NJAW Jumping Brook Water Treatment Plant Clearwell and High Service Pump Station Addition and Chlorine Conversion Project

Stormwater Management Report

Block 3001, Lot 12
Township of Neptune
County of Monmouth, New Jersey

Submitted to:
Township of Neptune
Freehold Soil Conservation District

Submitted by:
Jacobs Engineering Group Inc.
412 Mt. Kemble Avenue, Suite 100S
Downtown Building – 1st Floor

Morristown, NJ 07960-1936

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Joseph N. Bongiovanni, P.E.
New Jersey Professional Engineer License No. 24GE04377400

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APPENDIX

1.0 INTRODUCTION

The following study will analyze the stormwater drainage conditions that will occur as a result of a proposed 11,000± SF Water Treatment Building and Clearwell, a 125± SF addition to the Residuals Building, parking and site improvement, and a stormwater management system at the Jumping Brook Water Treatment Plant (WTP) in Township of Neptune, Monmouth County, NJ. The parcel area totals approximately 18.6 acres, however only a portion of the entire WTP property, approximately 1.07 acres, will be analyzed for this report. It should be noted that the overall limit of disturbance for the project totals 0.988 acres, however additional area has been analyzed to model the site drainage accurately. All remaining drainage for the adjacent area will maintain the existing drainage pattern.

The scope of this study includes an analysis of the existing drainage conditions and patterns in comparison with the proposed development. Maps of the existing conditions and proposed conditions are included in the appendix of this report entitled, "Existing Drainage Area Map", "Proposed Drainage Area Map", and Proposed Inlet Drainage Area Map". The primary design constraints for this project are based on regulations of the New Jersey Department of Environmental Protection (NJDEP), Freehold Soil Conservation District (SCD), and the Township of Neptune.

2.0 METHODOLOGY

The methodology utilized to design the subject stormwater management system follows all jurisdictional agency regulations. More specifically, the proposed design was developed for the subject site utilizing the SCS method. Runoff CN values were used for the pervious and impervious areas. The TR-55 Method was used to calculate time of concentration (Tc) with 10.0 minutes used as a minimum. Hydrographs were generated for each land type under the existing and proposed conditions and were generated using Hydraflow (stormwater design software). The rational method was used for pipe sizing calculations. All calculations and hydrographs are included within the appendix of this report.

3.0 EXISTING SITE CONDITIONS

The existing site conditions for the subject property are illustrated on the "Existing Drainage Area Map" included within the appendix of this report. The map is based on a survey prepared by Morgan Engineering and Surveying, dated May 27, 2021, and Colliers Engineering and Design, dated December 14, 2021. The area of analysis encompasses approximately 1.07 acres and slopes toward the north, west, and south into Jumping Brook.

The project site is located along Old Corlies Avenue within the Township of Neptune. The WTP is currently developed with numerous buildings, water tanks, bituminous pavement access drives, vehicular parking, concrete pads and sidewalks, and stormwater management consisting of stormwater inlets, pipes, and outfalls. Jumping Brook traverses the property from north to southeast. Wetlands and a Flood Hazard Area are associated with adjacent Jumping Brook.

Based on a review of the Natural Resources Conservation Service Web Soil Survey for Monmouth County and the site geotechnical report prepared by Jacobs, dated December 2, 2022, the site and adjacent areas contain EveB (Evesboro Sand), EveE (Evesboro Sand), DouB (Downer Urban Land), DoeBO (Downer Sandy Loam), and HumAt (Humaquepts) all of which have been delineated on the Soils Map located within the appendix of this report. In accordance with the Web Soil Survey, all soils have been classified as "A" type soils. Since the site is considered an industrial developed property, all pervious areas are considered poor condition. All existing runoff calculations were performed using the SCS

Method with a runoff CN of 57 for woods/brush areas (poor condition), 68 for pervious areas (poor condition), 76 for gravel, and 98 for impervious areas. The impervious areas have been split into three (3) areas, motor vehicle area, miscellaneous pavement/concrete area, and building roof area.

The project area is tributary to Jumping Brook. The entire existing drainage area will be referred to Drainage Area E1 (DA-E1). DA-E1 has been delineated into two (2) sub-drainage areas referred to as Drainage Area E1-A (DA-E1-A) and Drainage Area E1-B (DA-E1-B. All sub-areas are tributary to Jumping Brook.

DA-E1-A consists of 0.913 acres of existing impervious, pervious, and woods/brush area. Much of the area within DA-E1-A consists of small trees and grass. The north side of the area contains the existing WTP building and a portion of the loop access road. An asphalt drive extends from the access road south into the grass area. The stormwater from DA-E1-A flows south into Jumping Brook via overland flow and through an existing curb inlet along the access road. A CN of 70 was calculated and a Tc of 10.0 minutes was used for DA-E1-A.

DA-E1-B consists of 0.157 acres of existing impervious and pervious area and is located west and south of the Residuals Building. A large portion of the area contains the bituminous asphalt pavement access road and vehicular parking. The north side of the area contains a maintained grass area. The stormwater from DA-E1-B flows north into wetlands and Jumping Brook via overland flow and through stormwater inlets within the access road and parking area. A CN of 90 was calculated and a Tc of 10.0 minutes was used for DA-E1-B.

It should be noted that DA-E1-A and DA-E1-B have been combined in Hydraflow to accurately model the existing drainage conditions from DA-E1 into Jumping Brook.

Please refer to the appendix of this report for all drainage calculations and the "Existing Drainage Area Map."

4.0 PROPOSED SITE CONDITIONS

The project proposes a new 11,000± SF Water Treatment Building and Clearwell, a 125± SF addition to the Residuals Building, site improvements to disturbed asphalt pavement and grass areas, (5) new parking spaces, a grass paver access drive, and stormwater management/site utility improvements. The stormwater management facility includes combined detention and infiltration systems for quantity control. More specifically the system consists of storm inlets and storm piping, one (1) underground detention basin, and a headwall with a scour hole. It should be noted that The Township of Neptune and NJDEP require all projects that disturb one acre or more of land or increase impervious area by one quarter acre or more will be considered a major development and need to provide stormwater quality, stormwater quantity reductions, and stormwater recharge. The project proposes to disturb less than one acre of land (0.988 acres) and there will be an increase in impervious area less than one quarter acres (0.246 acres). The proposed site improvements will not be considered a major development.

The proposed site conditions maintain the existing drainage pattern as depicted on "Existing Drainage Area Map". The entire proposed drainage area will be referred to Drainage Area P1 (DA-P1). DA-P1 has been delineated into two (2) sub-drainage areas referred to as DA-P1-A1 and DA-P1-A2. All sub-areas are tributary to Jumping Brook.

DA-P1-A1 totals approximately 0.527 acres of impervious, pervious, and roof area, and consists of the detained portion of DA-P1-A. The stormwater from DA-P1-A1 is tributary to proposed underground detention basin, including the entire roof area for the new Water Treatment Building. An existing inlet along the loop access road between the existing filter building and proposed building will be reconstructed to collect adjacent overland stormwater runoff. 15" HDPE pipe will convey the runoff around the east side of the new building and then turn west around the south side of the building and discharge into the basin. The stormwater from the basin discharges onto a scour hole (POI #1) through HDPE pipe for a stable discharge into Jumping Brook. A CN of 89 was calculated for the stormwater runoff into the basin and a Tc of 10.0 minutes was used for DA-P1-A1.

DA-P1-A2 totals approximately 0.385 acres of impervious and pervious area. DA-P1-A2 consists of the overland un-detained portion of DA-P1-A and discharges into Jumping Brook via overland flow. A CN of 74 was calculated and a Tc of 10.0 minutes was used for DA-P1-A2.

DA-P1-B totals approximately 0.157 acres of impervious and pervious area and is tributary to the existing wetlands toward the north and eventually Jumping Brook (POI #2). A portion of the stormwater from DA-P1-B, approximately 0.01 acres of building roof area, will discharge to grade via downspouts. The remainder of DA-P1-B is tributary to Jumping Brook via overland flow and through existing inlets and piping. A CN of 89 was calculated for the stormwater runoff and a Tc of 10.0 minutes was used for DA-P1-B.

It should be noted that DA-P1-A and DA-P1-B have been combined in Hydraflow to accurately model the proposed drainage conditions from DA-P1 into Jumping Brook.

Please refer to the appendix of this report for all drainage calculations and the "Proposed Drainage Area Map".

5.0 UNDERGROUND DETENTION BASIN DESIGN

One (1) underground detention basin has been designed to collect and detain the storm runoff from DA-P1-A1. The system is located south of the new building within a grassed area. The basin will consist of 6'x6' precast box manholes and approximately 325 LF of 48" solid wall HDPE pipe surrounded with stone and filter fabric. The pipe storage will be sized to collect the roof area stormwater runoff from the new building and runoff tributary to a stormwater inlet north of the new building. A portion of the top of the concrete clear well is exposed at the southwest side of the building. This area will be collected by a trench drain and discharge into the basin. A precast concrete control structure will provide the safe discharge of stormwater into Jumping Brook. The basin pipe invert is set at elevation 13.50. A control structure has been designed to safely convey the stormwater from the basin with a rim elevation of 19.50'. The control structure consists of a weir wall with a 3" orifice set at elevation 13.45' and a 3" wide rectangular weir is set at elevation 15.70'. A stormwater elevation of 14.98' was calculated for the 2-year storm event, an elevation of 15.98' was calculated for the 10-year storm event, and an elevation of 17.42 was calculated for the 100-year storm event. A 15" HDPE pipe is set at elevation 13.40' to safely convey the stormwater from the basin, through a concrete headwall, and discharge onto a scour hole prior to entering Jumping Brook.

Sizing calculations for the underground infiltration basin have been provided within the appendix of this report.

6.0 QUANTITY REDUCTIONS

Quantity reductions are required for developments that increase impervious coverage and thereby would increase runoff. Where required, the quantity reduction for post-construction development, as set forth by Freehold SCD requires a 50% reduction for the peak 2-year storm event and a 25% reduction for the peak 10-year storm event or provide sufficient outlet protection at each outfall for downstream stability.

Drainage Area	Storm Event		
	2-year	**10-year**	**100-year**
DA-E1 (DA-E1-A + DA-E1-B)	1.11 cfs	2.54 cfs	5.82 cfs
Maximum Allowable Runoff	(50%) 0.56 cfs	(75%) 1.91 cfs	5.82 cfs
DA-P1 (DA-P1-A + DA-P1-B)	0.98 cfs	1.83 cfs	4.65 cfs

It should be noted that for modeling purposes, the peak 2-year storm event for DA-P1-A contains un-detained overland stormwater runoff (DA-P1-A2, 0.41 cfs) that is combined with the detention basin discharge. The 2-year storm event cannot be reduced by 50% under this scenario. The area tributary to the detention basin (DA-P1-A1) has a peak 2-year flow of 1.15 cfs. When routed through the basin, this flow has been reduced to 0.27 cfs, or a reduction of 77%. Additionally, the stormwater is directly tributary to Jumping Brook, which can be considered a stable discharge.

7.0 GRASS PAVER DESIGN

There are two areas on the site where grass pavers are proposed. Both areas will be used for emergency and/or maintenance access only. The area will not be used daily, and the vehicular load would be a utility vehicle or pick-up truck. At the most, a vac truck may be used to maintain the underground detention basin. The pavers are designed with a porous gravel base, plastic grid pavers, backfilled with topsoil and seed or sod installed. The pavers are in areas that were once compacted gravel and/or bituminous asphalt pavement and will allow for the infiltration of stormwater into the surrounding soil.

The first area is along the west side of the new Water Treatment Building. This area slopes down to the grass area at south side of the building. This area was once a compacted gravel and bituminous asphalt pavement access drive. The access drive will remain for emergency and maintenance access to the south side of the building and underground detention basin.

The second area is around the new transformers and concrete pads. The area was previously bituminous asphalt pavement and used for vehicular parking. The pavers around the transformers/pads will allow for maintenance of the electrical components and will not be subjected to heavy loads.

8.0 CONCLUSION

In summary, the proposed stormwater management system illustrated on the drawings prepared by Jacobs meets the requirements set forth by the NJDEP, Freehold SCD, and the Township of Neptune. As a result, we anticipate the proposed development will not have a negative impact on the existing stormwater management system or adjacent areas within the vicinity of the subject parcel.

APPENDIX

STORMWATER RUNOFF CALCULATIONS

SCS RUNOFF CURVES

RUNOFF CN CALCULATIONS FOR STORMWATER MANAGEMENT DESIGN

CN VALUES FOR EXISTING CONDITIONS

EXISTING	AREA (SF)	AREA (AC)	WOODS/GRASS AREA	PERVIOUS GRASS AREA	GRASS PAVER AREA	GAVEL AREA	IMPERVIOUS AREA			CN VALUE
							MOTOR VEHICLE AREA	MISC. PAVEMENT/CONC. AREA	ROOF AREA	
DA-E1-A	39,765	0.913	16,372	15,262	0	0	7,174	973	0	70
DA-E1-B	6,853	0.157	0	1,409	0	426	4,867	151	0	90
TOTAL AREA	46,618	1.070	16,372	16,671	0	426	12,041	1,124	0	-

Runoff Curve Numbers for existing conditions, 'A' type soil:
PERVIOUS AREA CN (POOR CONDITION)= 68
WOODS/GRASS AREA CN (POOR CONDITION) = 57
GRAVEL AREA CN = 76
IMPERVIOUS AREA CN = 98

CN VALUES FOR PROPOSED IMPROVEMENTS

PROPOSED	AREA (SF)	AREA (AC)	WOODS/BRUSH AREA	PERVIOUS GRASS AREA	GRASS PAVER AREA	GRAVEL AREA	IMPERVIOUS AREA			CN VALUE
							MOTOR VEHICLE AREA	MISC. PAVEMENT/CONC. AREA	ROOF AREA	
DA-P1-A1	22,973	0.527	0	7,019	0	0	3,021	2,912	10,021	89
DA-P1-A2	16,792	0.385	0	12,627	970	0	2,867	328	0	74
DA-P1-B	6,853	0.157	0	636	1,180	313	3,905	542	277	89
TOTAL AREA	46,618	1.070	0	20,282	2,150	313	9,793	3,782	10,298	-

Runoff Curve Numbers for proposed conditions, 'A' type soil:
PERVIOUS AREA CN = 68
PERVIOUS GRASS PAVER AREA CN = 68
GRAVEL AREA CN = 76
IMPERVIOUS AREA CN = 98

RUN-OFF HYDROGRAPHS AND ROUTING

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.761	-------	-------	1.934	-------	-------	4.710	DA-E1-A
2	SCS Runoff	------	-------	0.355	-------	-------	0.608	-------	-------	1.108	DA-E1-B
3	Combine	1, 2	-------	1.110	-------	-------	2.536	-------	-------	5.818	DA-E1
5	SCS Runoff	------	-------	1.150	-------	-------	2.000	-------	-------	3.685	DA-P1-A1 (BASIN)
6	Reservoir	5	-------	0.274	-------	-------	0.482	-------	-------	2.291	UG Basin
7	SCS Runoff	------	-------	0.416	-------	-------	0.953	-------	-------	2.163	DA-P1-A2 (NON-BASIN)
8	Combine	6, 7	-------	0.642	-------	-------	1.245	-------	-------	3.836	DA-P1-A
9	SCS Runoff	------	-------	0.342	-------	-------	0.596	-------	-------	1.098	DA-P1-B
10	Combine	8, 9	-------	0.979	-------	-------	1.831	-------	-------	4.645	DA-P1

2-YEAR STORM HYDROGRAPHS

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

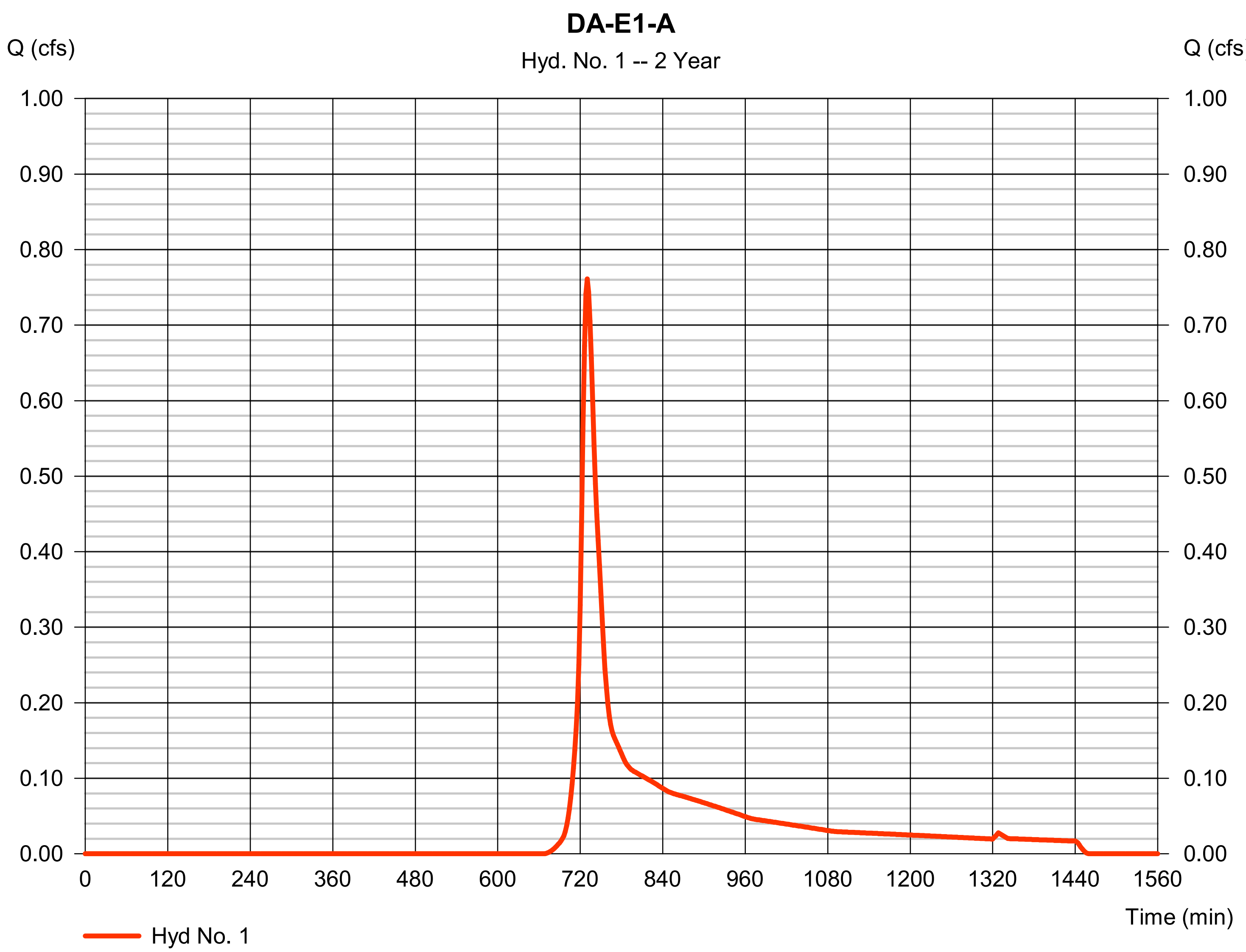
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.761	2	730	3,195	------	------	------	DA-E1-A
2	SCS Runoff	0.355	2	728	1,373	------	------	------	DA-E1-B
3	Combine	1.110	2	730	4,568	1, 2	------	------	DA-E1
5	SCS Runoff	1.150	2	728	4,432	------	------	------	DA-P1-A1 (BASIN)
6	Reservoir	0.274	2	756	4,430	5	14.98	1,468	UG Basin
7	SCS Runoff	0.416	2	730	1,669	------	------	------	DA-P1-A2 (NON-BASIN)
8	Combine	0.642	2	730	6,099	6, 7	------	------	DA-P1-A
9	SCS Runoff	0.342	2	728	1,320	------	------	------	DA-P1-B
10	Combine	0.979	2	730	7,419	8, 9	------	------	DA-P1

