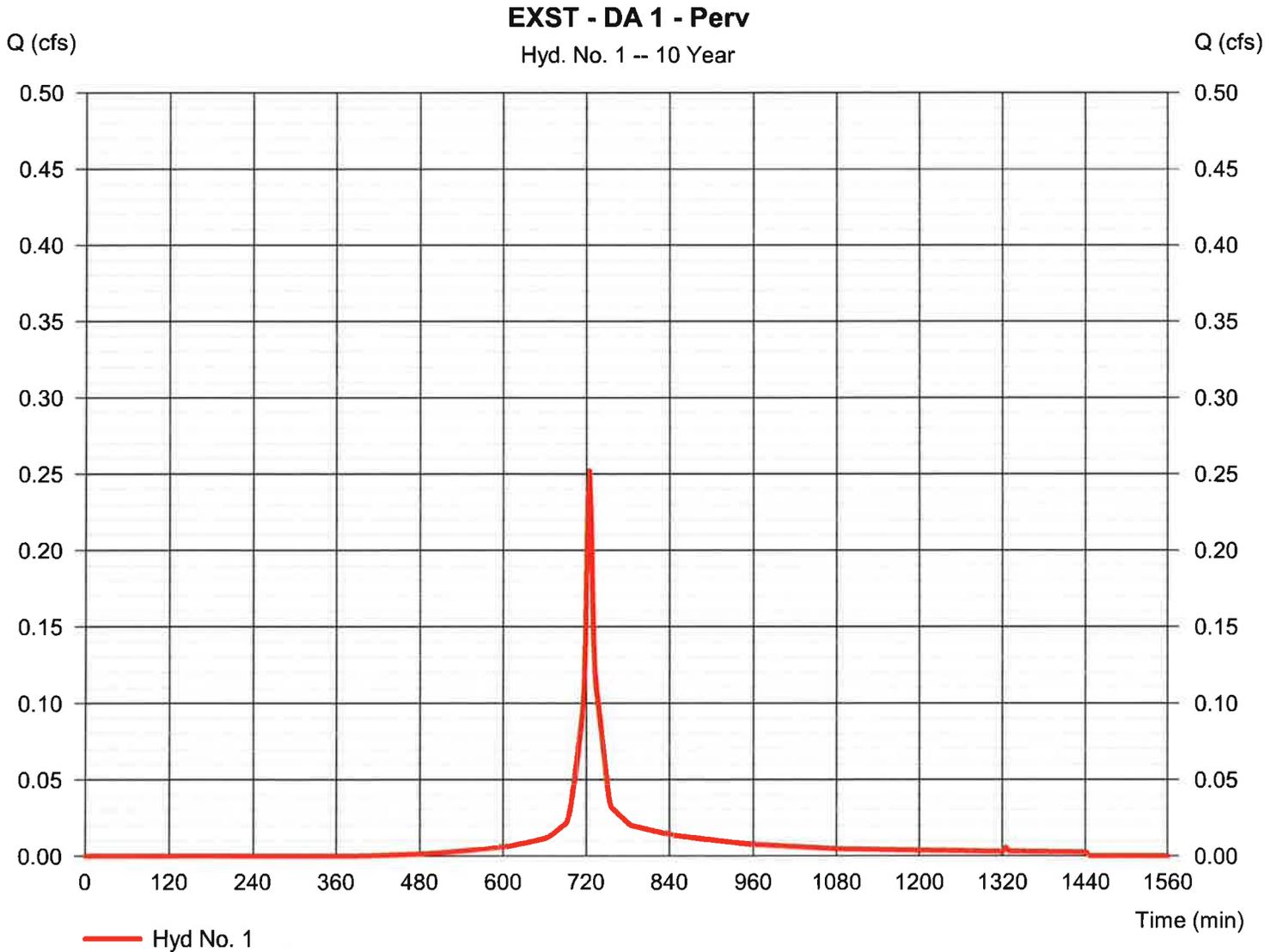
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Hyd. No. 1

EXST - DA 1 - Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.252 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 761 cuft
Drainage area	= 0.068 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

