Glade Spring Crossing Subdivision Rezoning Submission

Floodplain Calculations

Located off Glade Road and East of Shadow Lake Road
1000 Glade Road
Town of Blacksburg, Virginia

Date: April 28, 2023

Owner:
Glade Spring Crossing, LLC
707 South Main Street
Blacksburg, VA 24060

Submitted on behalf of Owner by the Applicant:
Eden & Associates, P.C.
1700 Kraft Dr. Suite 2350
Blacksburg, VA 24060
Phone: (540) 797-1250

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Introduction and Summary

This 45-acre tract of land encompasses two streams feeding Shadow Lakes Tributary, ultimately reaching Tom's Creek at approximate cross section T as shown on FEMA Flood Insurance Rate Map (FIRM) 51121C0127C and 51121C0131C. While this area is shown on the FEMA FIRMs, the area is not evaluated for the 100-year storm event. Shading shown is for "other flood areas", representing the 500-year floodplain. The area is reported as Zone X. In review of the published flood insurance study (51121CV0000B), revised January 6, 2012, Table 2 does not depict any summary of discharges along Shadow Lakes Tributary. In a similar manner, Table 4 does not depict any flow way data for Shadow Lakes Tributary.

For the purposes of this development, Glade Spring Crossing, the flood study begins at the convergence point of two smaller tributaries, labeled as Stream A and Stream B during the evaluation for Waters of the U.S., performed by ECS, with report prepared March 7, 2022. These streams convey approximately 57 acres and 92 acres of drainage respectively. The point of convergence of these smaller tributaries, about halfway through the site, marks the beginning of the studied unnamed tributary feeding Shadow Lakes tributary. From this point, Stream B conveys approximately 149 acres of drainage area. In accordance with Division 24 of the Zoning Ordinance: FHO Floodplain Overlay District, a 100-year floodplain boundary with elevations was delineated, using HEC-RAS, for the pre-development condition and the post development condition. Per Blacksburg Zoning Ordinance Article III, Division 24, Section 3247 (f), the development may not result in any increase in the 100-year flood elevations from pre to post conditions. This study was prepared to establish a delineated area subject to inundation by the 100-year flood in accordance with Town of Blacksburg Code Section 3243 (b) and to demonstrate that the proposed development does not cause any rise from the pre-developed condition.

As this area is studied, the Town of Blacksburg Official Creek Valley Overlay (CVO) limits have also been evaluated based on criteria described in Division 23. The proposed Creek Valley Overlay limits have been established based on the criteria described in Section 3231, specifically to include: 100-year floodplain limits, all areas of 25% or greater slopes adjacent to the floodplain, all wetlands contiguous to the above-described areas, and a 50' boundary limit from the center of the creek / stream. The official map may be amended. Site specific boundaries may be delineated by an applicant through a certified survey of the property. A preliminary delineation is shown within this document.

Existing Site Conditions

As indicated the existing watercourse drains approximately 149 acres, with most of that acreage being located on the eastern side of 460. Much of the watercourse's flow must pass through existing culverts under 460 before the flow makes its way to the site. Once at the site, the existing watercourse drains through the property and offsite to an existing "farm pond" on 1201 Lakewood Drive. Due to years of upstream development, portions of this watercourse have become eroded with gullies. Furthermore, the amount of offsite drainage through the watercourse is limited by a 48-inch concrete pipe to the north of the site, and a 36-inch corrugated metal pipe at the south of the site which convey offsite flow under 460. The upstream drainage areas experience some detention with raised headwaters for runoff to pass these storm pipes. The evaluation shows no overtopping 460 at these locations.

The Autodesk Hydraflow Hydrographs software was used to determine the peak 100-year storm that is generated from combined the 149-acre drainage area. Several subareas were analyzed and the flows combined. Hydraflow was used to generate the hydrographs from upstream drainage areas that were then routed to the point of convergence to give a realistic representation of the 100-year peak at the convergence. The culverts draining under 460 are providing some amount of detention as the flow is constricted on the high side by inlet control limiting factors. Information regarding the size, slopes,

and inverts of the 460 culverts were obtained from VDOT construction drawings and verified by field survey. It was determined that for the 100-year storm pre-developed condition, a combined 210.68 cfs is draining at the point of convergence. The flow rate is then combined with on-site 100-year flow data entering downstream of the convergence and entered into the HEC-RAS routing program to delineate the existing 100-year floodplain boundaries. A summary of flows is shown in this report along with the referenced Hydrograph to provide supporting calculations.

Proposed Development

Glade Spring Crossing Subdivision will be accessed with a connection at Glade Road, travel through the site, and connect to Village Way South. The proposed road crosses Stream A and Stream B independently and is upstream of the point of convergence. Wetlands were delineated and shown in a report prepared by ECS dated March 7, 2022. The summary portion of the report is included in an Appendix. The ECS report was submitted to the US Army Corps of Engineers (ACOE), using the new "SPGP Preliminary Screening Process" in July 2022; however, no information or determination has been received. While this project proposes drainage structures within the identified streams, any drainage structure is upstream of the point of convergence and is located in areas where streams are identified as R6 and R4, both considered to be intermittent streams.

Similar to the pre-development approach, flow rates for the development of the site were determined using Hydraflow Hydrographs. The proposed development adds impervious area draining to the point of convergence; however, the development also proposes two large detention ponds upstream of the point of convergence to greatly reduce the flow rate. As shown in the flow rate chart, the pre-developed flow is shown as 268.04 cfs at the point of convergence; the post developed flow is shown as 191.42 cfs at the point of convergence due to the planned detention ponds. The summary of flows depict a reduced flow rate at each cross section of the flood study. The reduced flow contributes to the flood elevation reduction for the post developed condition.