Hydrograph Report

Hyd. No. 1

DA-E1-A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.761 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 3,195 cuft
Drainage area	= 0.913 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

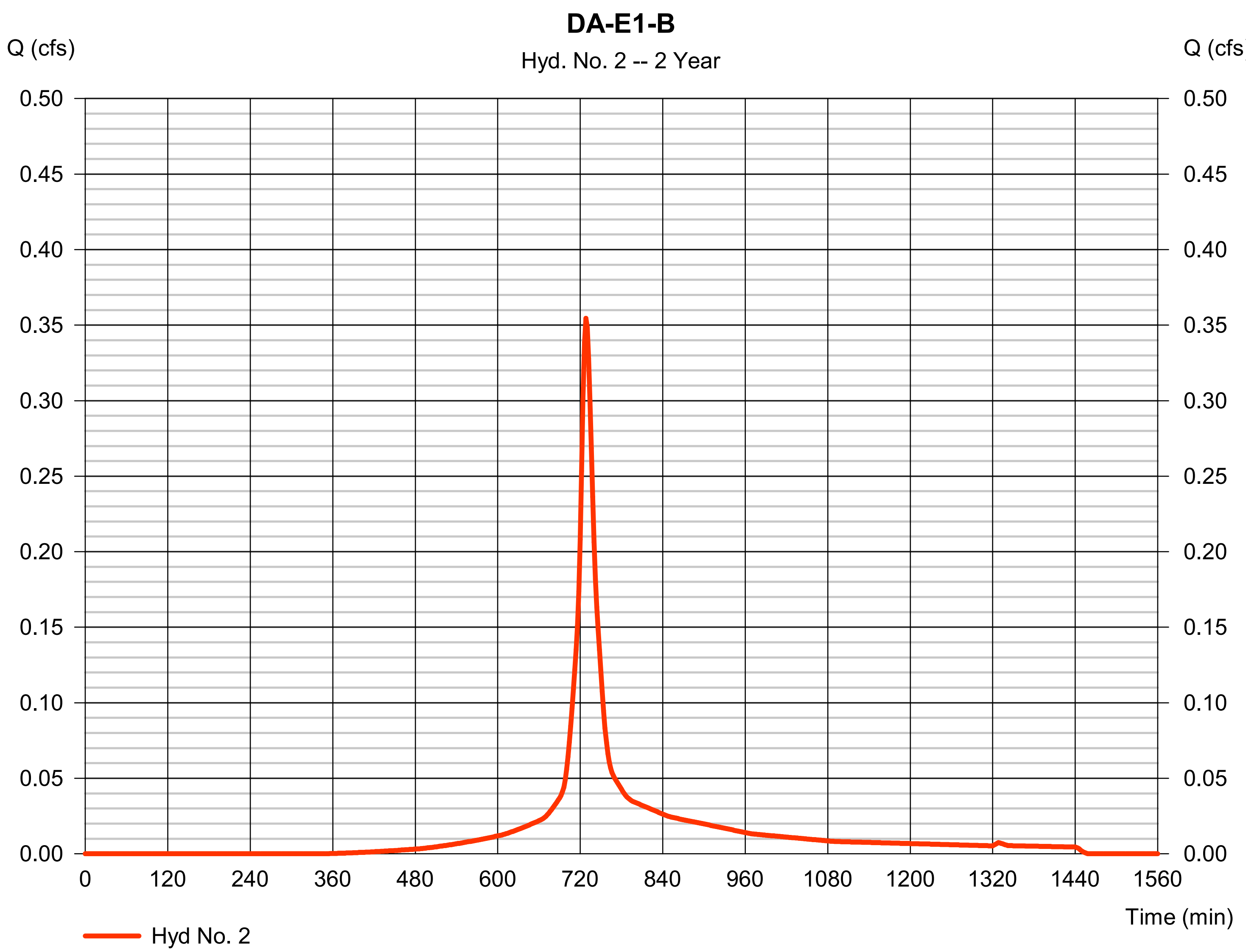


Hydrograph Report

Hyd. No. 2

DA-E1-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.355 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 1,373 cuft
Drainage area	= 0.157 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



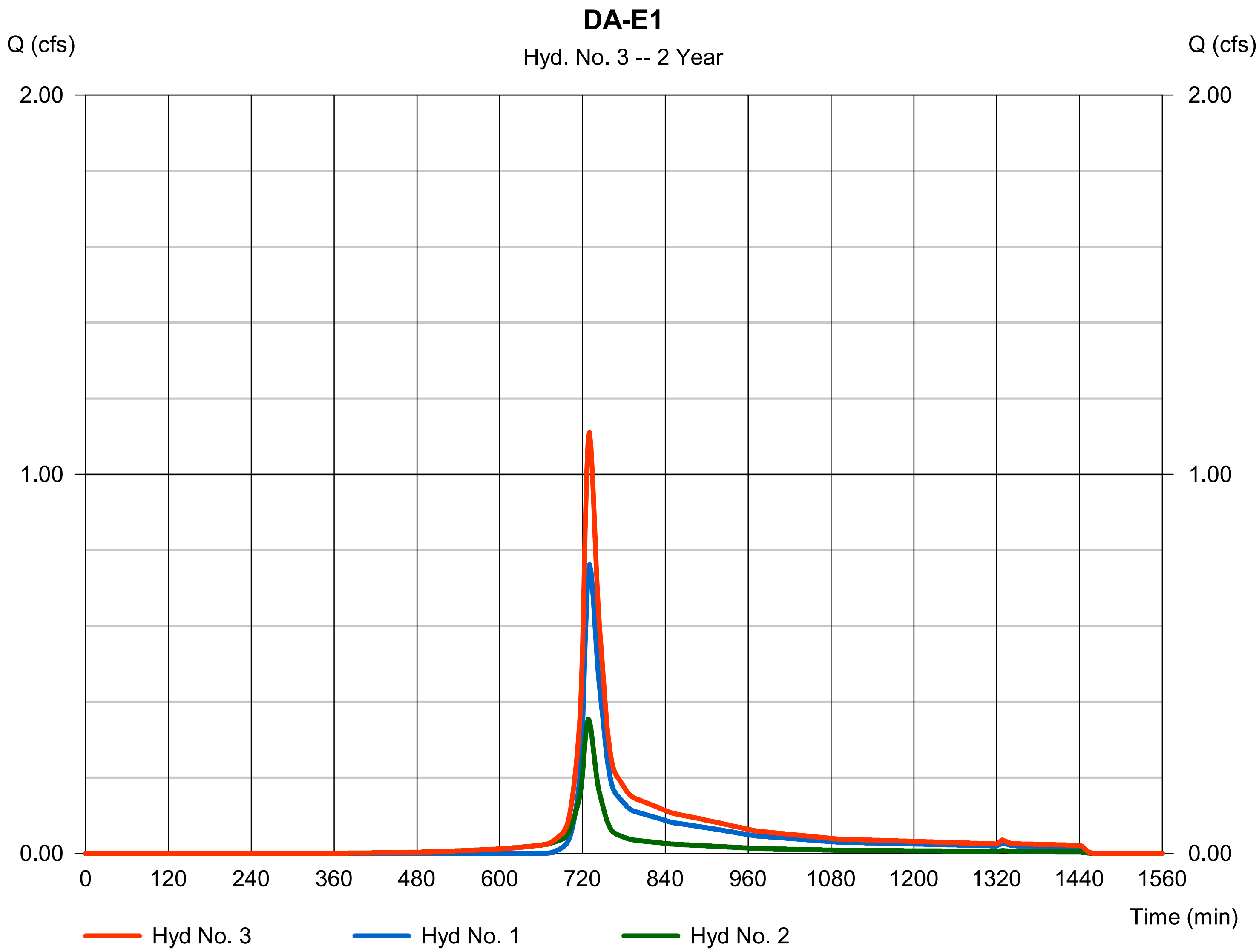
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 12 / 6 / 2022

Hyd. No. 3

DA-E1

Hydrograph type	= Combine	Peak discharge	= 1.110 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 4,568 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.070 ac

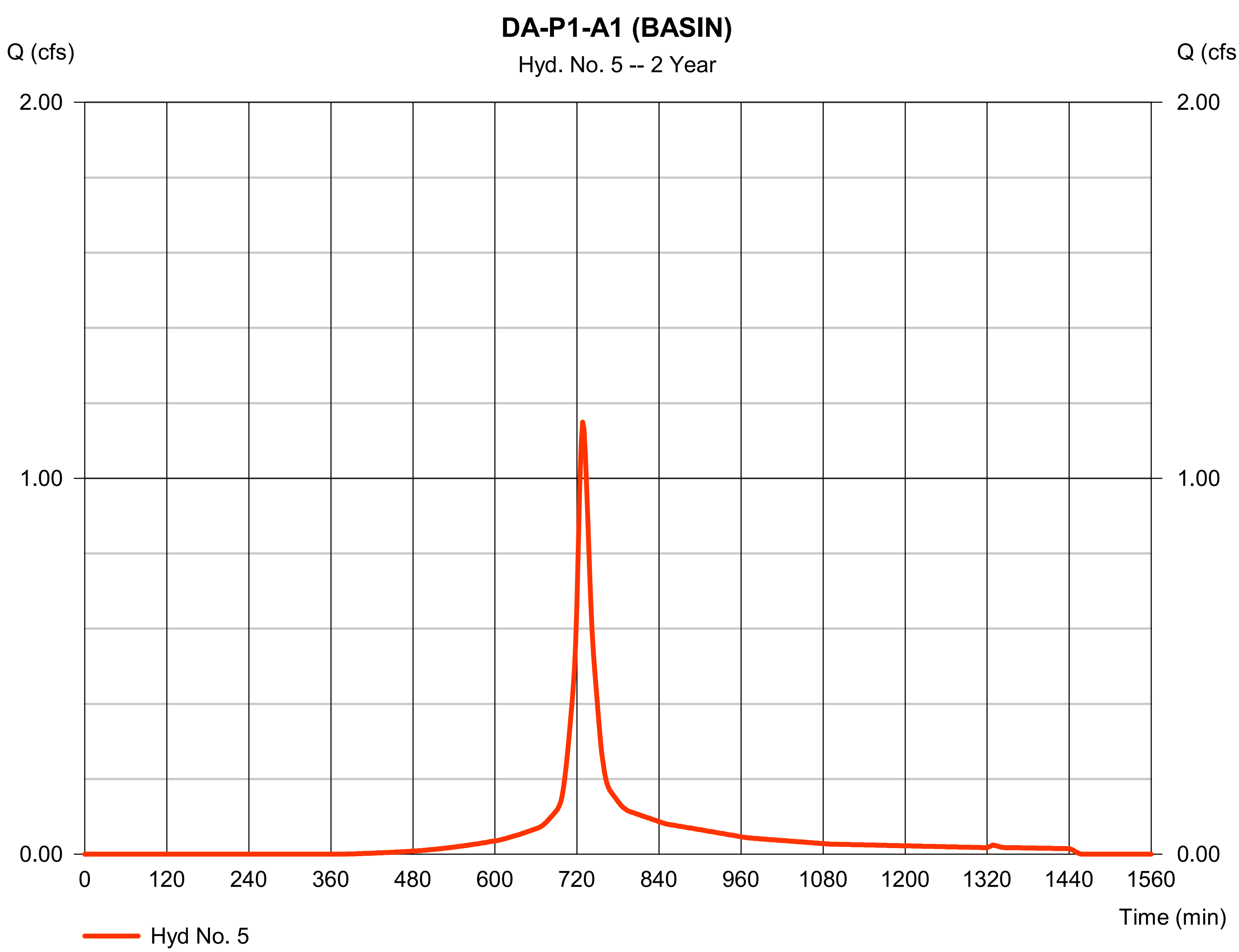


Hydrograph Report

Hyd. No. 5

DA-P1-A1 (BASIN)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.150 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 4,432 cuft
Drainage area	= 0.527 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



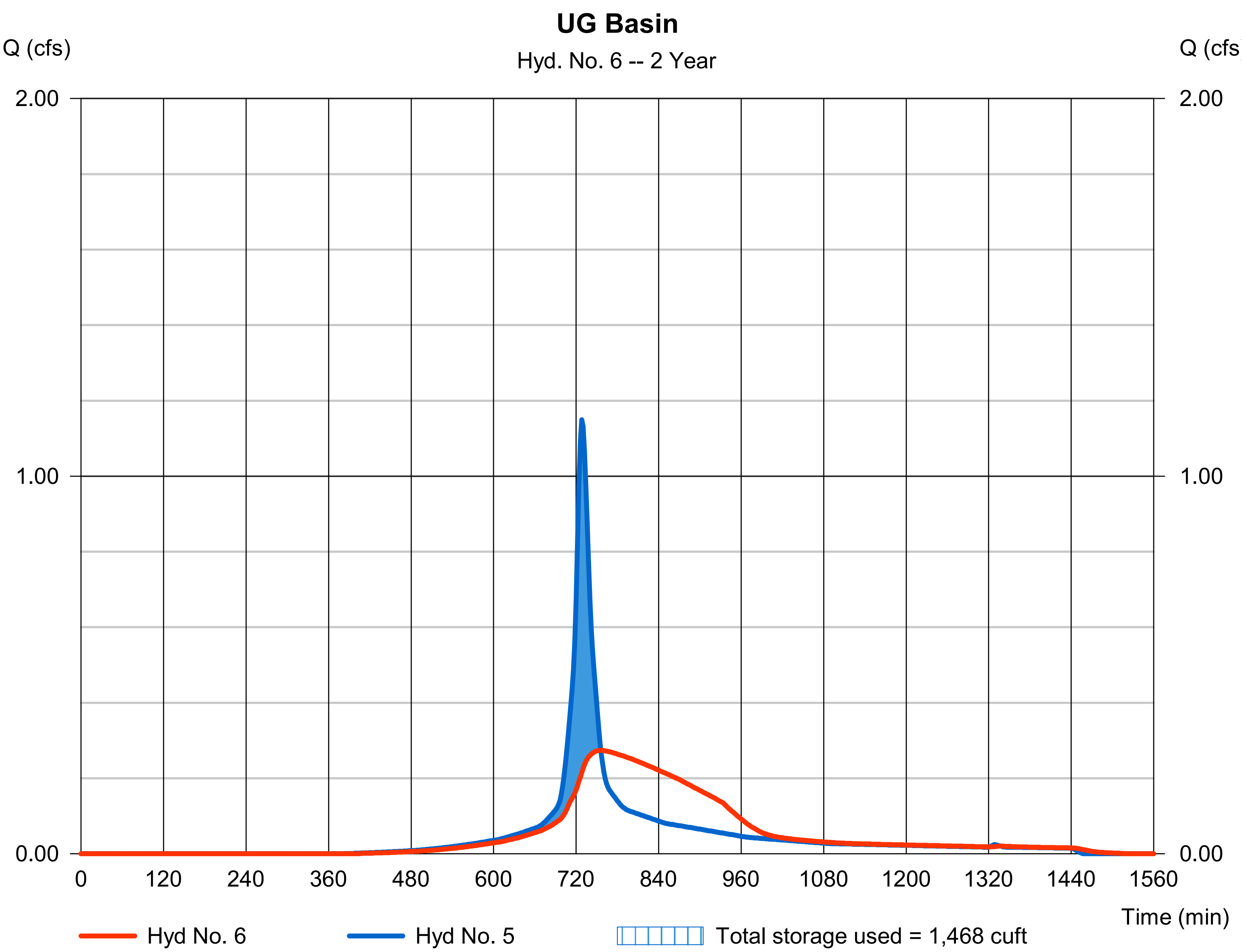
Hydrograph Report

Hyd. No. 6

UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.274 cfs
Storm frequency	= 2 yrs	Time to peak	= 756 min
Time interval	= 2 min	Hyd. volume	= 4,430 cuft
Inflow hyd. No.	= 5 - DA-P1-A1 (BASIN)	Max. Elevation	= 14.98 ft
Reservoir name	= UG Basin	Max. Storage	= 1,468 cuft

Storage Indication method used.

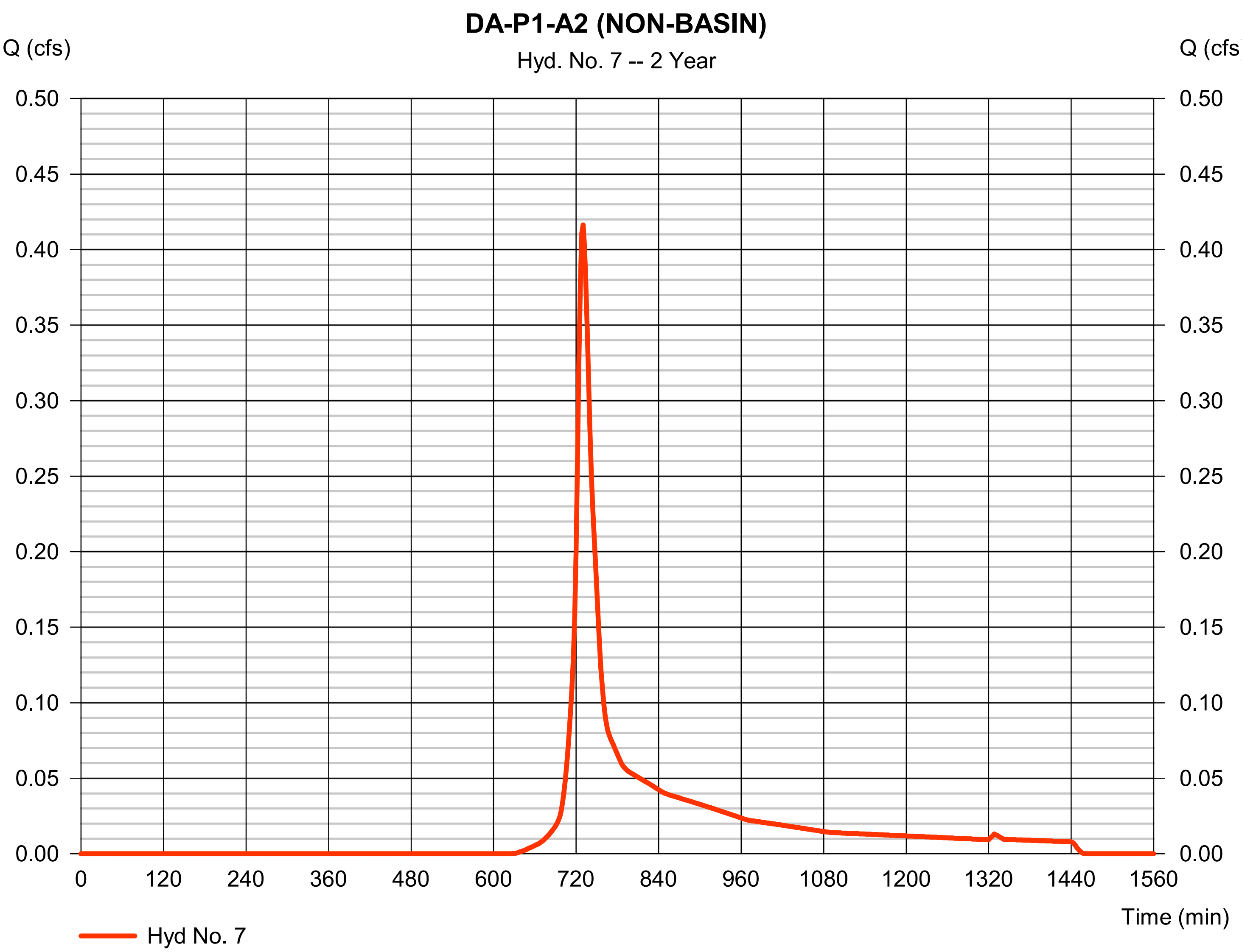


Hydrograph Report

Hyd. No. 7

DA-P1-A2 (NON-BASIN)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.416 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 1,669 cuft
Drainage area	= 0.385 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