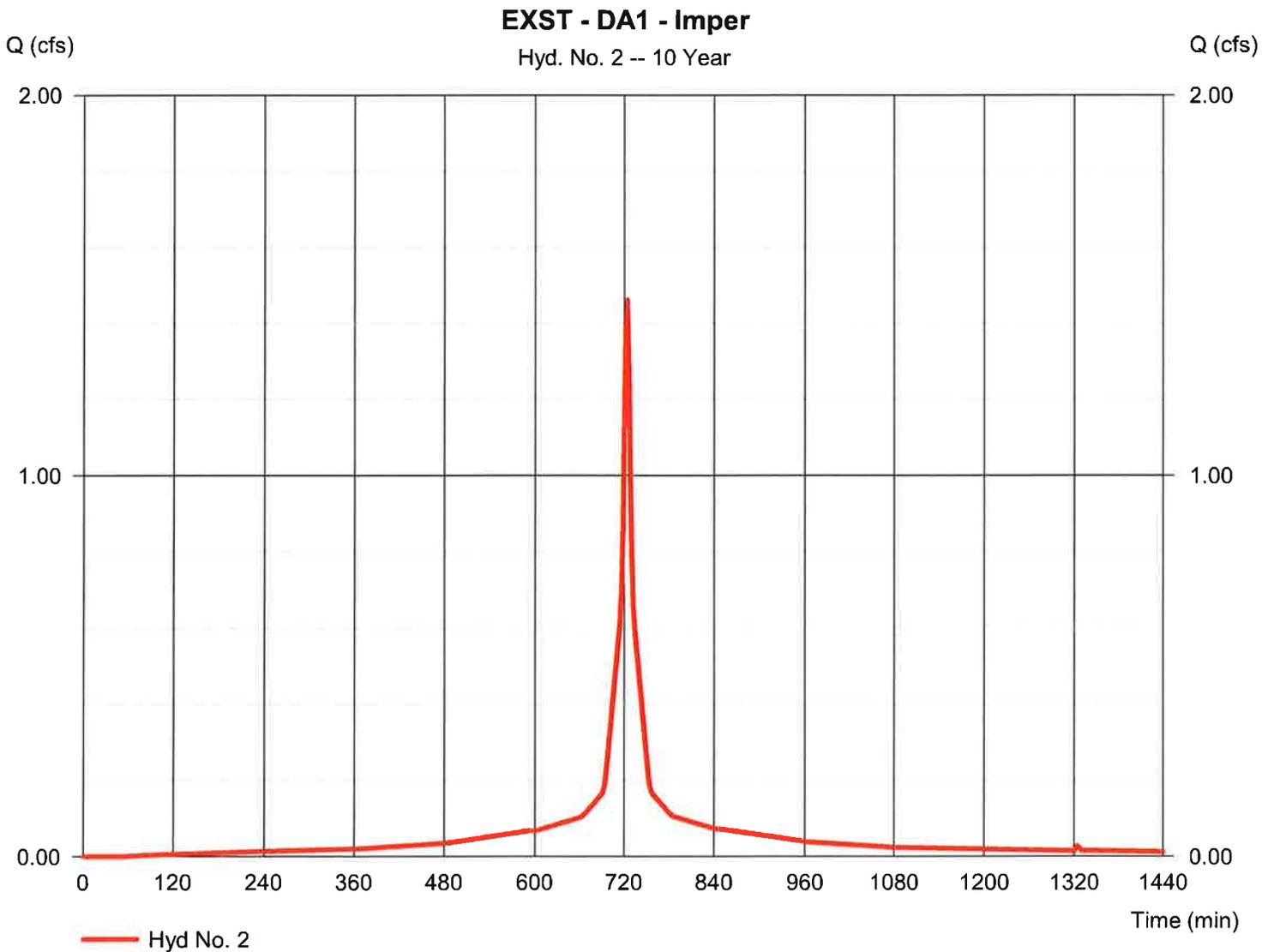
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Hyd. No. 2

EXST - DA1 - Imper

Hydrograph type	= SCS Runoff	Peak discharge	= 1.463 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 5,030 cuft
Drainage area	= 0.309 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

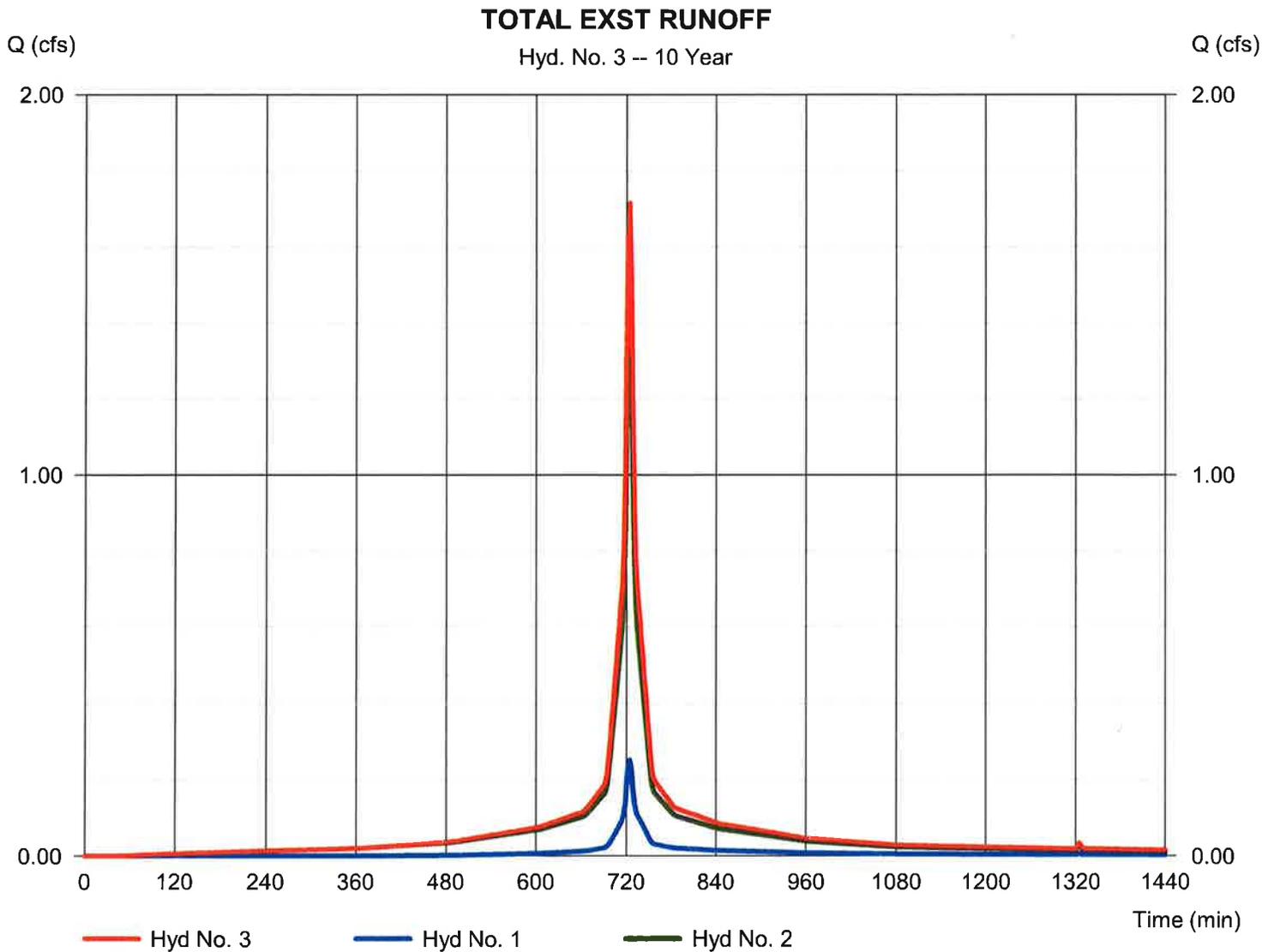


Hyd. No. 3

TOTAL EXST RUNOFF

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 1.715 cfs
Time to peak = 724 min
Hyd. volume = 5,791 cuft
Contrib. drain. area = 0.377 ac

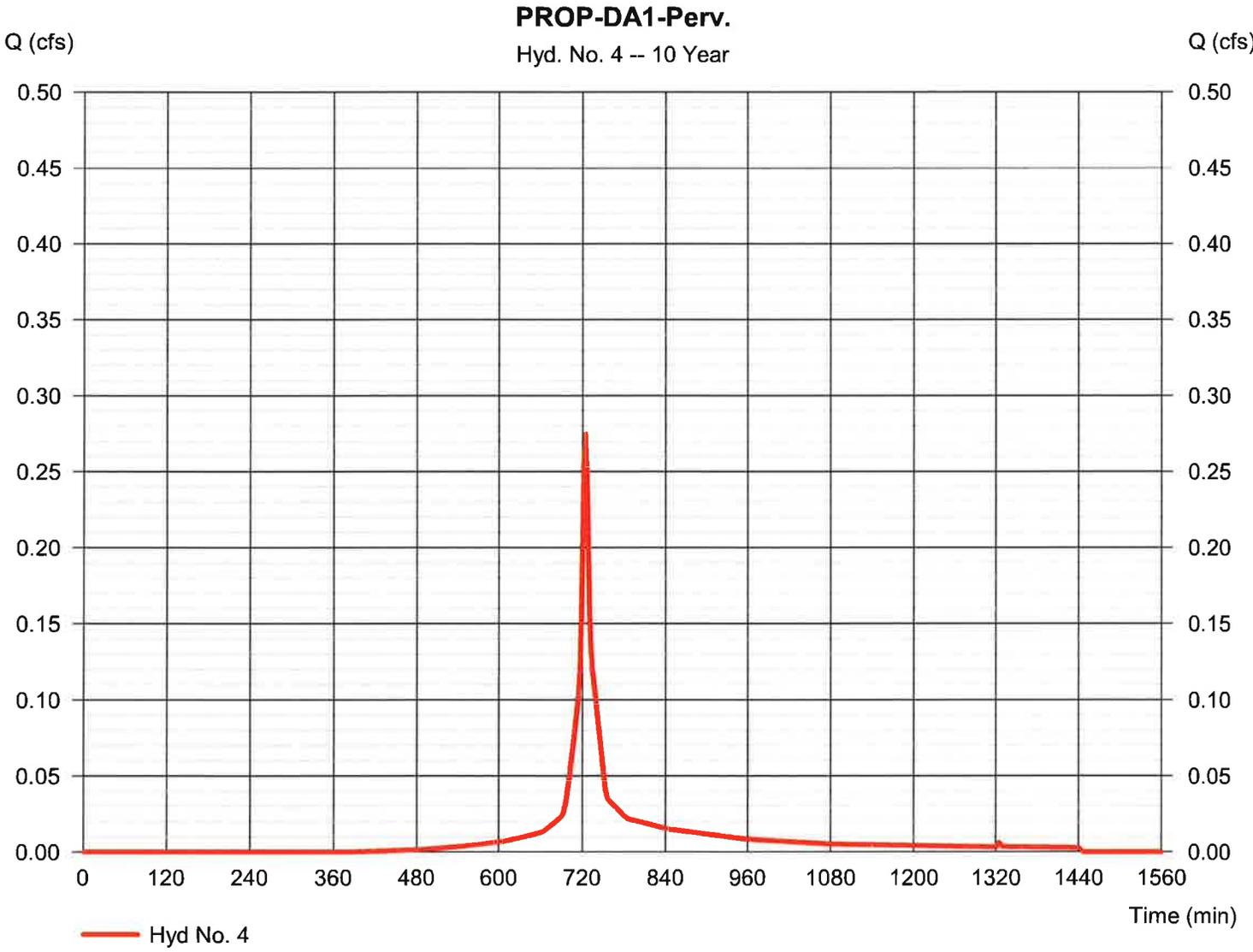


Hydrograph Report

Hyd. No. 4

PROP-DA1-Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.274 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 828 cuft
Drainage area	= 0.074 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