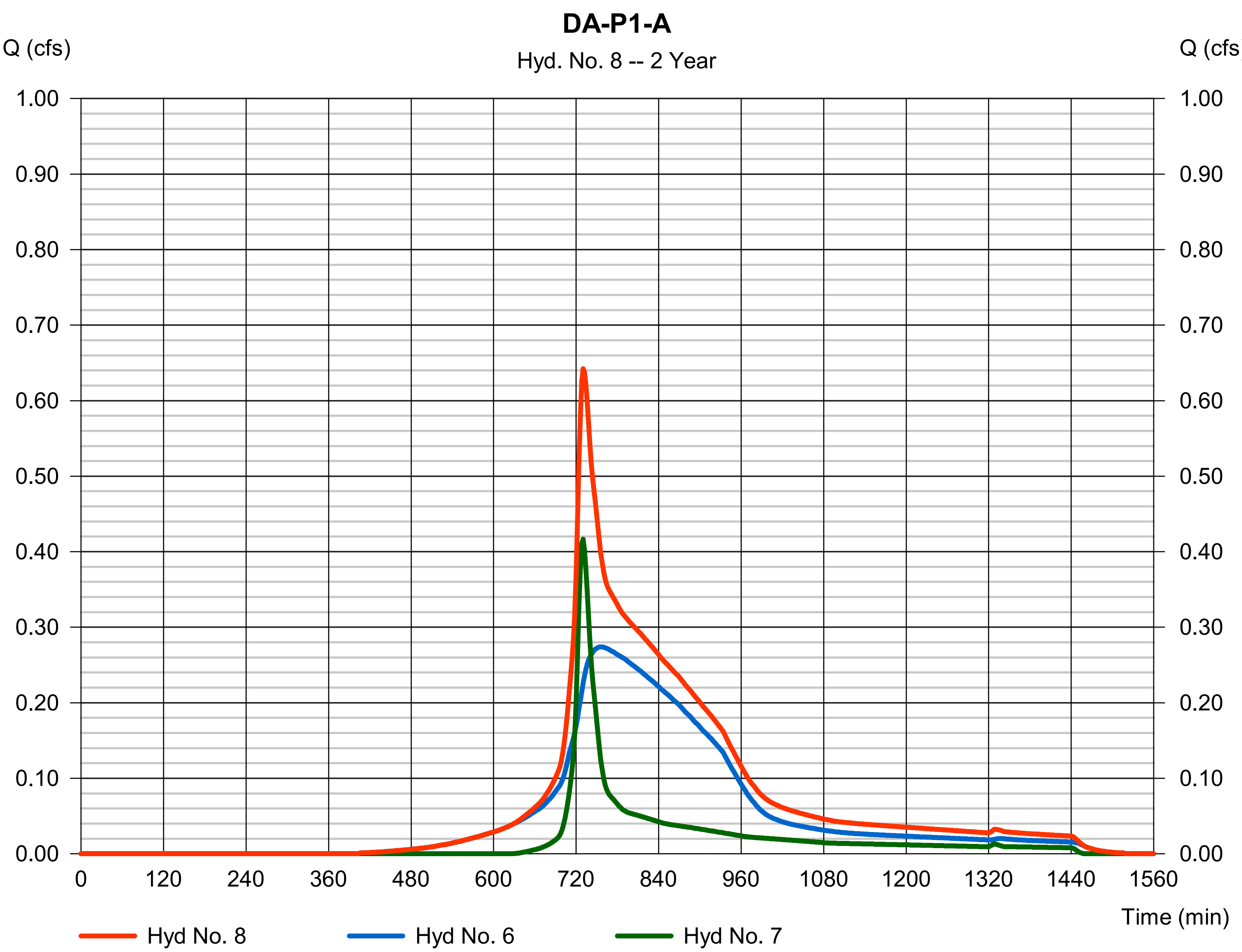


Hydrograph Report

Hyd. No. 8

DA-P1-A

Hydrograph type	= Combine	Peak discharge	= 0.642 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 6,099 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 0.385 ac

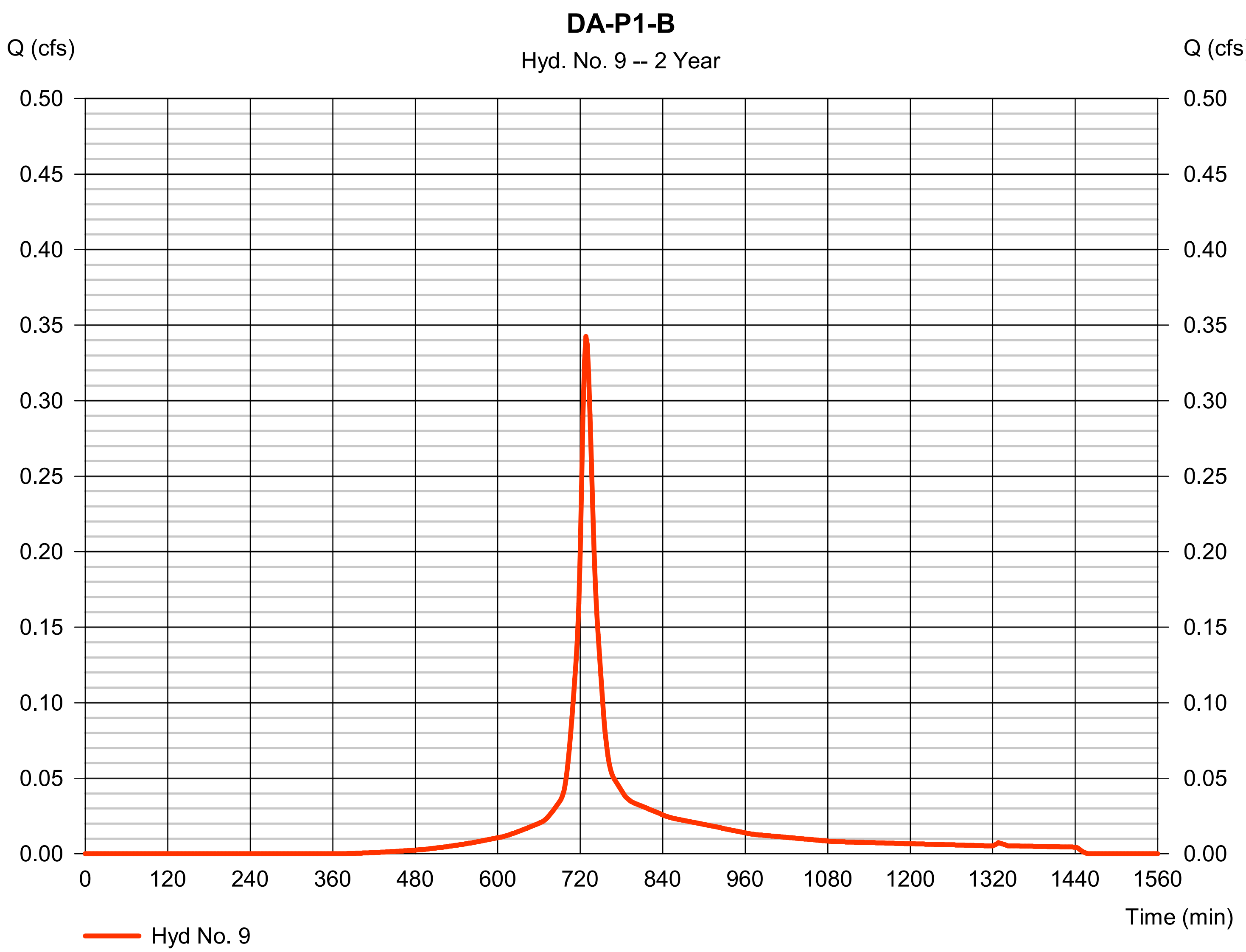


Hydrograph Report

Hyd. No. 9

DA-P1-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.342 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 1,320 cuft
Drainage area	= 0.157 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.38 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

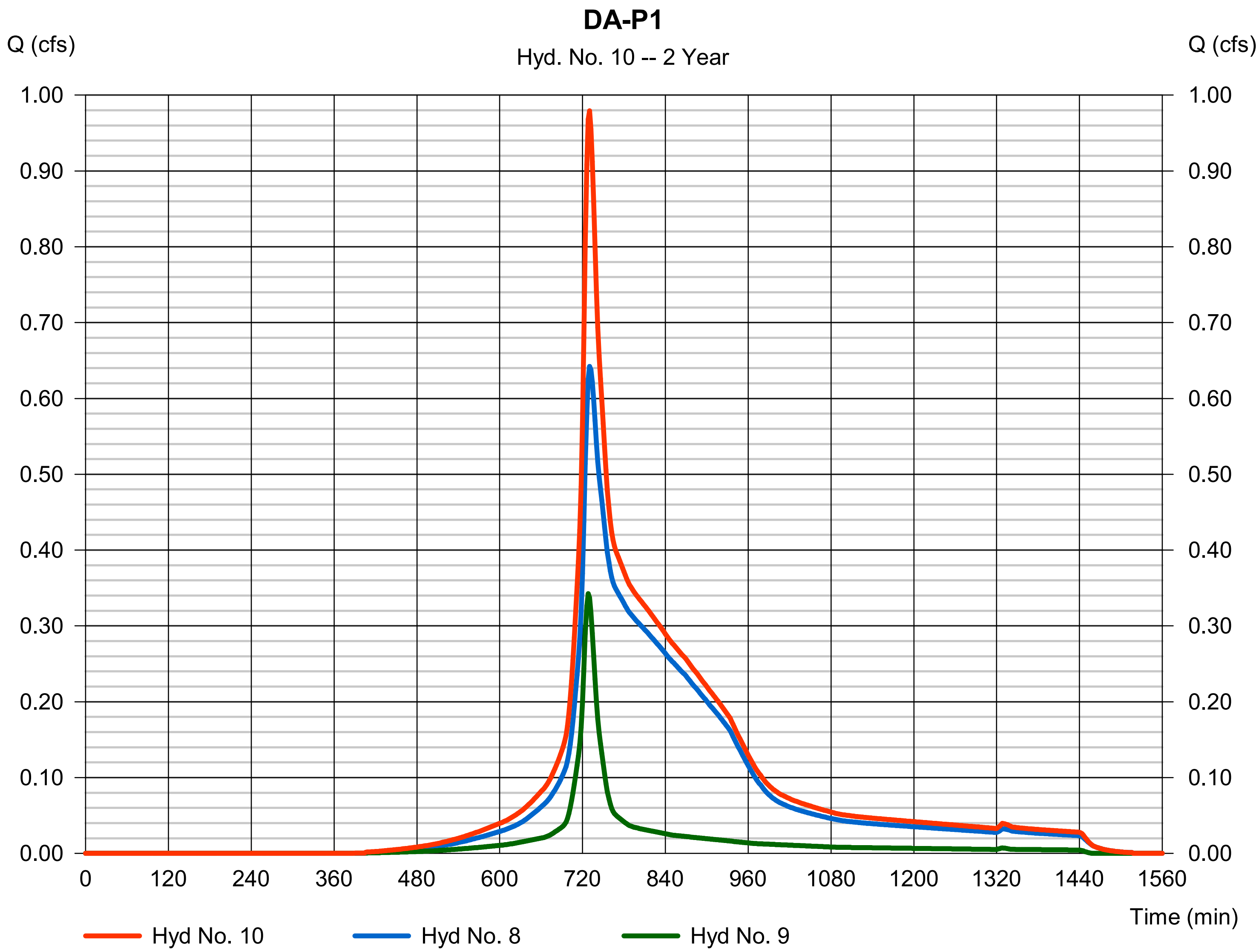


Hydrograph Report

Hyd. No. 10

DA-P1

Hydrograph type	= Combine	Peak discharge	= 0.979 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 7,419 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.157 ac



10-YEAR STORM HYDROGRAPHS

Hydrograph Summary Report

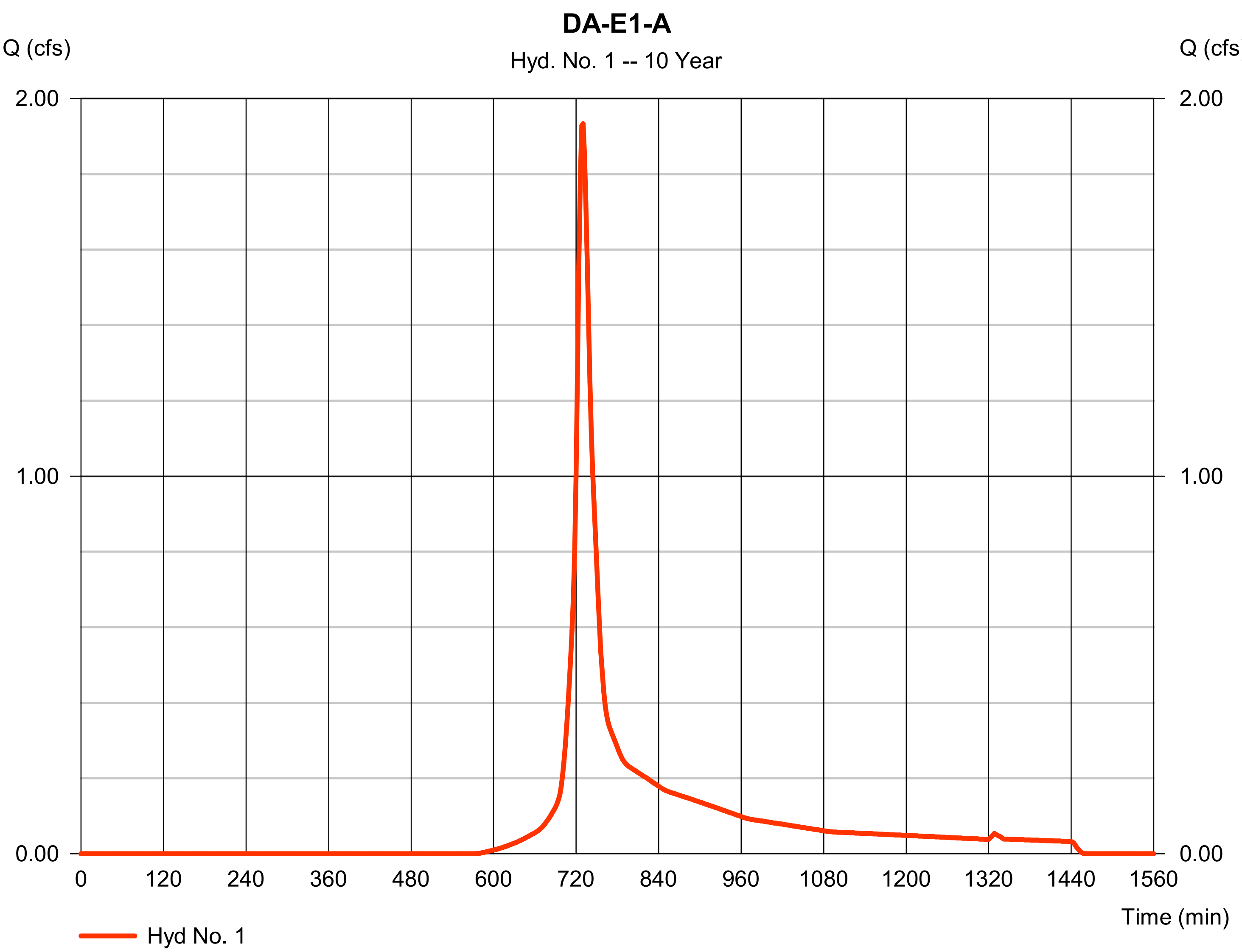
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.934	2	730	7,548	------	------	------	DA-E1-A
2	SCS Runoff	0.608	2	728	2,409	------	------	------	DA-E1-B
3	Combine	2.536	2	728	9,957	1, 2	------	------	DA-E1
5	SCS Runoff	2.000	2	728	7,876	------	------	------	DA-P1-A1 (BASIN)
6	Reservoir	0.482	2	756	7,875	5	15.98	2,843	UG Basin
7	SCS Runoff	0.953	2	728	3,674	------	------	------	DA-P1-A2 (NON-BASIN)
8	Combine	1.245	2	730	11,549	6, 7	------	------	DA-P1-A
9	SCS Runoff	0.596	2	728	2,346	------	------	------	DA-P1-B
10	Combine	1.831	2	728	13,895	8, 9	------	------	DA-P1

Hydrograph Report

Hyd. No. 1

DA-E1-A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.934 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 7,548 cuft
Drainage area	= 0.913 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

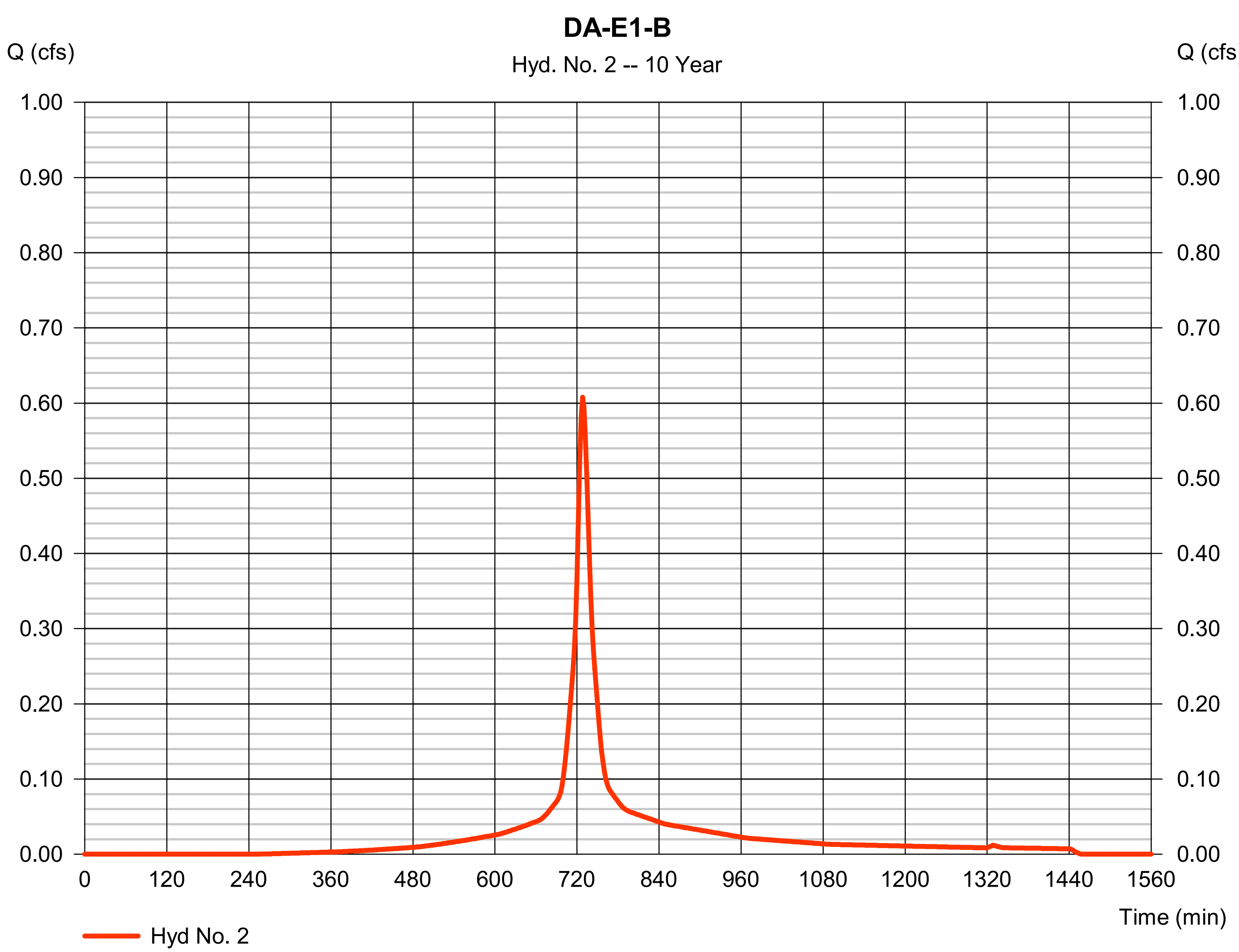


Hydrograph Report

Hyd. No. 2

DA-E1-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.608 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,409 cuft
Drainage area	= 0.157 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