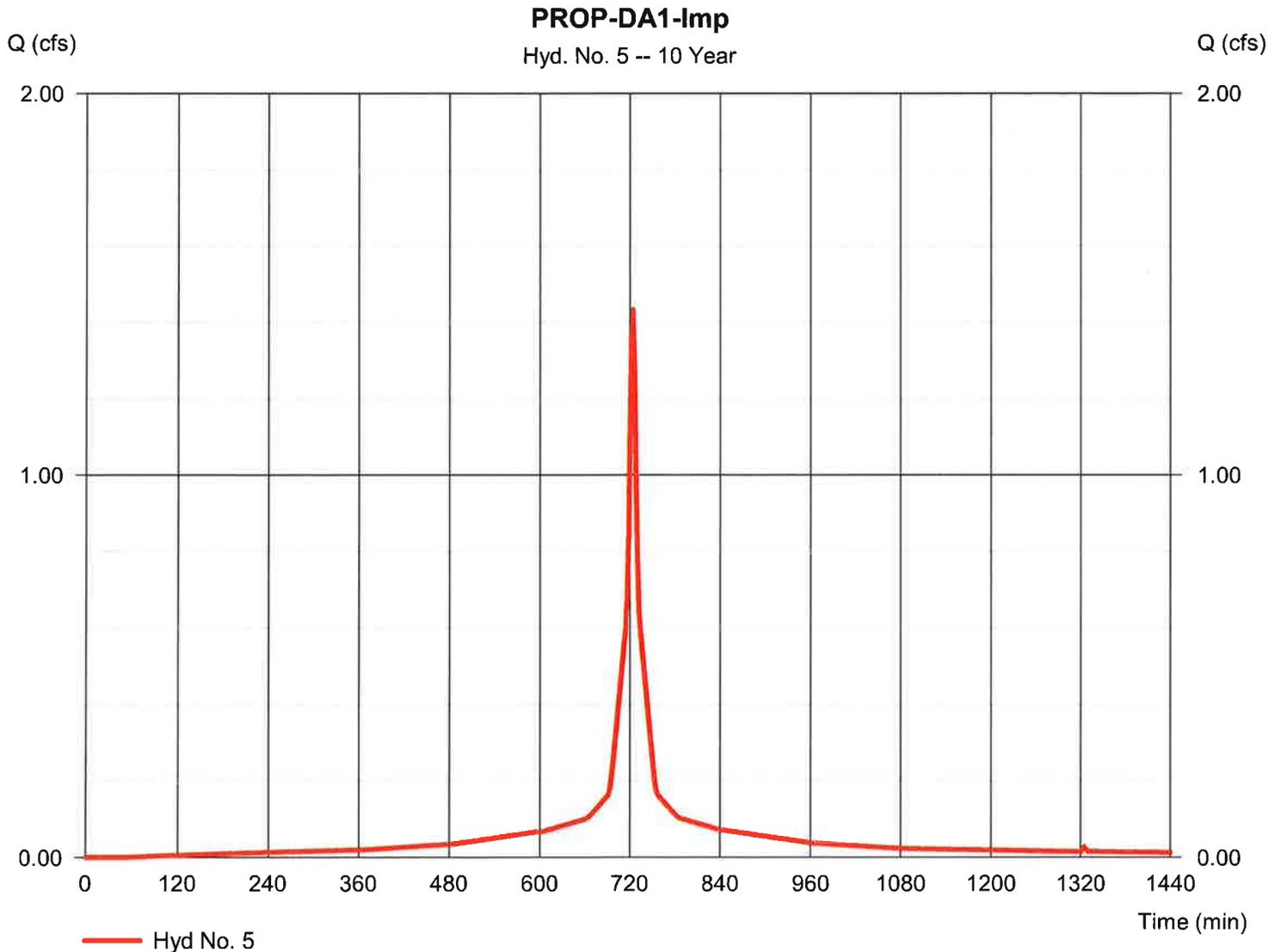
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Hyd. No. 5

PROP-DA1-Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 1.434 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 4,932 cuft
Drainage area	= 0.303 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.02 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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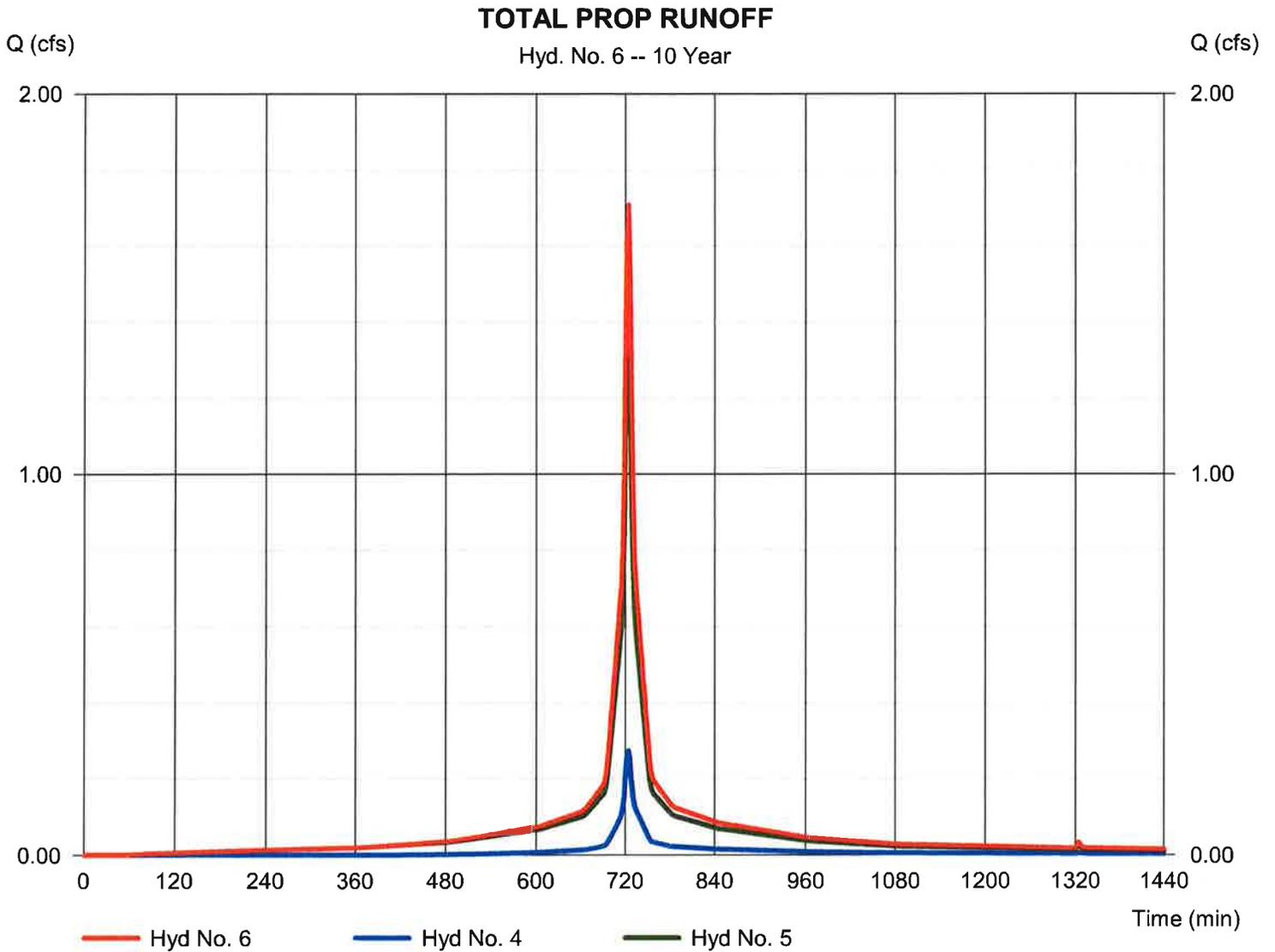
Friday, 05 / 8 / 2020

Hyd. No. 6

TOTAL PROP RUNOFF

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 4, 5

Peak discharge = 1.709 cfs
Time to peak = 724 min
Hyd. volume = 5,760 cuft
Contrib. drain. area = 0.377 ac



Hydrograph Summary Report

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Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	0.446	2	724	1,382	-----	-----	-----	EXST - DA 1 - Perv	
2	SCS Runoff	2.301	2	724	8,024	-----	-----	-----	EXST - DA1 - Imper	
3	Combine	2.747	2	724	9,405	1, 2	-----	-----	TOTAL EXST RUNOFF	
4	SCS Runoff	0.486	2	724	1,504	-----	-----	-----	PROP-DA1-Perv.	
5	SCS Runoff	2.256	2	724	7,868	-----	-----	-----	PROP-DA1-Imp	
6	Combine	2.742	2	724	9,372	4, 5	-----	-----	TOTAL PROP RUNOFF	
Hydraulic Calcs..gpw					Return Period: 100 Year			Friday, 05 / 8 / 2020		

Hydrograph Report

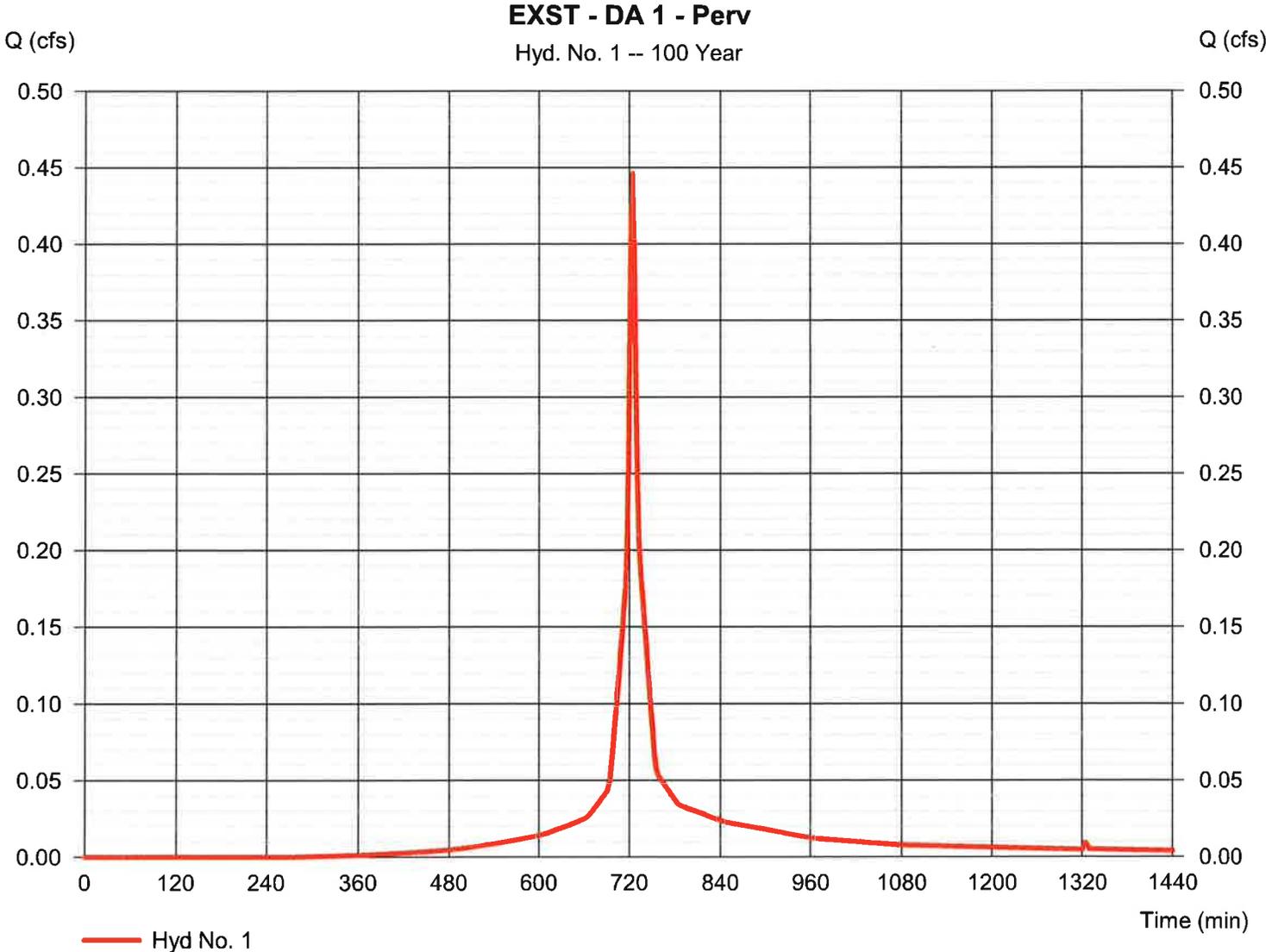
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Friday, 05 / 8 / 2020