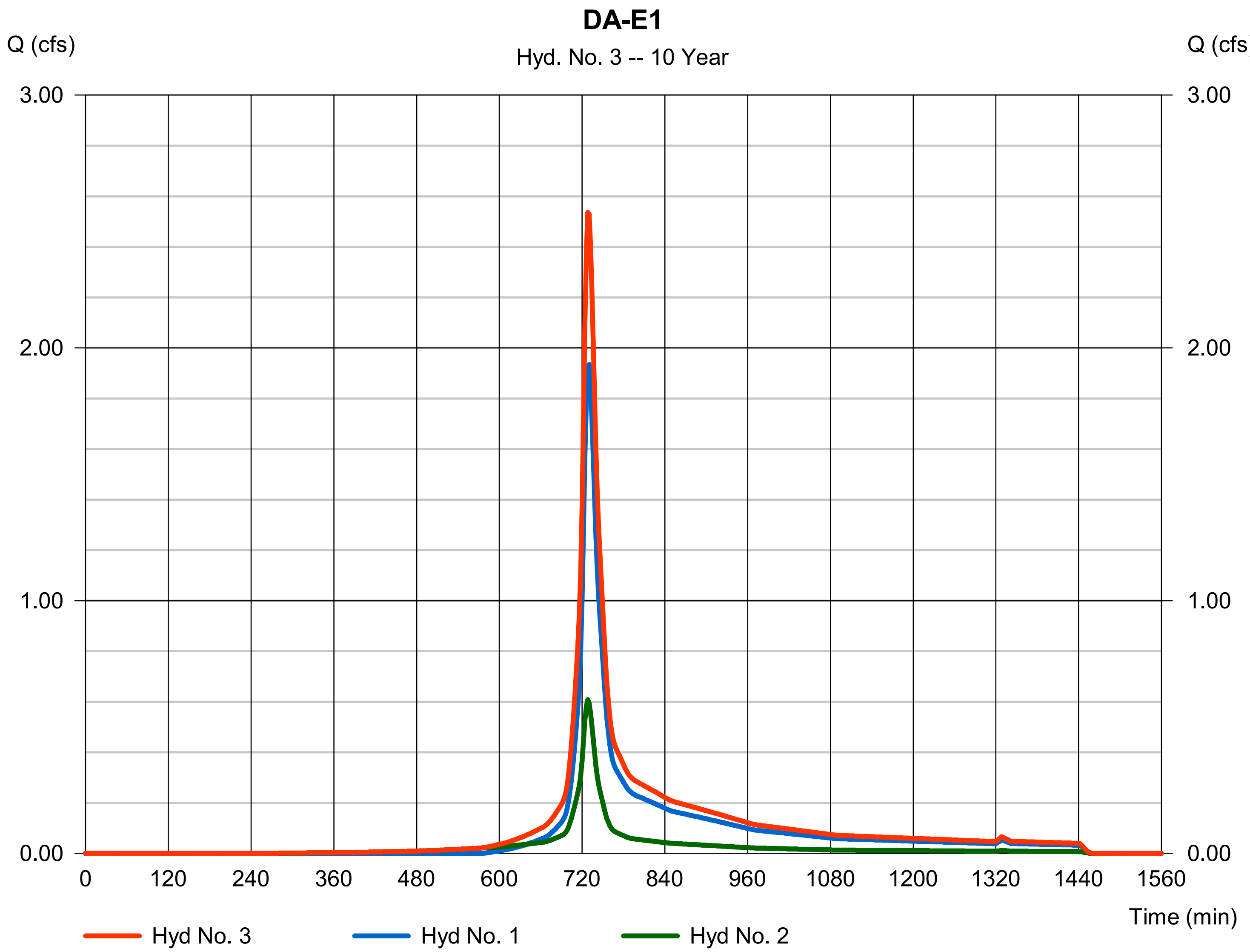


Hydrograph Report

Hyd. No. 3

DA-E1

Hydrograph type	= Combine	Peak discharge	= 2.536 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 9,957 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.070 ac

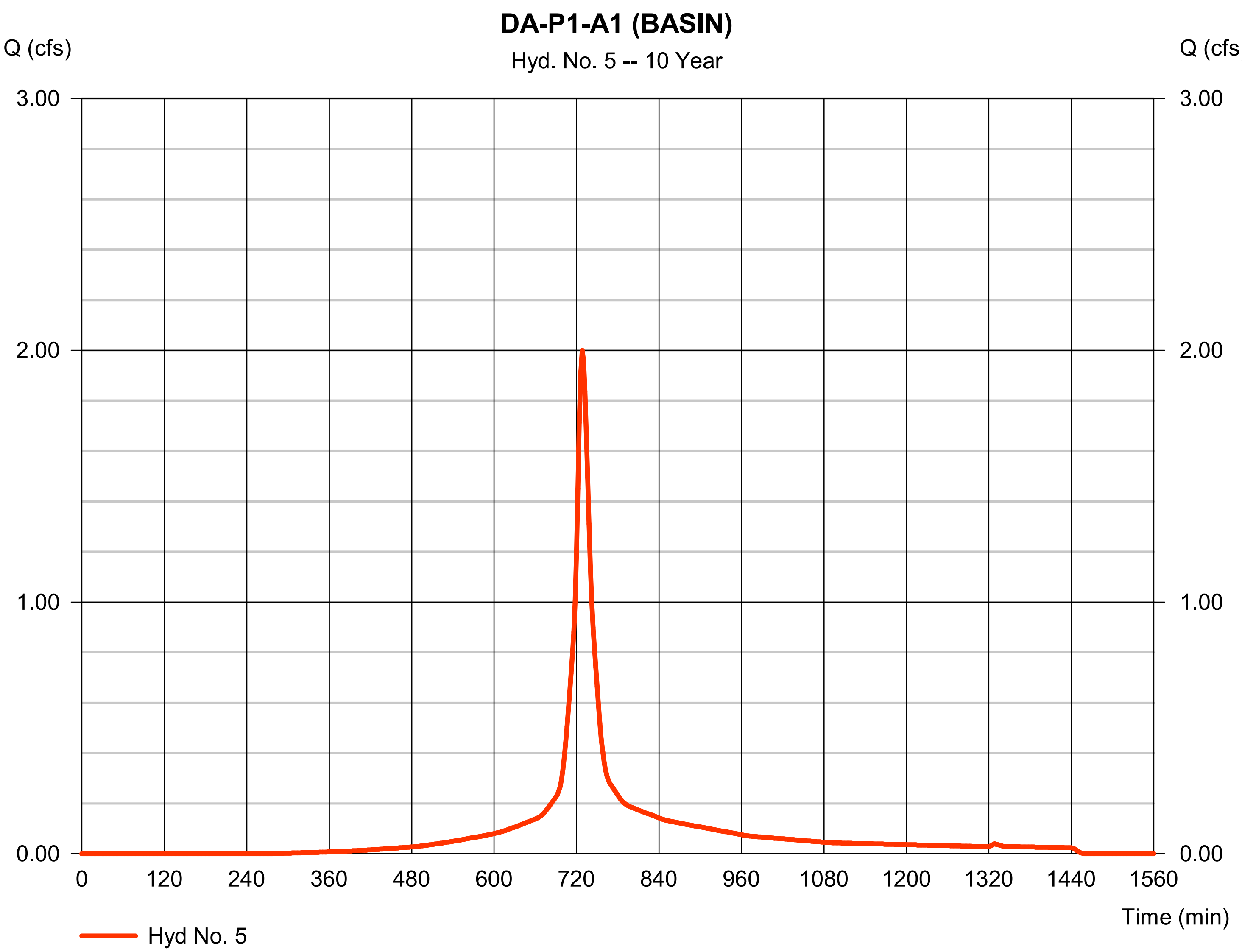


Hydrograph Report

Hyd. No. 5

DA-P1-A1 (BASIN)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 7,876 cuft
Drainage area	= 0.527 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



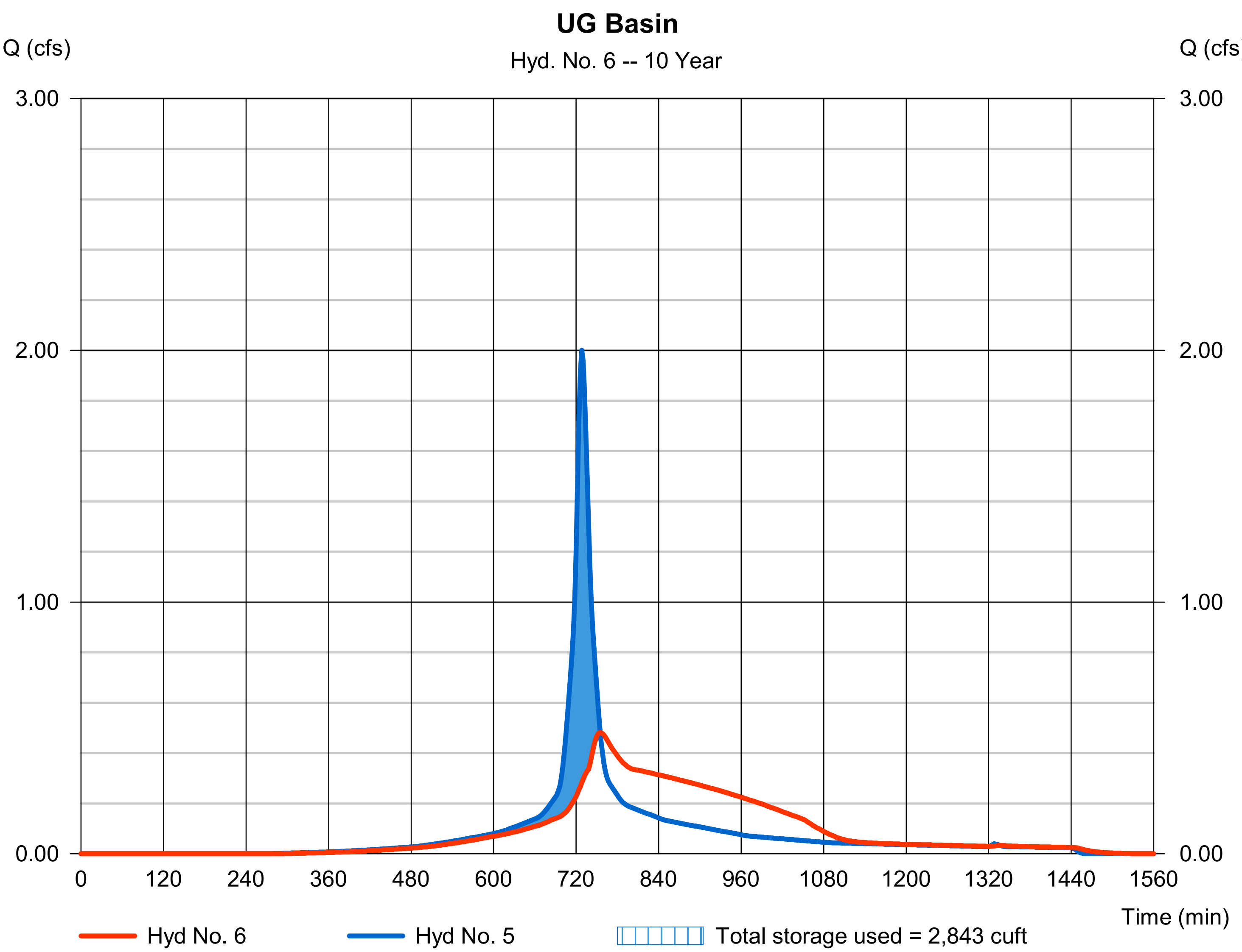
Hydrograph Report

Hyd. No. 6

UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.482 cfs
Storm frequency	= 10 yrs	Time to peak	= 756 min
Time interval	= 2 min	Hyd. volume	= 7,875 cuft
Inflow hyd. No.	= 5 - DA-P1-A1 (BASIN)	Max. Elevation	= 15.98 ft
Reservoir name	= UG Basin	Max. Storage	= 2,843 cuft

Storage Indication method used.

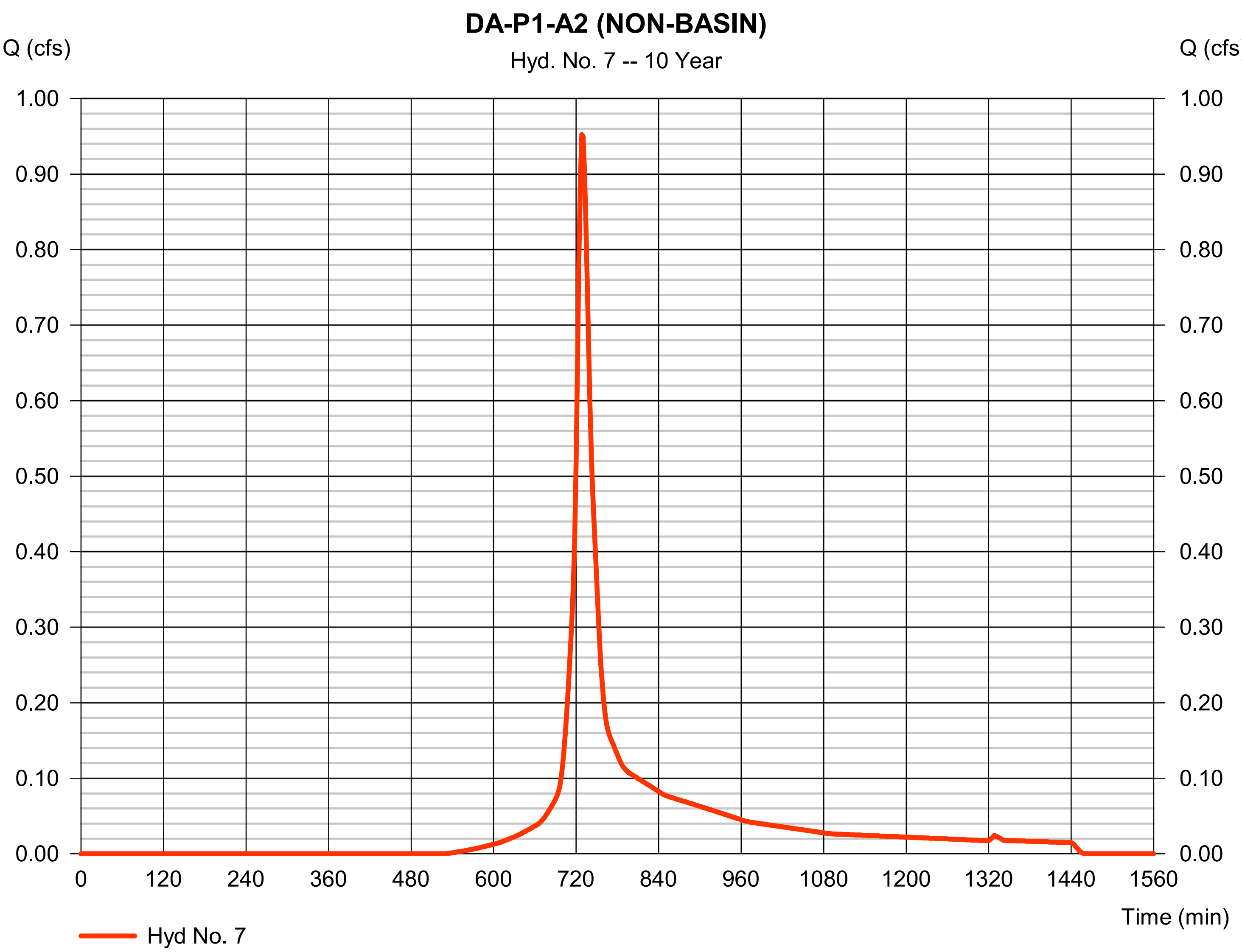


Hydrograph Report

Hyd. No. 7

DA-P1-A2 (NON-BASIN)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.953 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 3,674 cuft
Drainage area	= 0.385 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

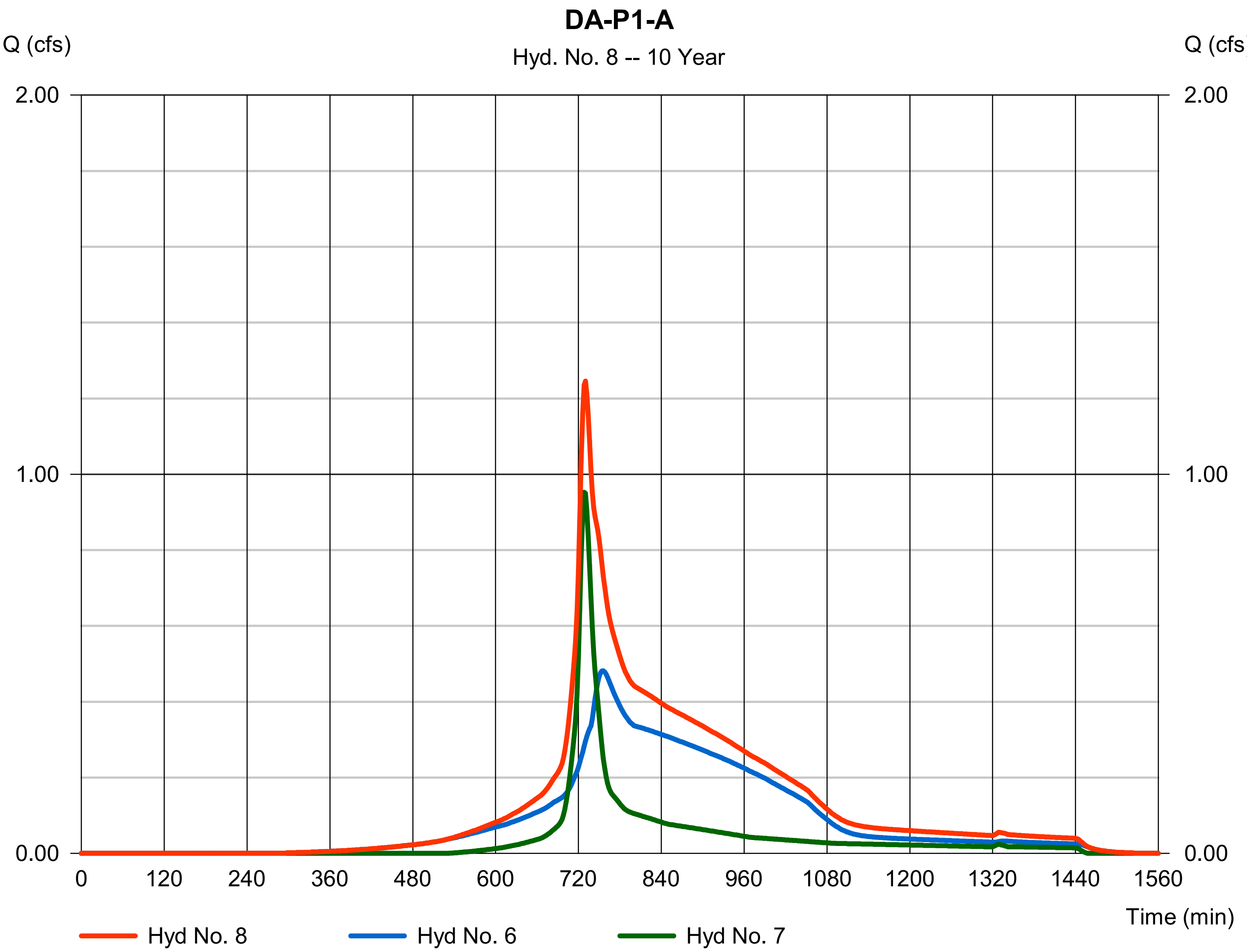


Hydrograph Report

Hyd. No. 8

DA-P1-A

Hydrograph type	= Combine	Peak discharge	= 1.245 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 11,549 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 0.385 ac