Hyd. No. 1

EXST - DA 1 - Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.446 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,382 cuft
Drainage area	= 0.068 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.87 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

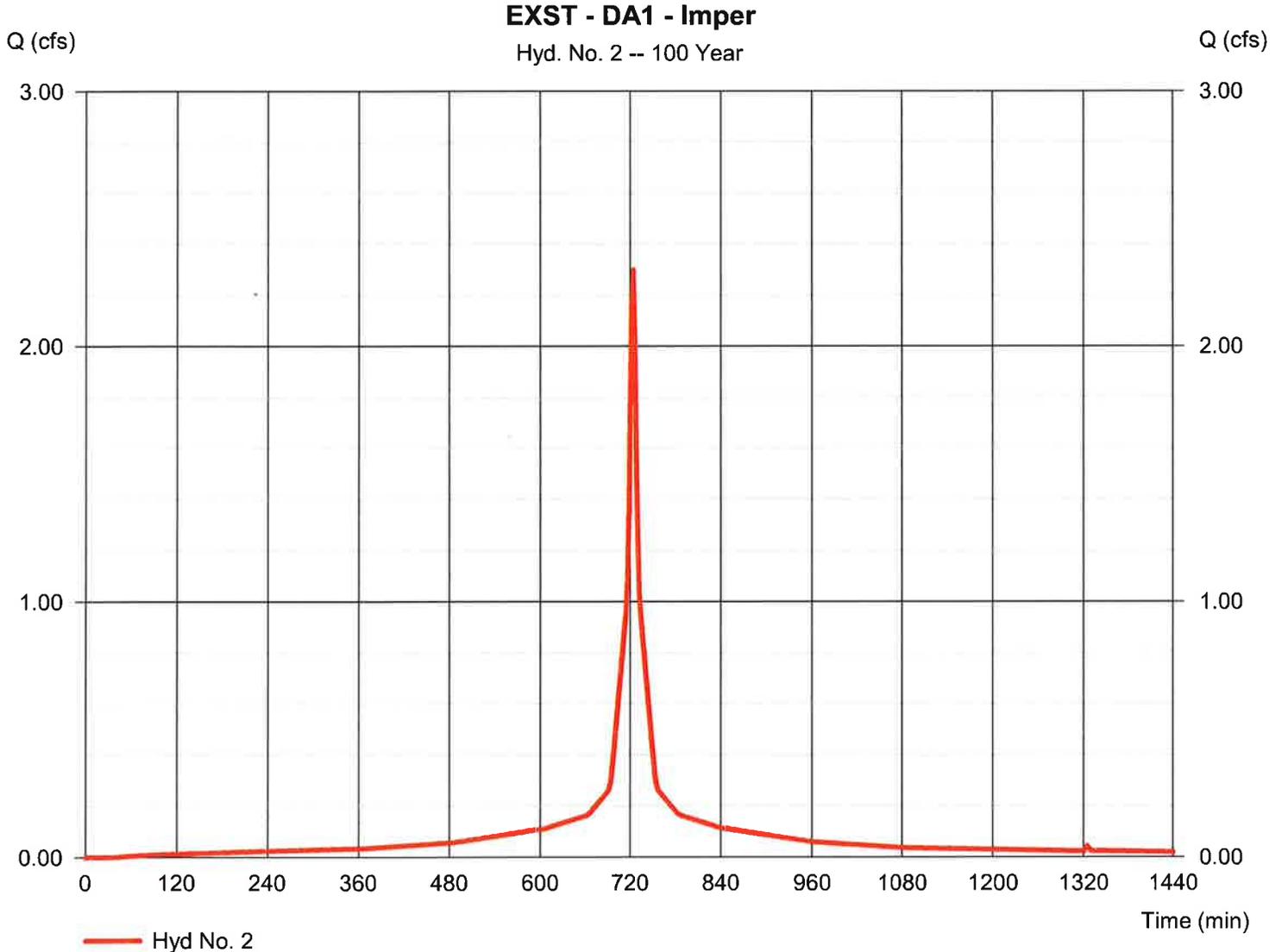
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Friday, 05 / 8 / 2020