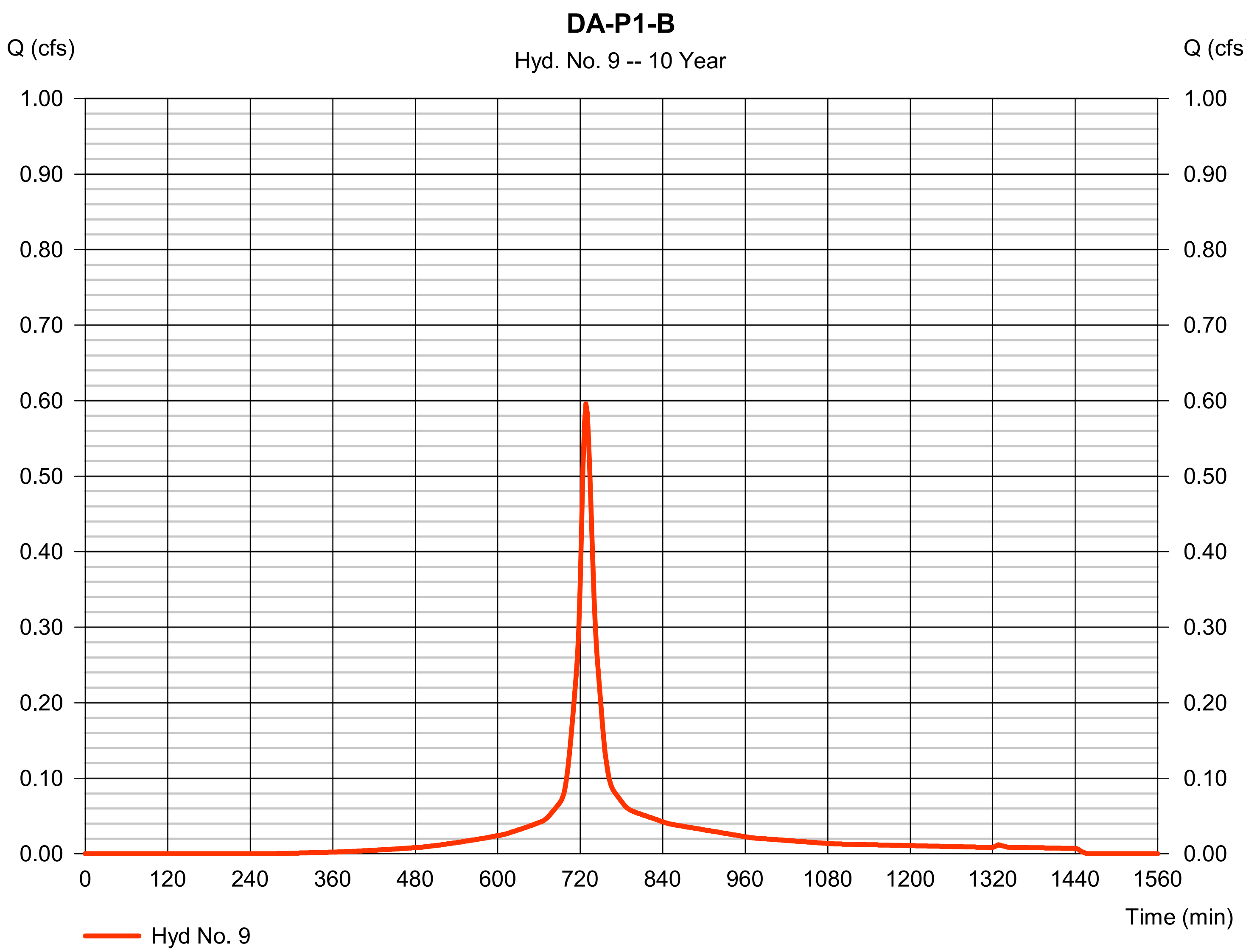


Hydrograph Report

Hyd. No. 9

DA-P1-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.596 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,346 cuft
Drainage area	= 0.157 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.23 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

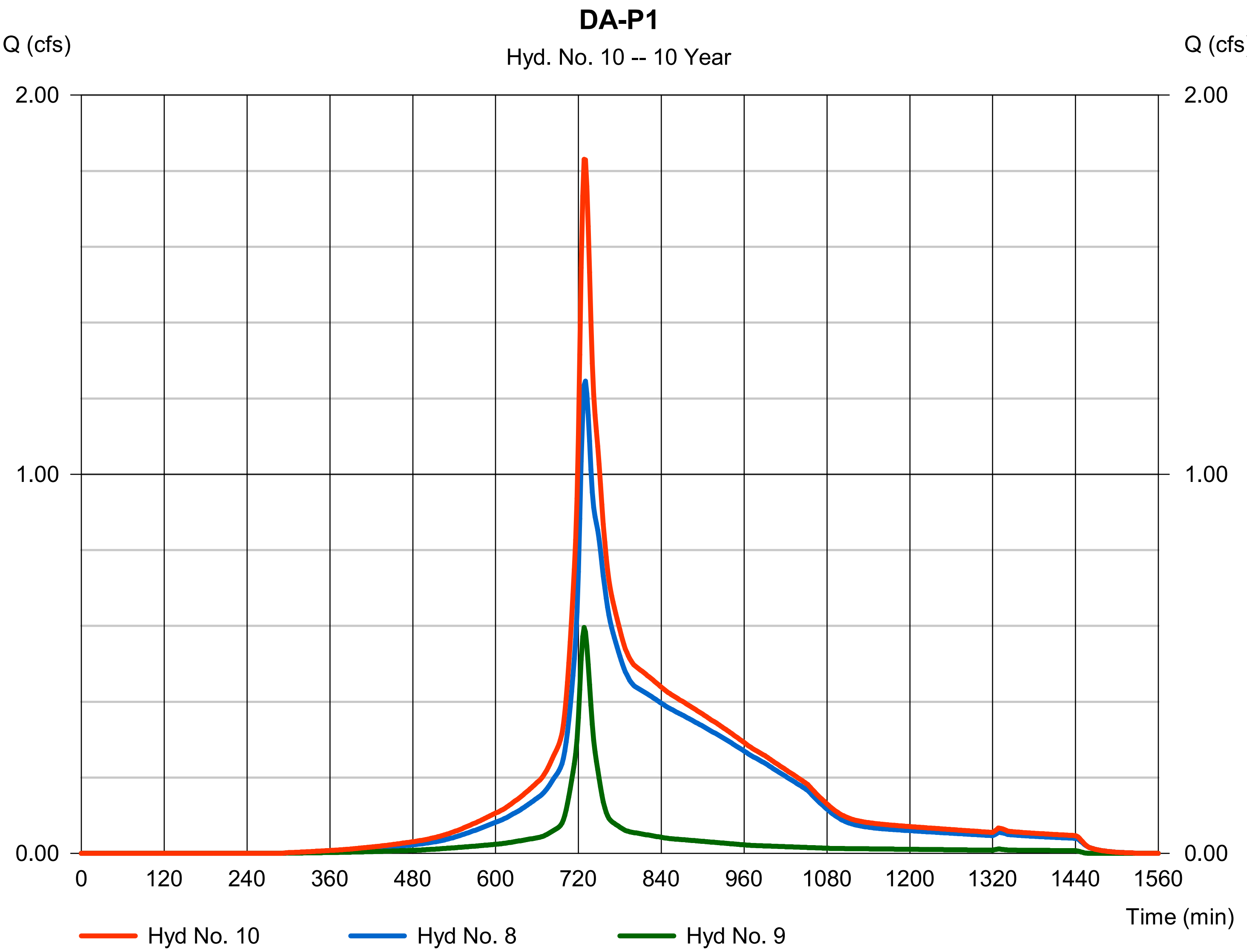


Hydrograph Report

Hyd. No. 10

DA-P1

Hydrograph type	= Combine	Peak discharge	= 1.831 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 13,895 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.157 ac



100-YEAR STORM HYDROGRAPHS

Hydrograph Summary Report

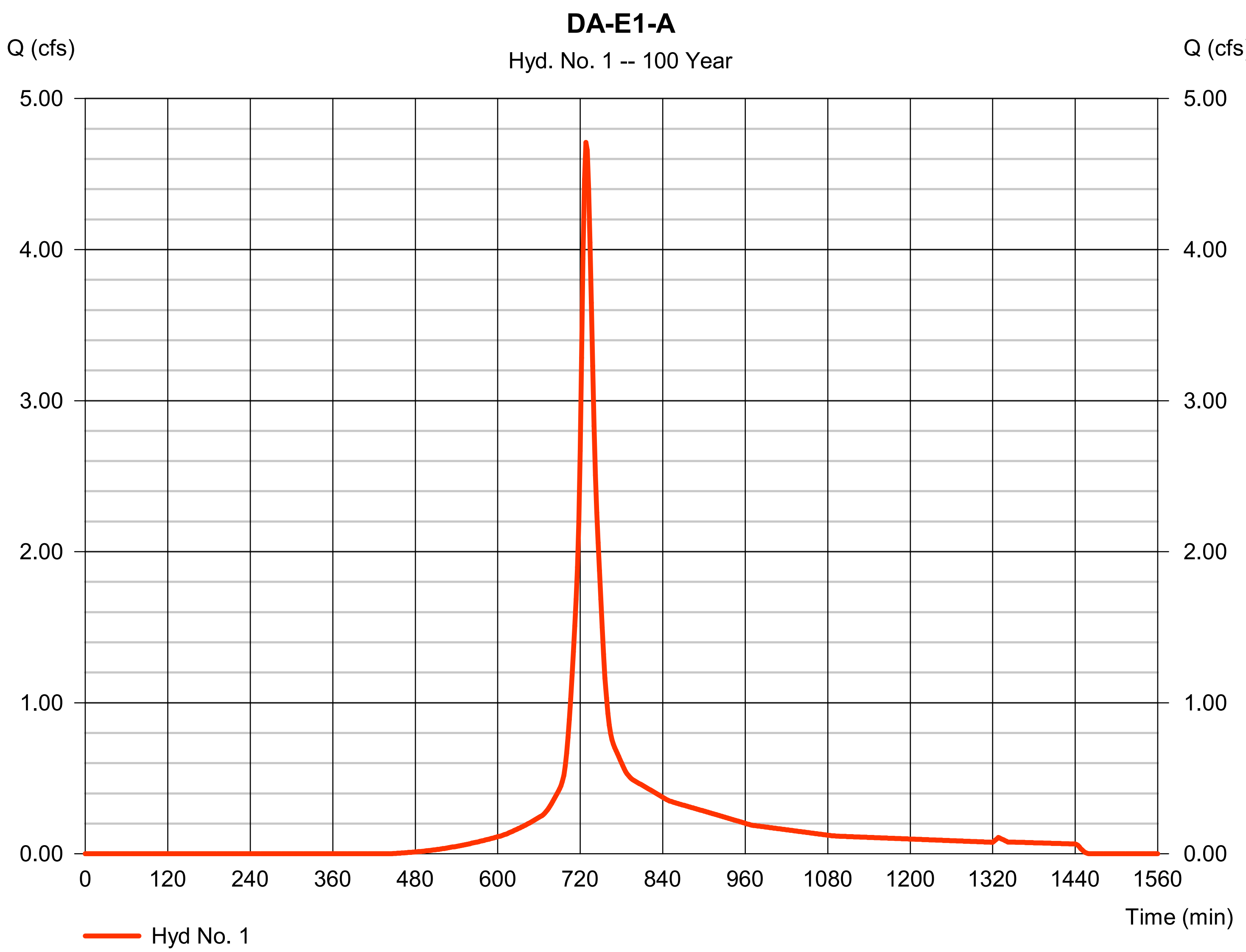
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.710	2	728	18,053	------	------	------	DA-E1-A
2	SCS Runoff	1.108	2	728	4,544	------	------	------	DA-E1-B
3	Combine	5.818	2	728	22,597	1, 2	------	------	DA-E1
5	SCS Runoff	3.685	2	728	15,014	------	------	------	DA-P1-A1 (BASIN)
6	Reservoir	2.291	2	738	15,013	5	17.42	4,311	UG Basin
7	SCS Runoff	2.163	2	728	8,322	------	------	------	DA-P1-A2 (NON-BASIN)
8	Combine	3.836	2	736	23,335	6, 7	------	------	DA-P1-A
9	SCS Runoff	1.098	2	728	4,473	------	------	------	DA-P1-B
10	Combine	4.645	2	734	27,808	8, 9	------	------	DA-P1

Hydrograph Report

Hyd. No. 1

DA-E1-A

Hydrograph type	= SCS Runoff	Peak discharge	= 4.710 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 18,053 cuft
Drainage area	= 0.913 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

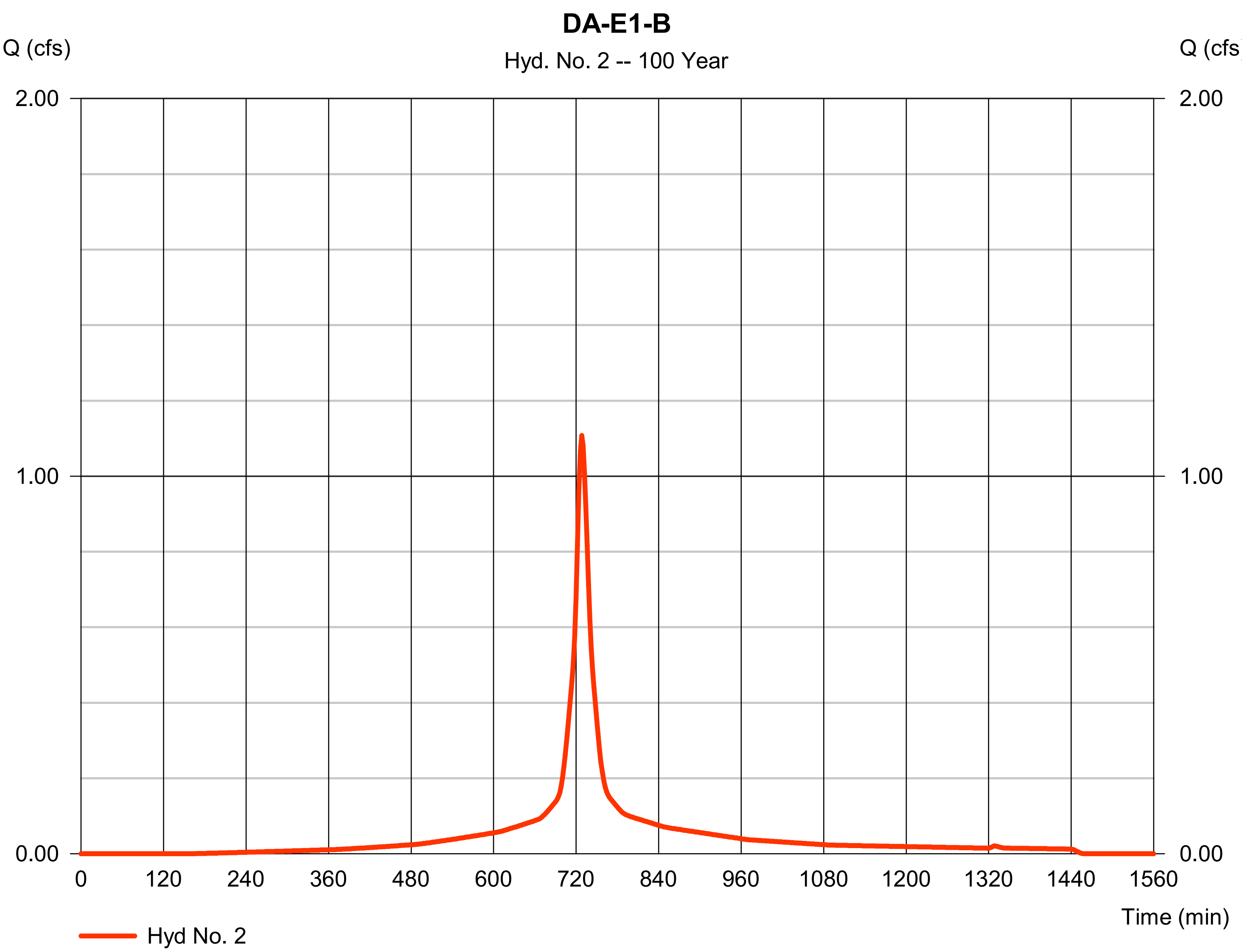


Hydrograph Report

Hyd. No. 2

DA-E1-B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.108 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 4,544 cuft
Drainage area	= 0.157 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



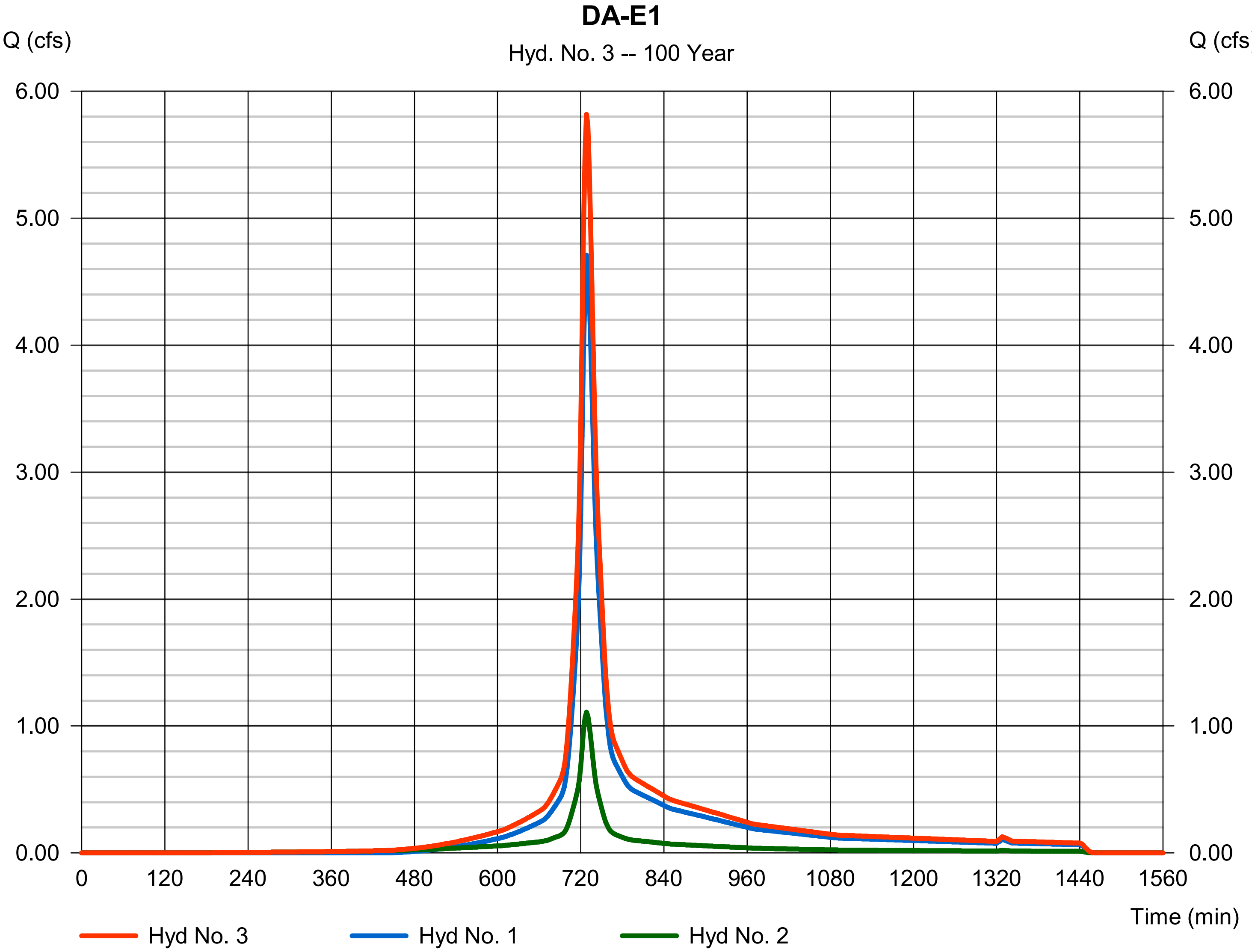
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 12 / 6 / 2022

Hyd. No. 3

DA-E1

Hydrograph type	= Combine	Peak discharge	= 5.818 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 22,597 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.070 ac

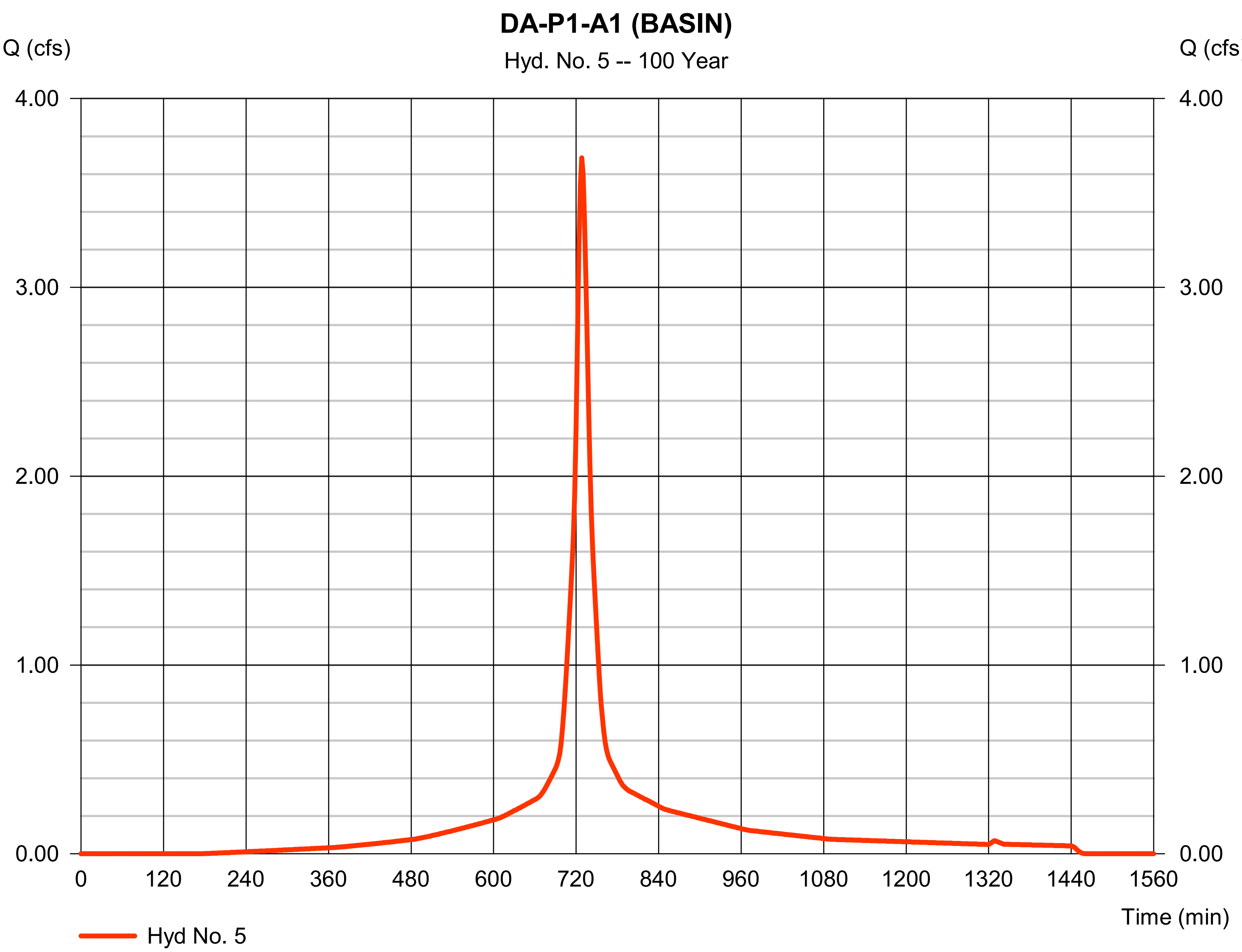


Hydrograph Report

Hyd. No. 5

DA-P1-A1 (BASIN)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.685 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 15,014 cuft
Drainage area	= 0.527 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



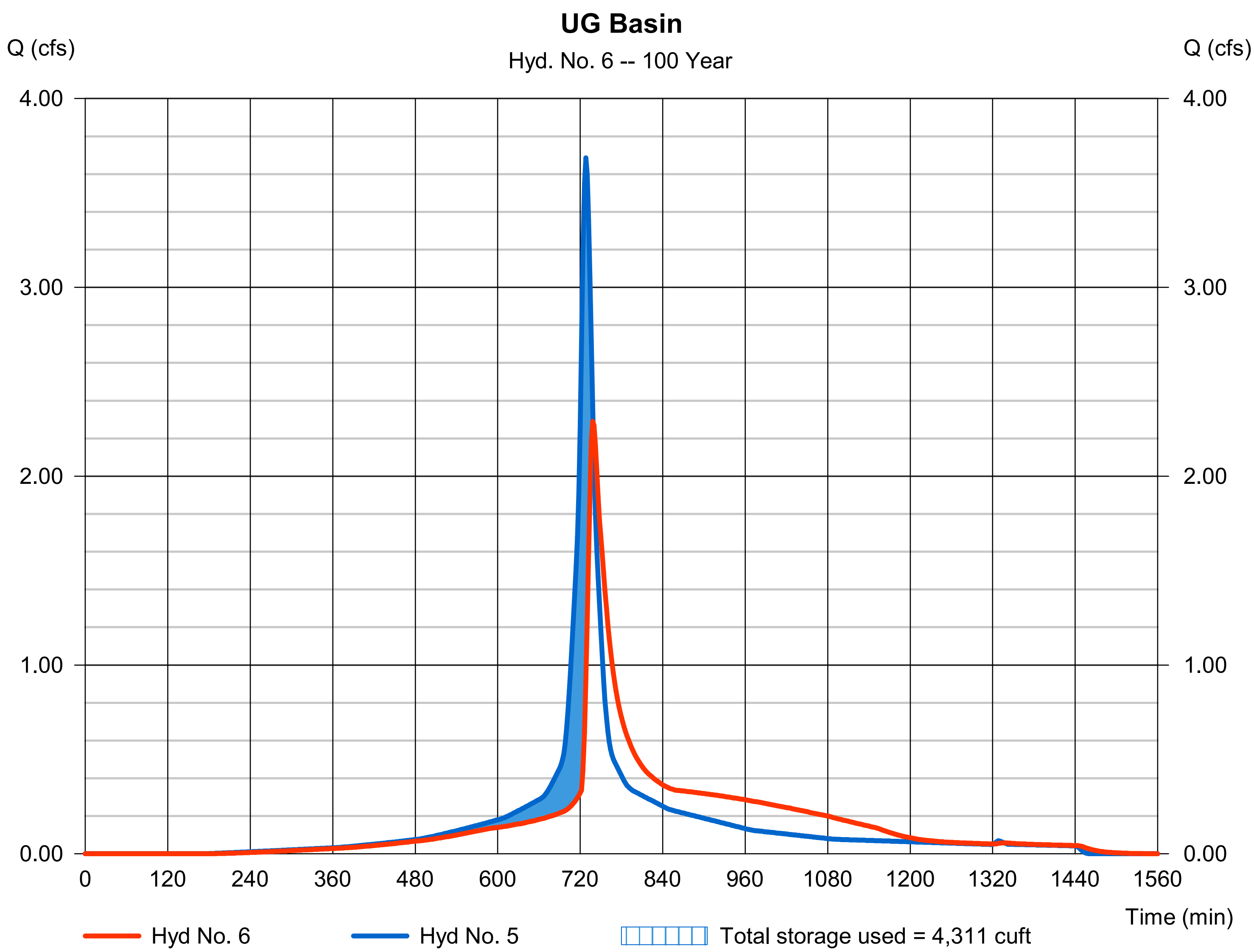
Hydrograph Report

Hyd. No. 6

UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 2.291 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 15,013 cuft
Inflow hyd. No.	= 5 - DA-P1-A1 (BASIN)	Max. Elevation	= 17.42 ft
Reservoir name	= UG Basin	Max. Storage	= 4,311 cuft

Storage Indication method used.

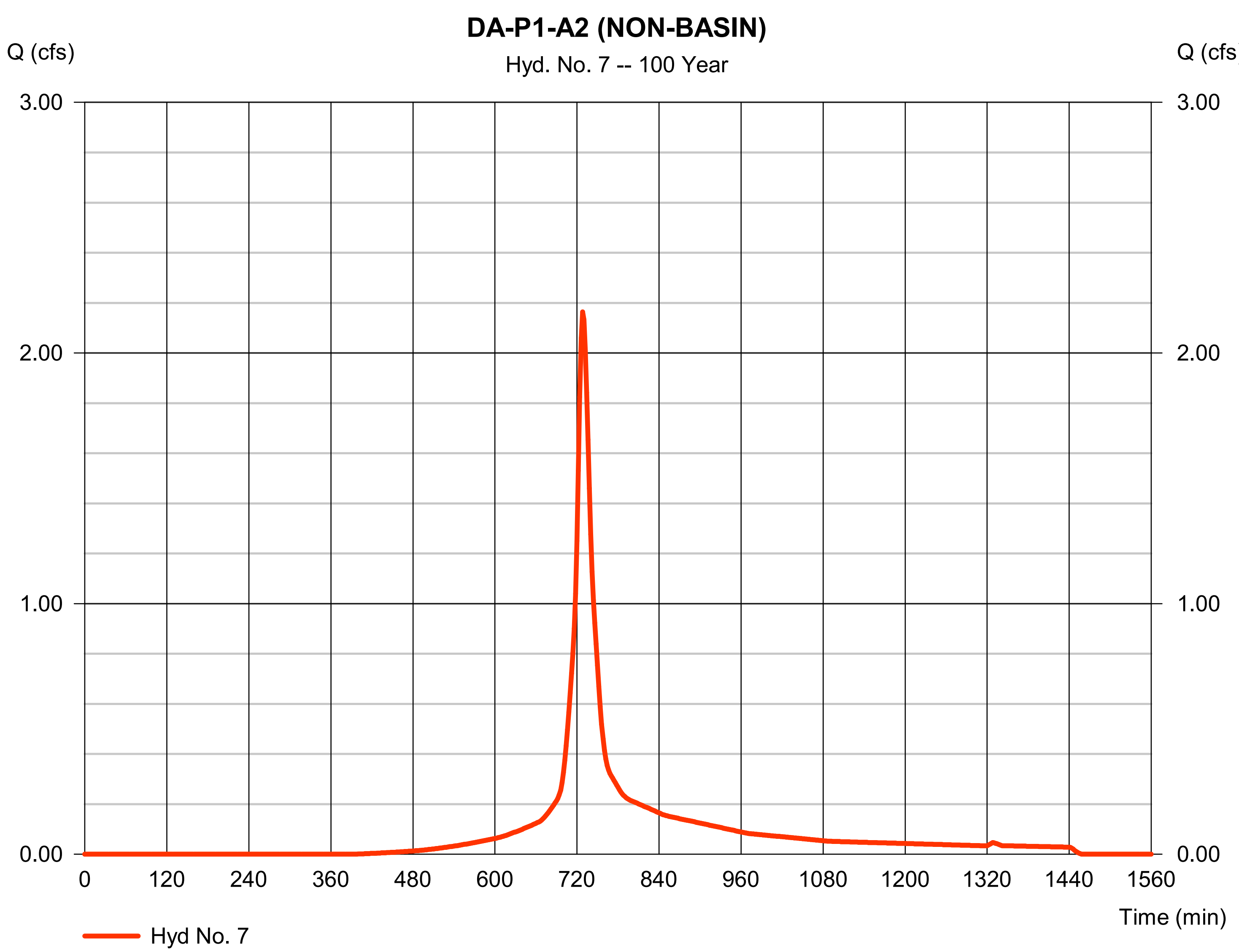


Hydrograph Report

Hyd. No. 7

DA-P1-A2 (NON-BASIN)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.163 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 8,322 cuft
Drainage area	= 0.385 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

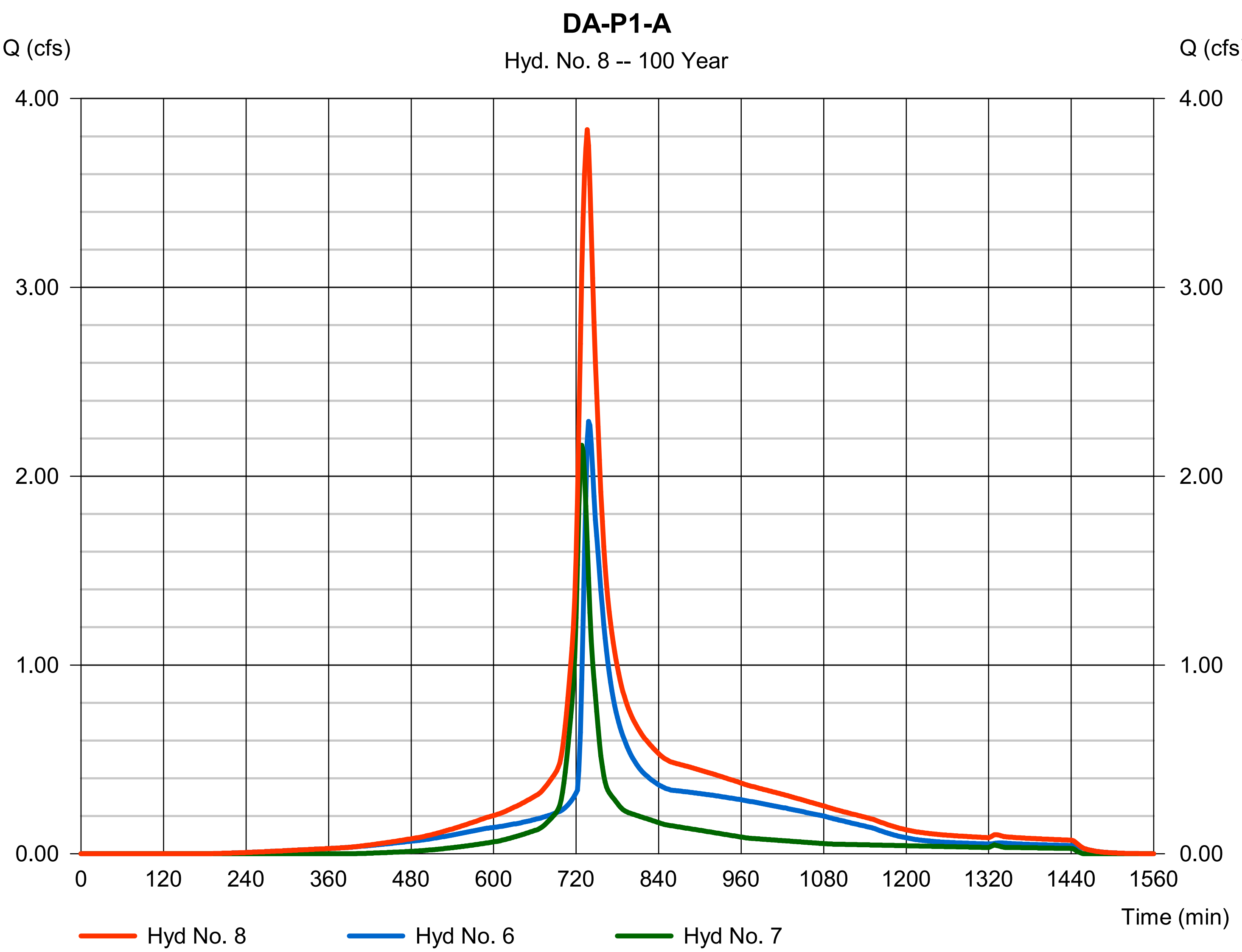


Hydrograph Report

Hyd. No. 8

DA-P1-A

Hydrograph type	= Combine	Peak discharge	= 3.836 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 23,335 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 0.385 ac

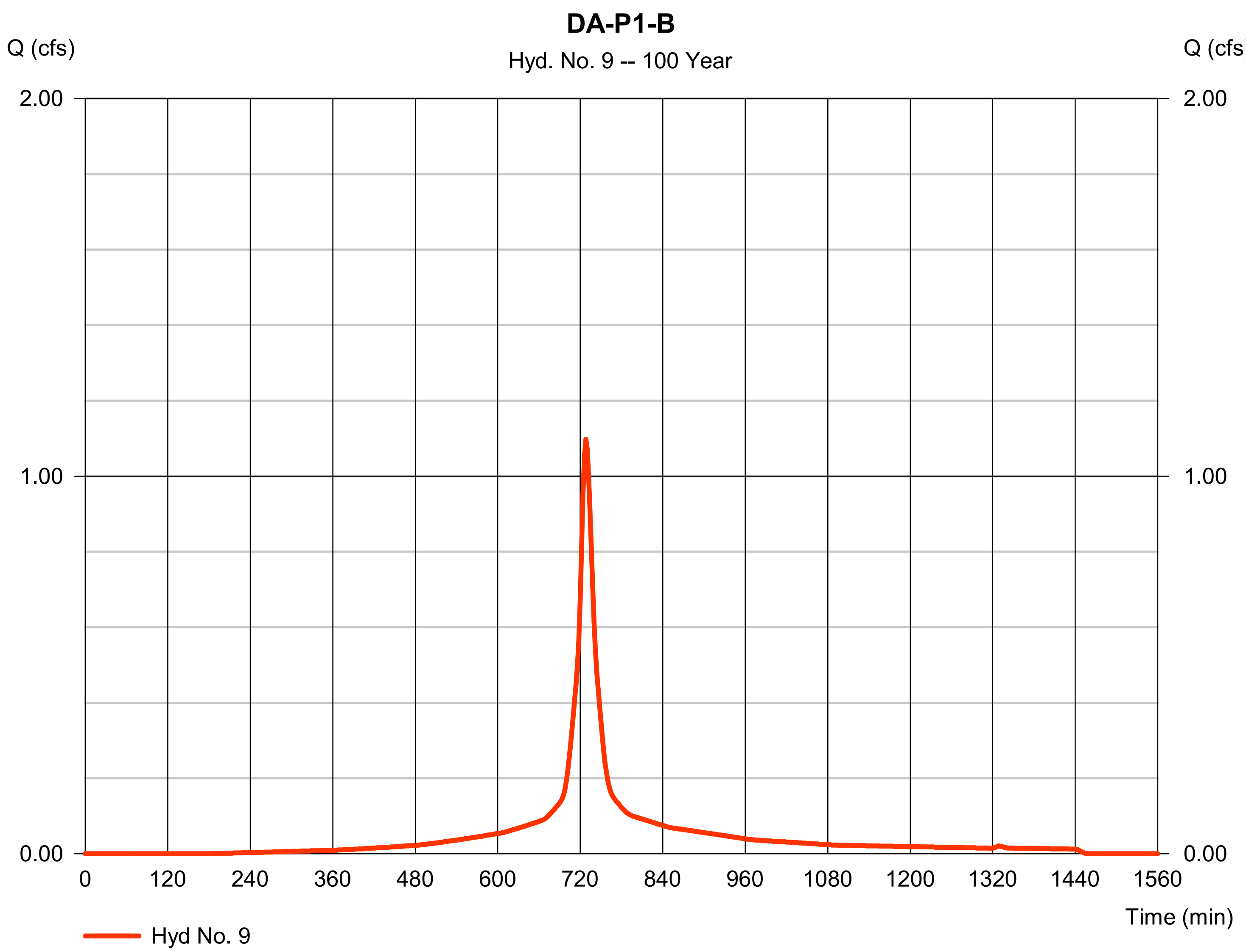


Hydrograph Report

Hyd. No. 9

DA-P1-B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.098 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 4,473 cuft
Drainage area	= 0.157 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.94 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