Hyd. No. 2

EXST - DA1 - Imper

Hydrograph type	= SCS Runoff	Peak discharge	= 2.301 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 8,024 cuft
Drainage area	= 0.309 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.87 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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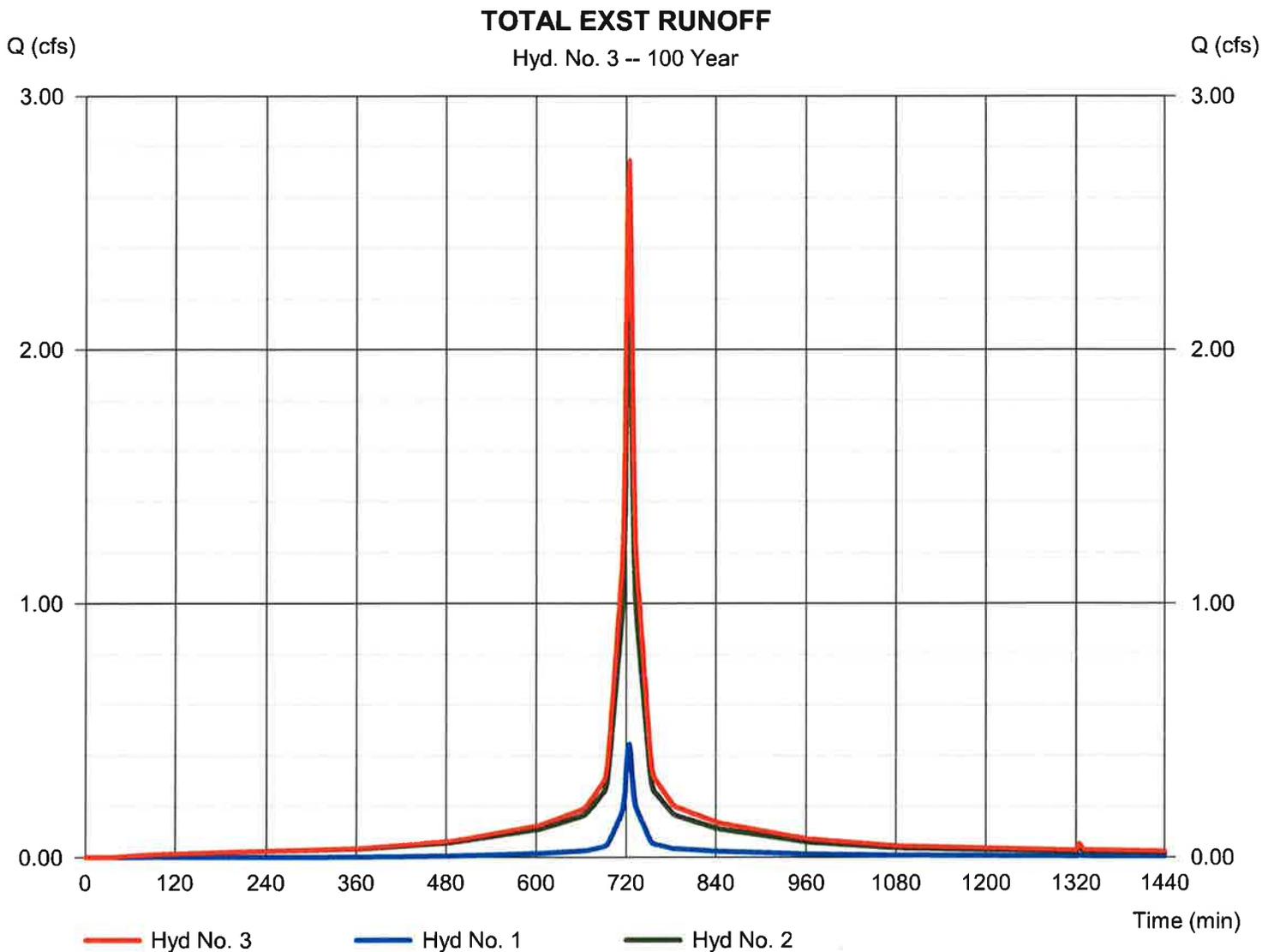
Friday, 05 / 8 / 2020

Hyd. No. 3

TOTAL EXST RUNOFF

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 2.747 cfs
Time to peak = 724 min
Hyd. volume = 9,405 cuft
Contrib. drain. area = 0.377 ac



Hydrograph Report

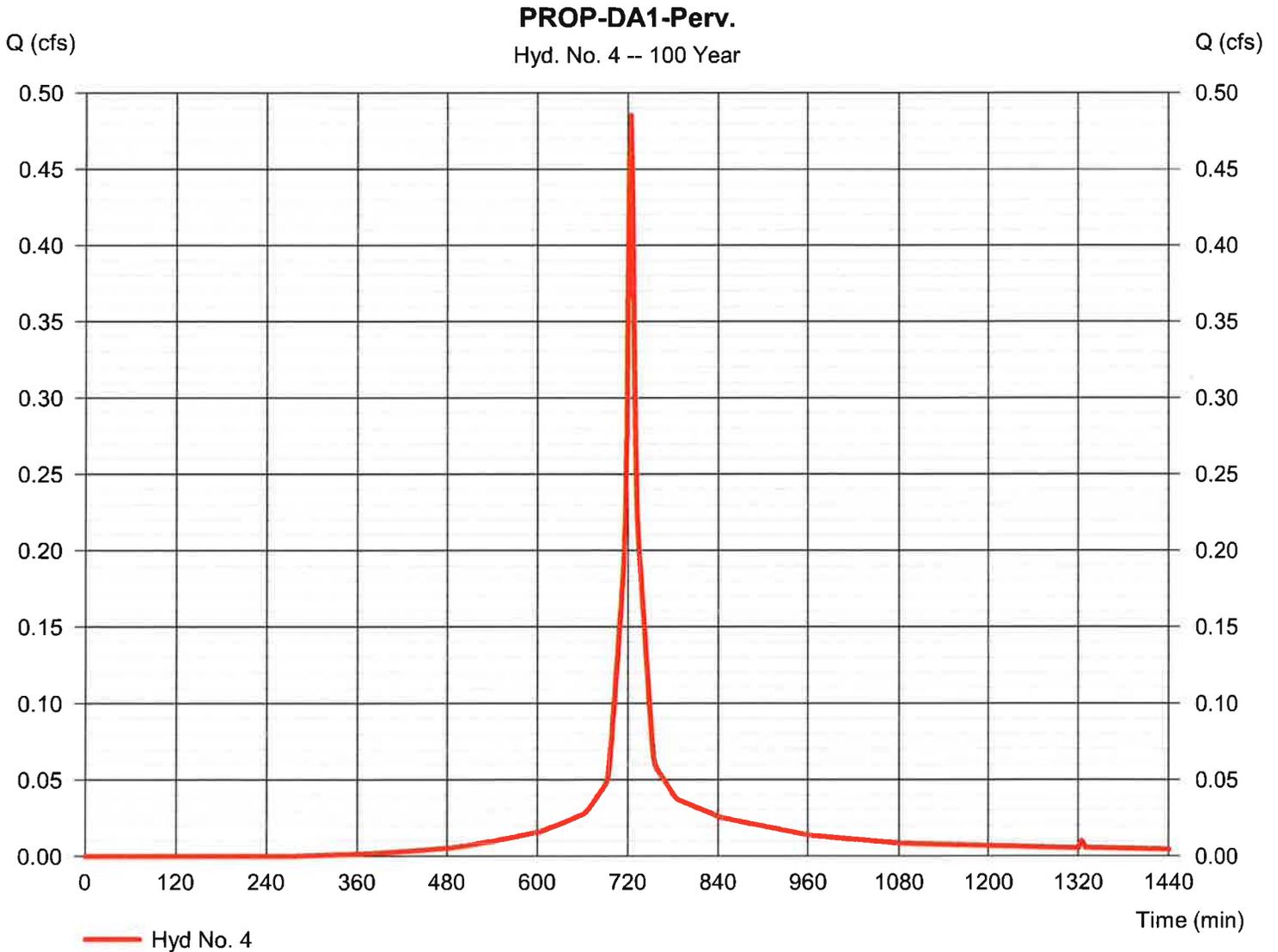
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Friday, 05 / 8 / 2020

Hyd. No. 4

PROP-DA1-Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.486 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,504 cuft
Drainage area	= 0.074 ac	Curve number	= 84
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.87 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

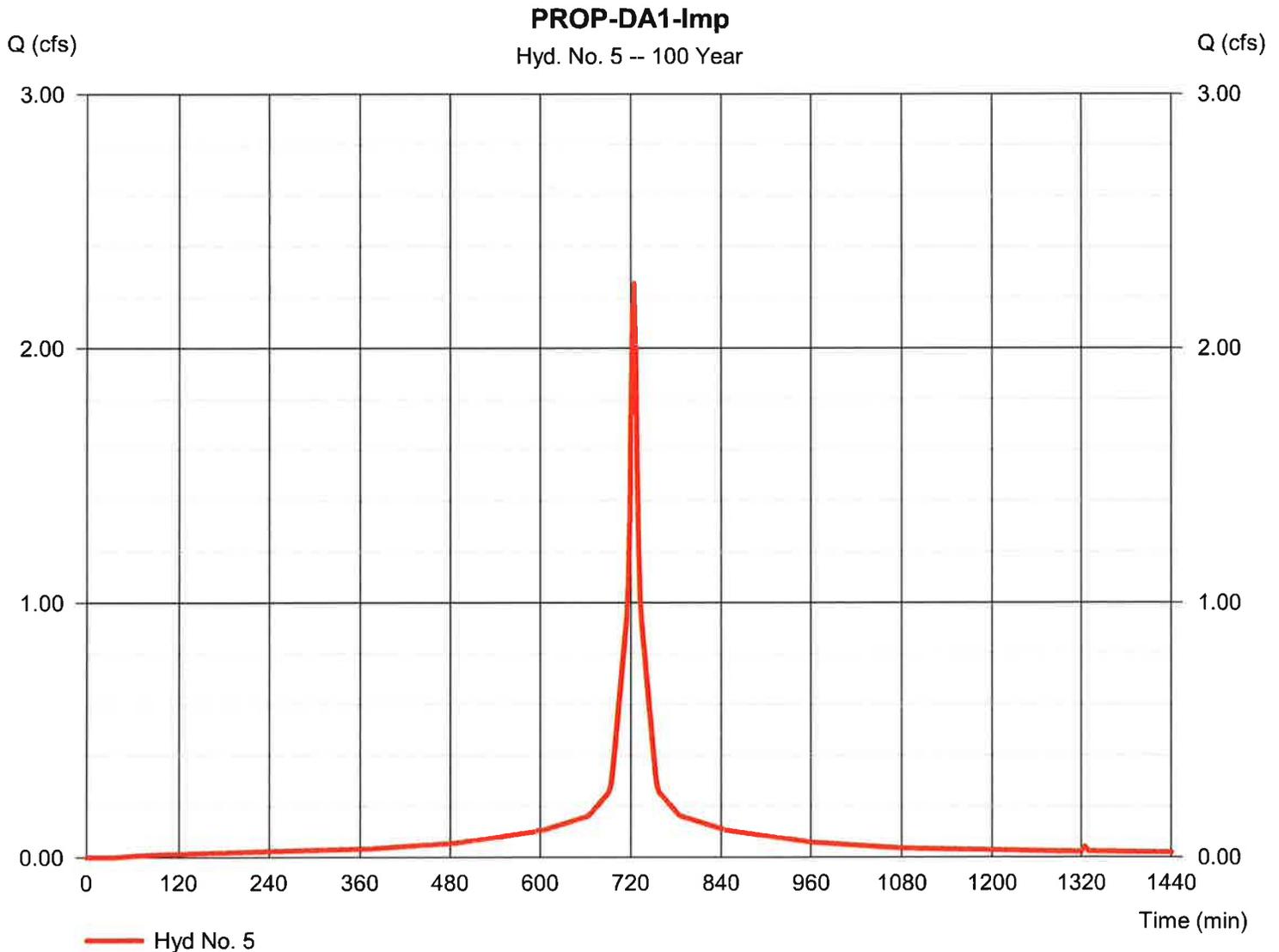
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Friday, 05 / 8 / 2020

Hyd. No. 5

PROP-DA1-Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 2.256 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 7,868 cuft
Drainage area	= 0.303 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 7.87 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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Hyd. No. 6

TOTAL PROP RUNOFF

Hydrograph type	= Combine	Peak discharge	= 2.742 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 9,372 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.377 ac