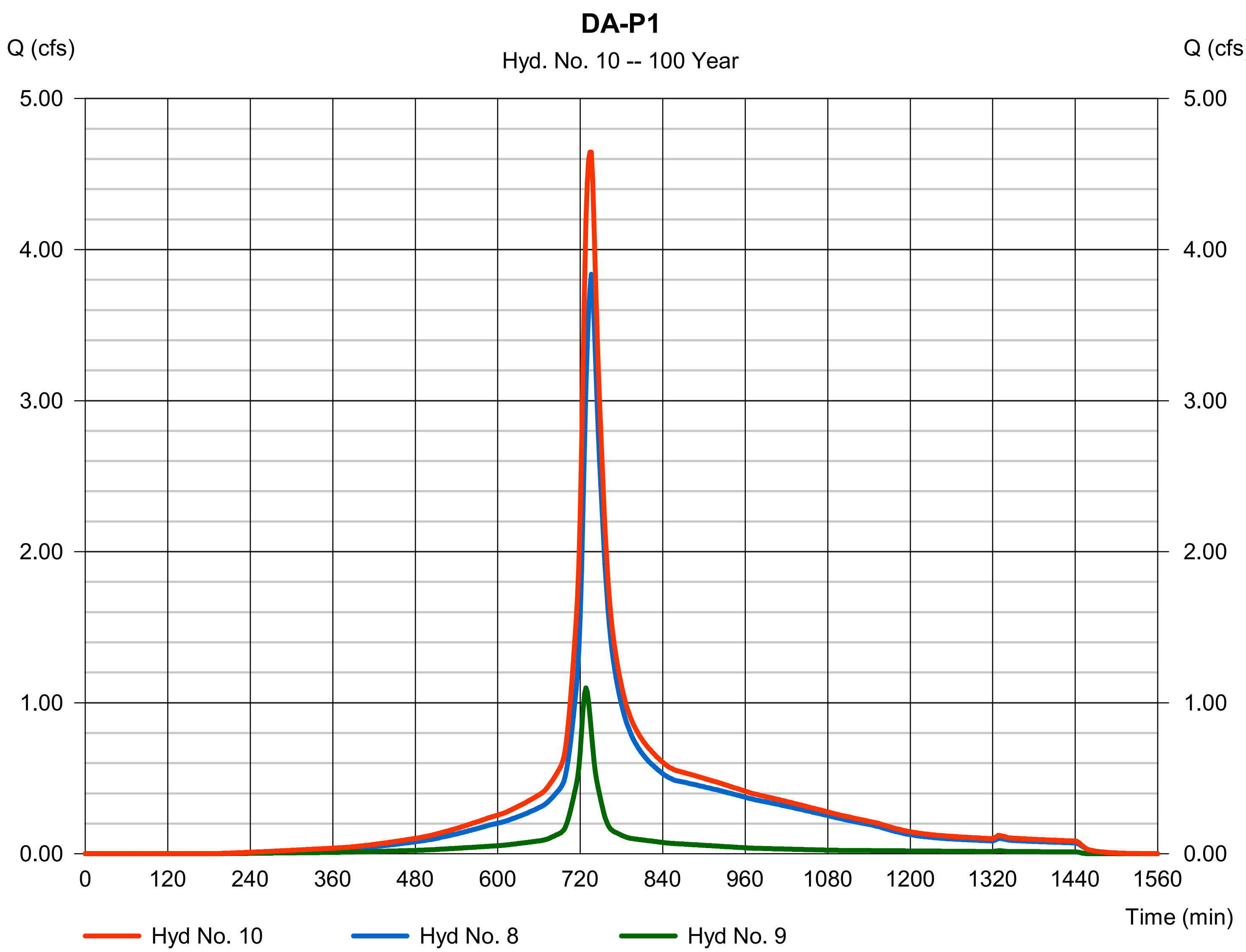


Hydrograph Report

Hyd. No. 10

DA-P1

Hydrograph type	= Combine	Peak discharge	= 4.645 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 27,808 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.157 ac



BASIN DATA SUMMARY FORM

Pond Report

Pond No. 1 - UG Basin

Pond Data

UG Chambers -Invert elev. = 13.50 ft, Rise x Span = 4.00 x 4.00 ft, Barrel Len = 105.00 ft, No. Barrels = 3, Slope = 0.00%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	13.50	n/a	0	0
0.40	13.90	n/a	227	227
0.80	14.30	n/a	394	621
1.20	14.70	n/a	480	1,101
1.60	15.10	n/a	528	1,629
2.00	15.50	n/a	552	2,181
2.40	15.90	n/a	552	2,733
2.80	16.30	n/a	528	3,261
3.20	16.70	n/a	479	3,741
3.60	17.10	n/a	394	4,135
4.00	17.50	n/a	227	4,361

Culvert / Orifice Structures

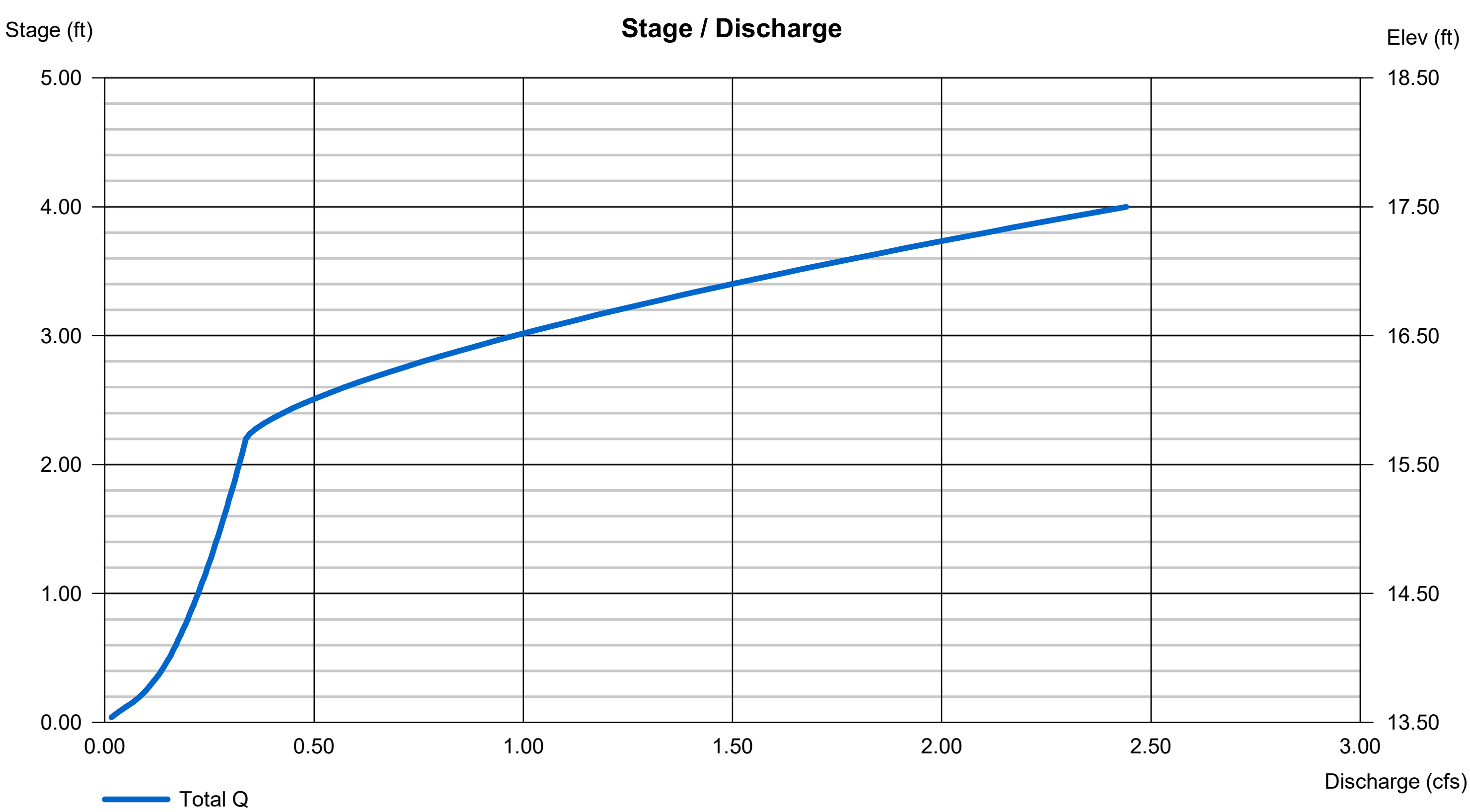
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.00	0.00	0.00
Span (in)	= 15.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 13.40	13.45	0.00	0.00
Length (ft)	= 19.00	0.00	0.00	0.00
Slope (%)	= 2.10	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.25	0.00	0.00
Crest El. (ft)	= 19.50	15.70	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



PREFORMED SCOUR HOLE CALCULATIONS

CONDUIT OUTLET PROTECTION COMPUTATIONS

SCOUR HOLE #: 1

Design Input:

Design Storm Flow for 10 Year (Q):	0.48	cfs
Vertical Dimension of Outlet Pipe (D_o)	15.0	inches
Horizontal Dimension of Outlet Pipe (W_o):	15.0	inches
Tailwater Depth (Tw):[1]	0.25	feet
Scour Hole Depth ($^1/_2$ D_o or D_o) :	15.0	inches

Apron Dimension Computations:

Minimum Bottom Width = 2 W_o = 2.50 feet

Minimum Bottom Length = 3 D_o = 3.75 feet

Minimum Top Width (max side slope of 3:1) = 10.00 feet

Minimum Top Length (max side slope of 3:1) = 11.25 feet

Rip Rap Stone Size Calculations:

Unit Dicharge, q = Q/D_o = 0.38 cfs per foot

Case Y = 1/2 D_o

Median Stone d_{50} = $\frac{0.0125\ q^{1.33}}{Tw}$ = inches or Inches

Apron Thickness = 2*d_{50} with filter fabric = Inches

Case Y = D_o

Median Stone d_{50} = $\frac{0.0082\ q^{1.33}}{Tw}$ = 0.11 inches, use 6 Inches

Apron Thickness = 2*d_{50} with filter fabric = 12 Inches

Notes:

1. The side slopes shall be 3:1 or flatter.
2. The bottom grade shall be 0.0% (level).
3. There shall be no over fall at the end of the apron or at the end of the culvert.
4. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
5. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
6. Rip-rap and filter fabric shall meet the standards of the local SCD.
7. Where the scour hole is to be placed within an existing or proposed waterway:
   a. The scour hole sidewalls should be eliminated to maintain a smooth hydraulic line along the waterway bottom to avoid inviting turbulent flow from a sudden depression in the waterway.
   b. If the flow in the waterway is greater than the flow from the proposed outlet, the rip-rap used to construct the scour hole should be sized based on the greater flow value according to the standard rip-rap.

Footnotes

1. Tailwater depth shall be the 2 year storm if discharging into a detention basin. For areas where the tailwater cannot be computed, use Tw = 0.2Do.

SOIL SURVEY REPORT AND MAP

United States Department of Agriculture

NRCS

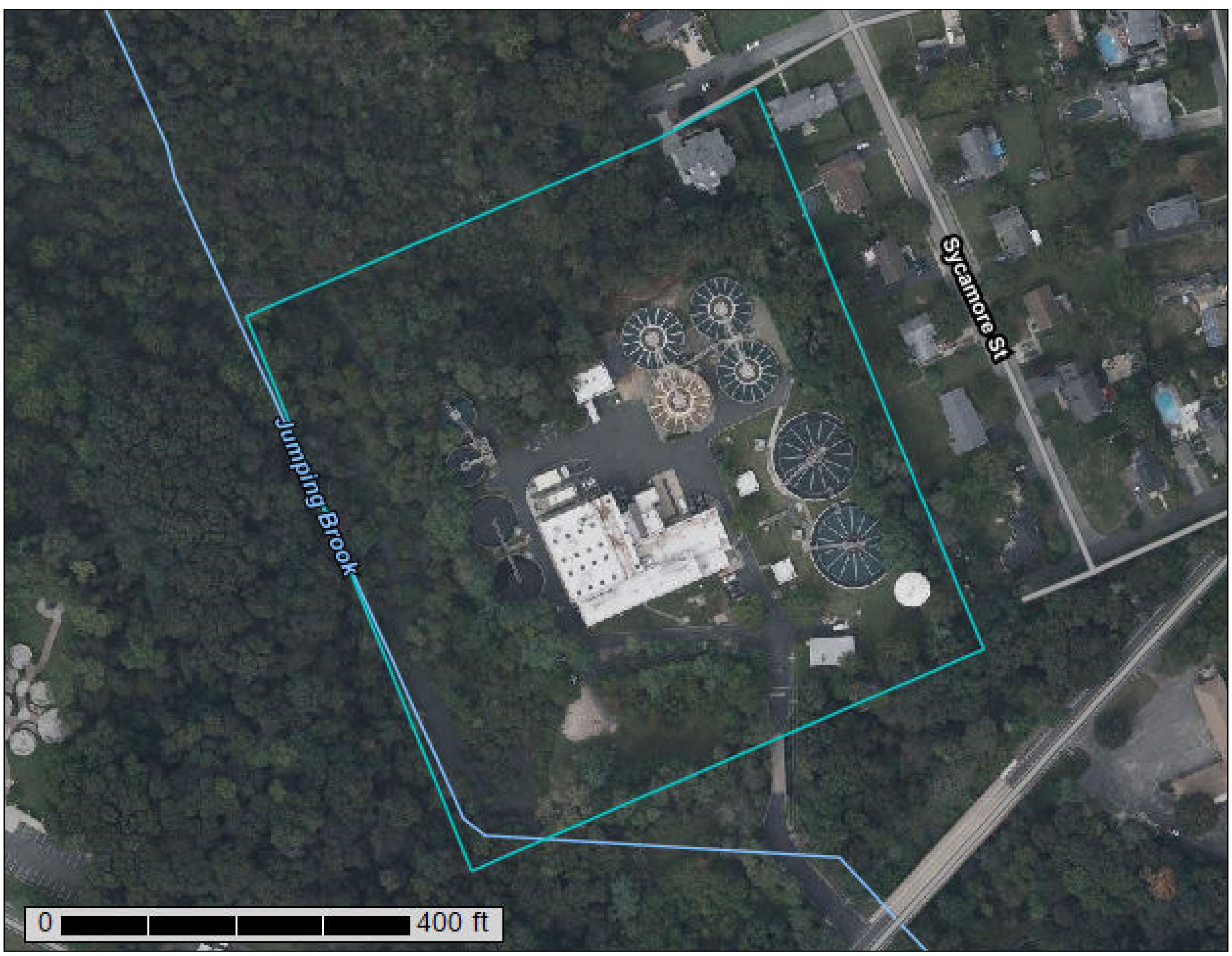
Natural Resources Conservation Service

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

Monmouth County, New Jersey

Jumping Brook WTP



July 19, 2022

Preface

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

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

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

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

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

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

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Contents

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.

Soil Map

Map Scale: 1:2,000 if printed on A portrait (8.5" x 11") sheet.

0 25 50 100 150 Meters

0 50 100 200 300 Feet

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N 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 1:24,000.

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: Monmouth County, New Jersey
Survey Area Data: Version 15, Aug 31, 2021

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

Date(s) aerial images were photographed: Sep 25, 2020—Oct 15, 2020

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
DouB	Downer-Urban land complex, 0 to 5 percent slopes	0.8	7.7%
EveB	Evesboro sand, 0 to 5 percent slopes	1.9	18.4%
EveE	Evesboro sand, 15 to 25 percent slopes	4.4	43.4%
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded	3.1	30.4%
Totals for Area of Interest		**10.1**	**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.

Monmouth County, New Jersey

DouB—Downer-Urban land complex, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 4j72
Elevation: 0 to 170 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition

Downer and similar soils: 60 percent
Urban land: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Downer

Setting

Landform: Knolls, low hills
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits and/or gravelly fluviomarine deposits

Typical profile

Ap - 0 to 10 inches: sandy loam
Bt1 - 10 to 16 inches: sandy loam
Bt2 - 16 to 36 inches: sandy loam
C1 - 36 to 48 inches: loamy sand
C2 - 48 to 80 inches: stratified sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Urban Land

Setting

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Woodstown

Percent of map unit: 5 percent
Landform: Flats, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Sassafras

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

EveB—Evesboro sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 4j74
Elevation: 0 to 150 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Evesboro

Setting

Landform: Low hills
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy eolian deposits and/or sandy fluviomarine deposits

Typical profile

A - 0 to 4 inches: sand
AB - 4 to 17 inches: sand
Bw - 17 to 31 inches: sand
C - 31 to 80 inches: stratified loamy sand to sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Mullica, rarely flooded

Percent of map unit: 5 percent
Landform: Flood plains, depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Downer

Percent of map unit: 5 percent
Landform: Knolls, low hills
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Atsion

Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip, talf

Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Lakehurst

Percent of map unit: 5 percent
Landform: Flats, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

EveE—Evesboro sand, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 4j77
Elevation: 10 to 120 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition

Evesboro and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Evesboro

Setting

Landform: Low hills
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits and/or sandy fluviomarine deposits

Typical profile

A - 0 to 4 inches: sand
AB - 4 to 17 inches: sand
Bw - 17 to 31 inches: sand
C - 31 to 80 inches: stratified loamy sand to sand

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 20.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Westphalia
Percent of map unit: 5 percent
Landform: Knolls, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear
Hydric soil rating: No

HumAt—Humaquepts, 0 to 3 percent slopes, frequently flooded

Map Unit Setting
National map unit symbol: 1j1jd
Elevation: 0 to 300 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition
Humaquepts, frequently flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Humaquepts, Frequently Flooded

Setting
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile
A - 0 to 18 inches: loam
C - 18 to 60 inches: sand

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Manahawkin, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Atsion

Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Mullica, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains, depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

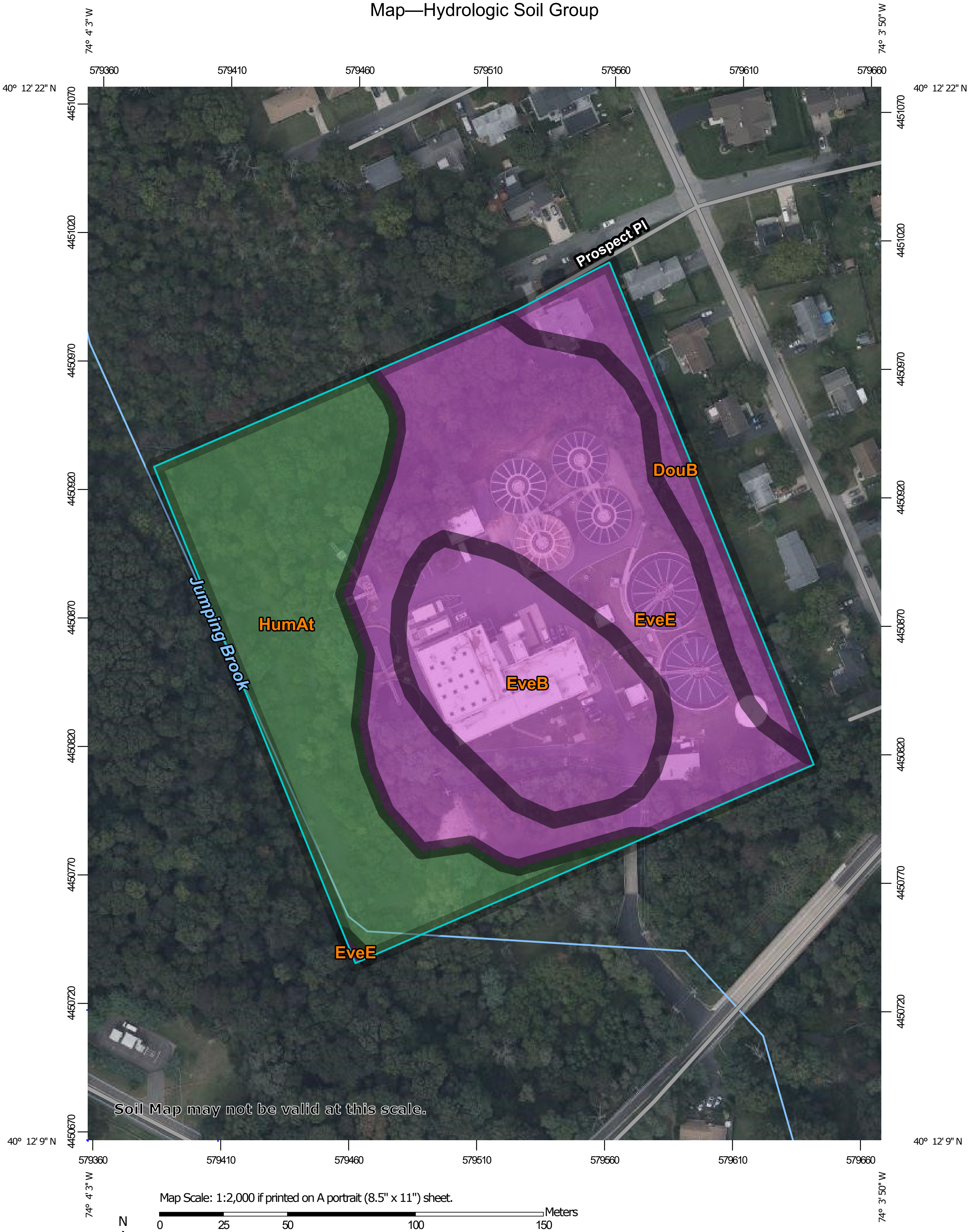
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group



Map Scale: 1:2,000 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:24,000.

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: Monmouth County, New Jersey
Survey Area Data: Version 15, Aug 31, 2021

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

Date(s) aerial images were photographed: Sep 25, 2020—Oct 15, 2020

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DouB	Downer-Urban land complex, 0 to 5 percent slopes	A	0.8	7.7%
EveB	Evesboro sand, 0 to 5 percent slopes	A	1.9	18.4%
EveE	Evesboro sand, 15 to 25 percent slopes	A	4.4	43.4%
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded	A/D	3.1	30.4%
Totals for Area of Interest			**10.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

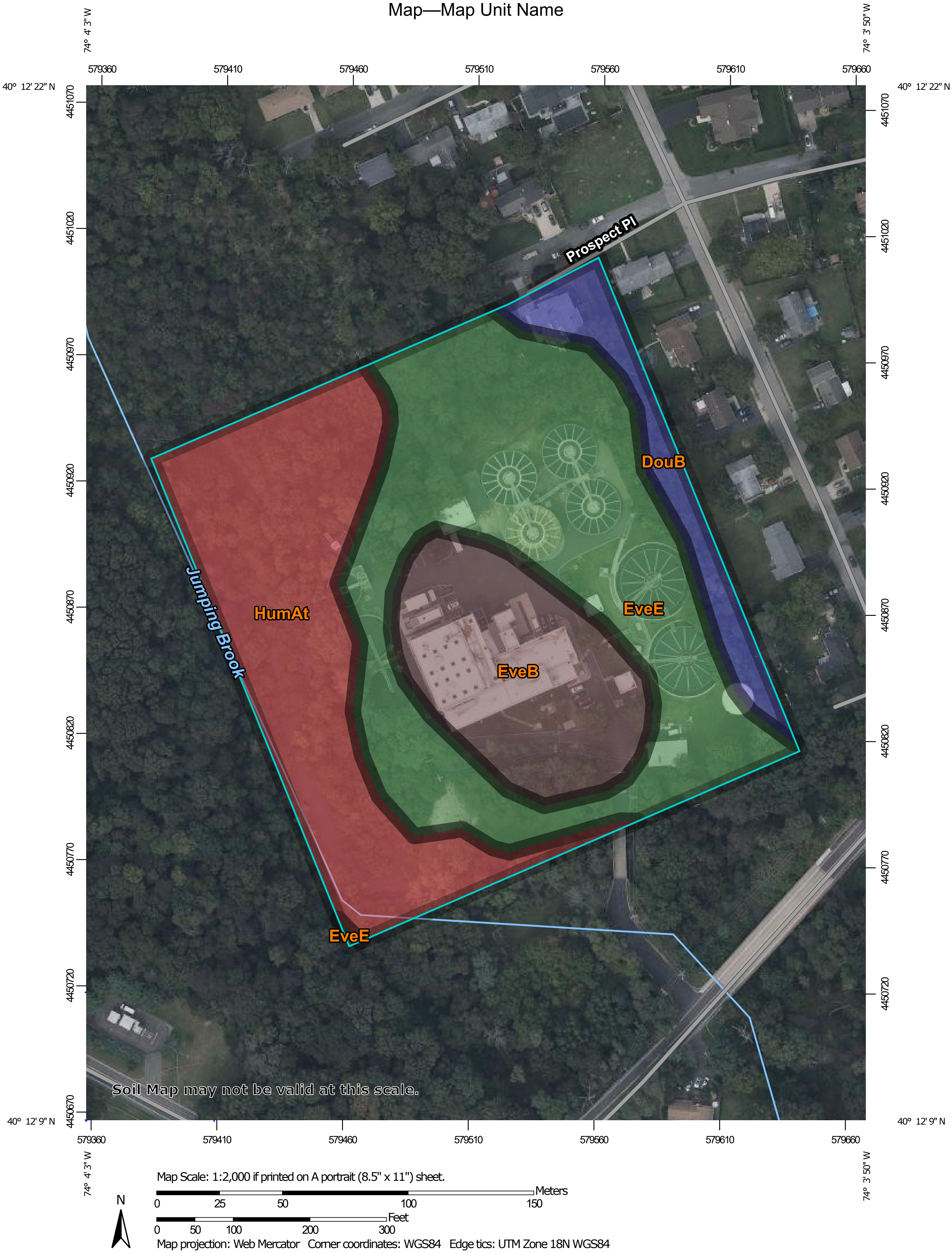
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Map Unit Name

A soil map unit is a collection of soil areas or nonsoil areas (miscellaneous areas) delineated in a soil survey. Each map unit is given a name that uniquely identifies the unit in a particular soil survey area.

Map—Map Unit Name



Map Scale: 1:2,000 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Downer-Urban land complex, 0 to 5 percent slopes
- Evesboro sand, 0 to 5 percent slopes
- Evesboro sand, 15 to 25 percent slopes
- Humaquepts, 0 to 3 percent slopes, frequently flooded
- Not rated or not available

Soil Rating Lines

- Downer-Urban land complex, 0 to 5 percent slopes
- Evesboro sand, 0 to 5 percent slopes
- Evesboro sand, 15 to 25 percent slopes
- Humaquepts, 0 to 3 percent slopes, frequently flooded
- Not rated or not available

Soil Rating Points

- Downer-Urban land complex, 0 to 5 percent slopes
- Evesboro sand, 0 to 5 percent slopes
- Evesboro sand, 15 to 25 percent slopes
- Humaquepts, 0 to 3 percent slopes, frequently flooded
- Not rated or not available

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 1:24,000.

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

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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.

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Soil Survey Area: Monmouth County, New Jersey
Survey Area Data: Version 15, Aug 31, 2021

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

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Table—Map Unit Name

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DouB	Downer-Urban land complex, 0 to 5 percent slopes	Downer-Urban land complex, 0 to 5 percent slopes	0.8	7.7%
EveB	Evesboro sand, 0 to 5 percent slopes	Evesboro sand, 0 to 5 percent slopes	1.9	18.4%
EveE	Evesboro sand, 15 to 25 percent slopes	Evesboro sand, 15 to 25 percent slopes	4.4	43.4%
HumAt	Humaquepts, 0 to 3 percent slopes, frequently flooded	Humaquepts, 0 to 3 percent slopes, frequently flooded	3.1	30.4%
Totals for Area of Interest			**10.1**	**100.0%**

Rating Options—Map Unit Name

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

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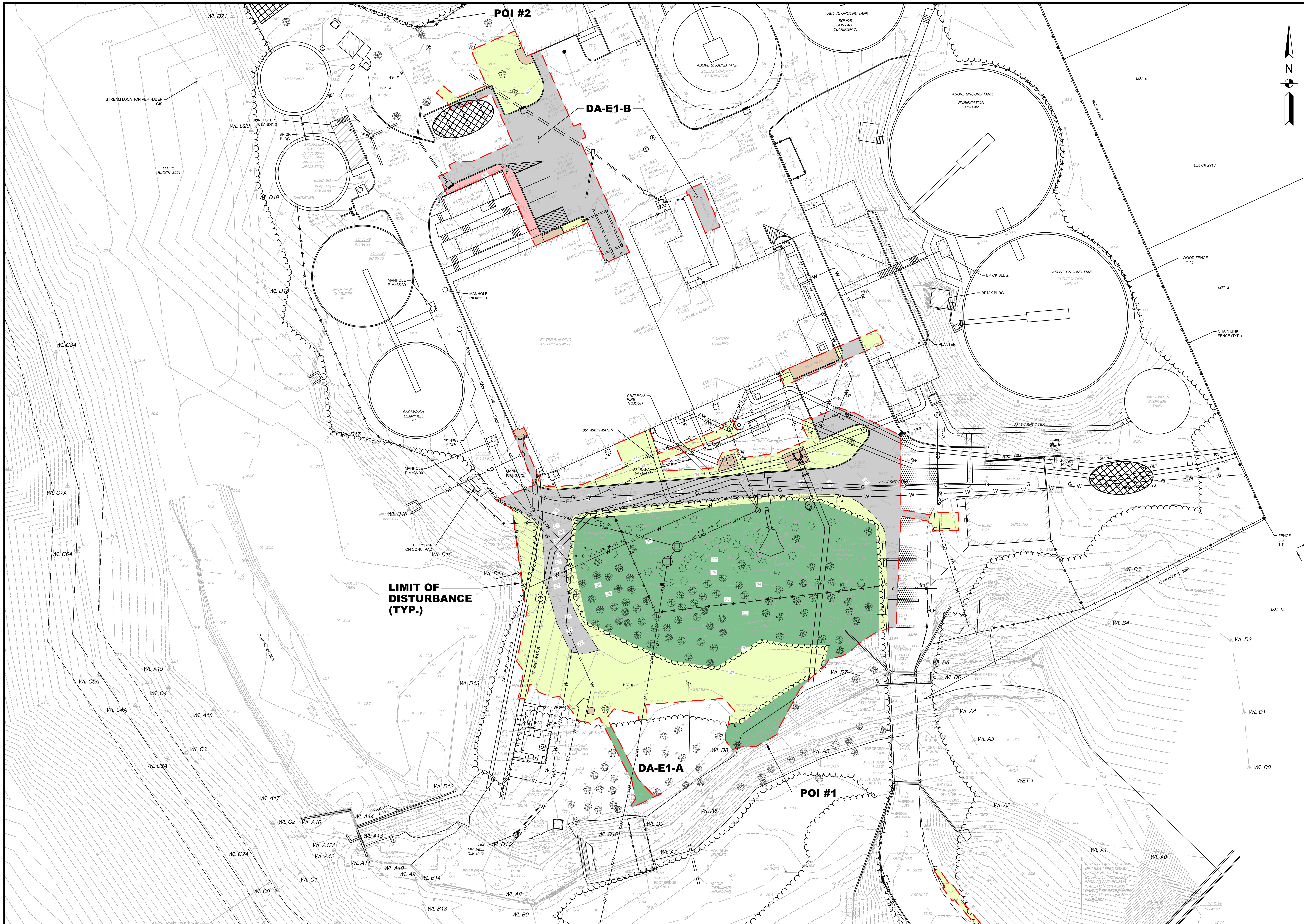
DRAINAGE AREA MAPS



DRAINAGE AREA TABLE

DA-E1-A (36,197 SF / 0.831 AC)

	AREA NAME	AREA (SF)	AREA (AC)
	PERVIOUS AREA	12,114	0.278
	WOODS	16,372	0.376
	REGULATED MOTOR VEHICLE SURFACE	7,174	0.165
	MISCELLANEOUS IMPERVIOUS AREA	537	0.012
	EXISTING PAVEMENT MILL/OVERLAY AREA (NO DISTURBANCE)		
	TOTAL	36,197	0.831

DA-E1-B (6,853 SF / 0.157 AC)

	AREA NAME	AREA (SF)	AREA (AC)
	PERVIOUS AREA	1,409	0.032
	WOODS	0	0.000
	REGULATED MOTOR VEHICLE SURFACE	4,867	0.112
	MISCELLANEOUS IMPERVIOUS AREA	151	0.003
	GRAVEL	426	0.010
	TOTAL	6,853	0.157

DA-E1 (43,050 SF / 0.988 AC)

	AREA NAME	AREA (SF)	AREA (AC)
	PERVIOUS AREA	13,523	0.310
	WOODS	16,372	0.376
	REGULATED MOTOR VEHICLE SURFACE	12,041	0.276
	MISCELLANEOUS IMPERVIOUS AREA	688	0.016
	GRAVEL	426	0.010
	EXISTING PAVEMENT MILL/OVERLAY AREA (NO DISTURBANCE)		
	TOTAL	43,050	0.988

0 30' 60'
SCALE: 1"=30'

Jacobs
JACOBS ENGINEERING GROUP INC.
412 MOUNT KEMBLE AVE.
MORRISTOWN, NJ 07960
NJDCA 246A27990200

REVISIONS

REVISIONS

NORTHEAST REMSCO Construction

JOSEPH N. BONGIOVANNI

NJ LICENSED PROFESSIONAL ENGINEER 24GE04377400

AMERICAN WATER ENGINEERING
1 WATER STREET
CAMDEN, NJ 08102

NEW JERSEY AMERICAN WATER

DRAWN BY
PROJECT ENG'R

DATE 10/24/22

PROJECT E6X98900

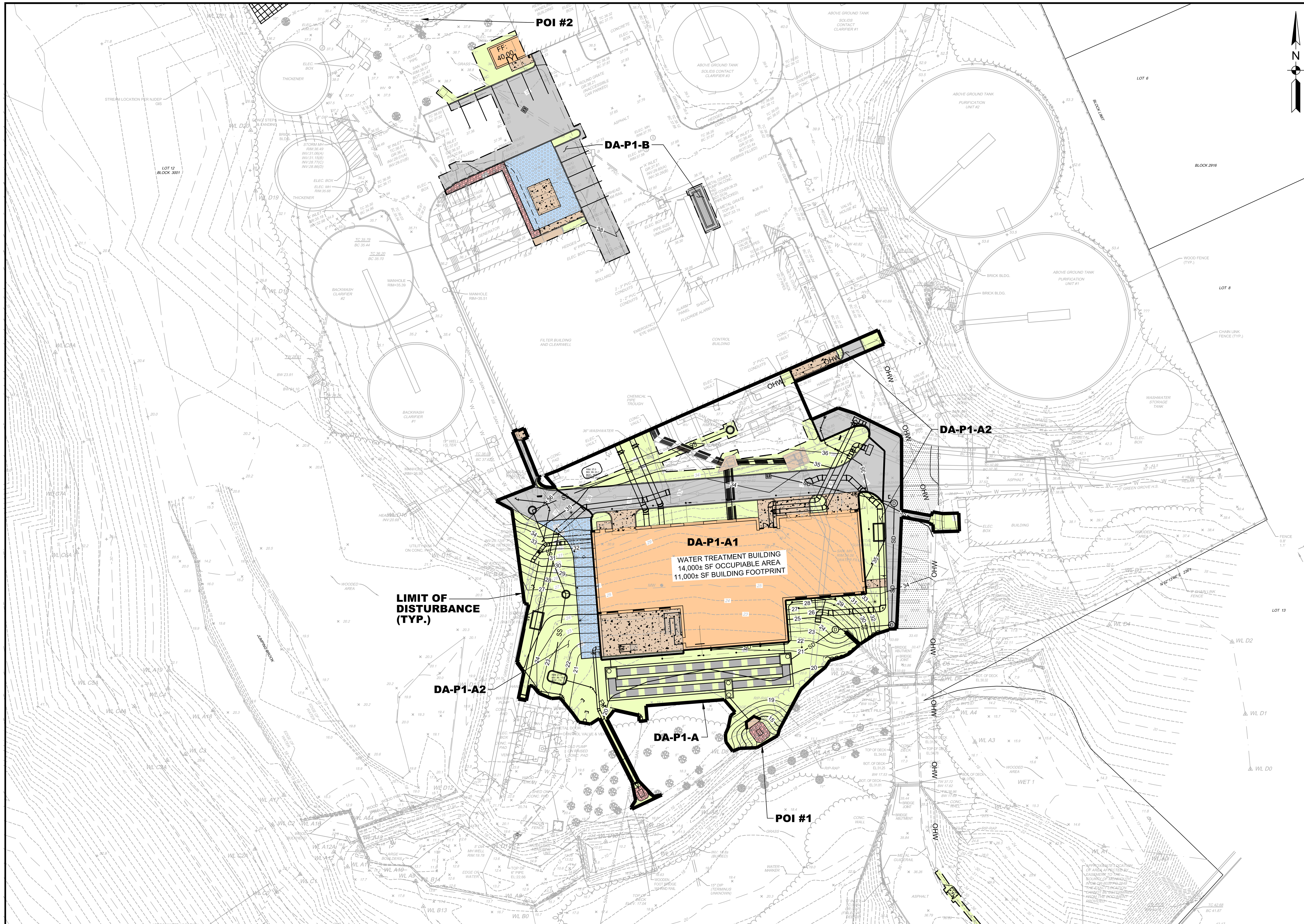
CLEARWELL / HIGH SERVICE PUMP STATION ADDITION AND CHLORINE CONVERSION
CIVIL
EXISTING DRAINAGE AREA MAP

NEW JERSEY AMERICAN WATER

USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES

USE DIMENSIONS ONLY
SCALE 1"=30'

CG103



DRAINAGE AREA TABLE

DA-P1-A (36,197 SF / 0.831 AC)

	AREA NAME	AREA (SF)	AREA (AC)
	PERVIOUS AREA	16,171	0.371
	REGULATED MOTOR VEHICLE SURFACE	5,888	0.135
	MISCELLANEOUS IMPERVIOUS AREA	2,777	0.064
	PROPOSED BUILDING AREA	10,016	0.230
	VEGETATED PERMEABLE GRASS PAVER AREA	1,184	0.027
	GRAVEL	161	0.004
	EXISTING PAVEMENT MILL/OVERLAY AREA (NO DISTURBANCE)		
	TOTAL	36,197	0.831

DA-P1-B (6,853 SF / 0.157 AC)

	AREA NAME	AREA (SF)	AREA (AC)
	PERVIOUS AREA	636	0.015
	REGULATED MOTOR VEHICLE SURFACE	3,905	0.090
	MISCELLANEOUS IMPERVIOUS AREA	542	0.012
	PROPOSED BUILDING AREA	277	0.006
	VEGETATED PERMEABLE GRASS PAVER AREA	1,180	0.027
	GRAVEL	313	0.007
	TOTAL	6,853	0.157

DA-P1 (42,050 SF / 0.988 AC)

	AREA NAME	AREA (SF)	AREA (AC)
	PERVIOUS AREA	16,807	0.386
	REGULATED MOTOR VEHICLE SURFACE	9,793	0.225
	MISCELLANEOUS IMPERVIOUS AREA	3,319	0.076
	PROPOSED BUILDING AREA	10,293	0.236
	VEGETATED PERMEABLE GRASS PAVER AREA	2,364	0.054
	GRAVEL	474	0.011
	EXISTING PAVEMENT MILL/OVERLAY AREA (NO DISTURBANCE)		
	TOTAL	43,050	0.988

0 30' 60'
SCALE: 1"=30'

Jacobs
JACOBS ENGINEERING GROUP INC.
412 MOUNT KEMBLE AVE.
MORRISTOWN, NJ 07960
NJDCA 246A27990200

REVISIONS

REVISIONS

NORTHEAST REMSCO Construction

JOSEPH N. BONGIOVANNI
NJ LICENSED PROFESSIONAL ENGINEER
24GE04377400

AMERICAN WATER ENGINEERING
1 WATER STREET
CAMDEN, NJ 08102

NEW JERSEY AMERICAN WATER

DRAWN BY
PROJECT ENG'R

DATE 10/24/22

PROJECT E6X98900

CLEARWELL / HIGH SERVICE PUMP STATION ADDITION AND CHLORINE CONVERSION CIVIL PROPOSED DRAINAGE AREA MAP

NEW JERSEY AMERICAN WATER

USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES

USE DIMENSIONS ONLY
SCALE 1"=30'

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