The subdivision includes the establishment of two (2) detention ponds and one (1) wet pond to address stormwater management for quantity and quality purposes. Each pond is located upland of the delineated floodplain. By separate cover, the stormwater report has been submitted for review.

Methodology for Calculations

Methodology: The analysis starts with a breakdown of both offsite and onsite drainage areas with weighted curve numbers and time of concentrations calculated from Civil 3D, Google Earth, and field observation. Curve numbers for given ground covers are defined by SCS and TR-55 methods while time of concentrations (Tc) are calculated from sheet flow, shallow concentrated flow, and channel flow times. Supporting documentation is provided in Appendix D.

Drainage area weighted curve numbers and total time of concentrations are used in tandem with local rainfall data in Autodesk Hydraflow to calculate the hydrographs for each drainage area. Several of these hydrographs are combined to represent the flow entering tributaries onsite at given cross-sections. A summary of flows is provided for the pre-developed and post-developed conditions. Supporting Hydrographs are depicted in Appendix C.

Field survey and inspection were used to model channels, piping, junctions, and storage for the upstream reaches. Offsite drainage area hydrographs from Hydraflow are combined with onsite hydrographs, in both predevelopment and post development conditions, and routed to the point of convergence, giving us the necessary flows for our model.

The peak 100-year flow from the combined confluence point hydrograph is entered in to HEC-RAS at cross section SL-12 shown in the chart following. Onsite hydrographs coming from the drainage report, reach cross-sections, and channel geometry are also utilized to model the 100-year floodplain on the site. Floodplain elevations are summarized by cross-section in tabular form and shown in floodplain maps.

To be consistent with Federal Emergency Management Agency (FEMA) reporting method in Flood Insurance Study Number 51121CV000B, flood elevations are reported to one-tenth of a foot (0.1'), as utilized in Table 4 of the study. Reporting to one-tenth of a foot is recommended due to the analysis being based on a 2-foot contour interval, limitations to gathered elevations where minor discrepancies may exist between gathered elevations, and fluctuations in floodwater flow. The HEC-RAS analysis is based on a steady flow simulation, recommended by the program guidance. Where flows are introduced between cross sections, the additional flow is introduced at the immediate upstream cross section to provide a conservative engineering approach.

Recurrence Intervals: The term "100-Year Storm" is equivalent to a 1-percent annual chance of flow rates and flood water reaching reported values, consistent with the engineering methods described in Study Number 51121CV000B. The limits of study for the 100-year floodplain are beyond the studied limits of Toms Creek by FEMA. This study does not reach the studied limits performed by FEMA or depicted on the Flood Insurance Rate Map (FIRM). Nothing in this report contradicts the reported study for the 500-year floodplain as described as "other flood areas".

Vertical Datum: The reported elevations are based on NAVD 88 datum as established by the direct and responsible charge of Ralph o. Clements, L.S. from an actual ground survey and from photogrammetric mapping prepared under the direct and responsible charge of Joseph M. Kovach, Surveyor Photogrammetrist. The imagery was obtained on 2/9/2022 and the original field data was obtained April and May 2022. The ground surface was produced to meet 0.30 foot vertical accuracy in clear, unobscured areas.

Intent of Use: This study is prepared to establish a delineated area subject to inundation by the 100-year flood in accordance with Town of Blacksburg Code Section 3243 (b). This study is also prepared to demonstrate that the proposed development, with any encroachment of the studied stream would not result in any increase in the 100-year flood elevation in accordance with Town of Blacksburg Code Section 3247 (f). Nothing in this report expresses a use beyond the intended use of Study Number 51121CV000B, specifically referenced in Section 4.0 Floodplain Management Applications and the intended use to indicate areas of flood risk.

Results and Conclusions

As shown in the HEC-RAS routing results, there is no reportable increase to the 100-year flood elevations. The proposed development achieves the requirement established by the Town of Blacksburg Section 3247 (f) to demonstrate the planned development would not result in any increase in the 100-year flood elevation in accordance with standard engineering practice. The results of the HEC-RAS model for the floodplain elevations as well as output for the Hydraflow and Autodesk programs are detailed in the tables and cross sections included in this report.

In this instance, upland detention is the key factor toward keeping post developed floodplain elevations below the pre-developed elevations and allowing for development downstream of the detention and water quality ponds. No drainage structures are proposed within the evaluation area, downstream of the point of convergency.

Documentation of analyzed flows:

The chart below summarizes the flow rate for the 100-year storm event of each tributary and where site flow is introduced in the analysis. A complete chart is provided in the appendix.

100-YEAR FLOW RATES FOR ANALYSIS							
Cross Section	Stream Station	Pre Developed FLOW	Pre-Dev ADDED FLOW	Pre-Dev Notes	Post Developed FLOW	Post Dev ADDED FLOW	Post-Dev Notes
Unnamed Toms Creek Tributary/Glade Spring Crossing Stream B Reach							
SL-1	2+00.00	335.07			296.70		
SL-2	3+00.00	335.07	3.77	Village Ph1 Pond 1 Out (Floodplain Hydrograph No. 25)	296.70	3.77	Village Ph1 Pond 1 Out (Floodplain Hydrograph No. 25)
SL-3	5+00.00	331.30			292.93		
SL-4	6+00.00	331.30	20.62	DA 3 Pre (Floodplain Hydrograph No. 62)	292.93	18.05	DA 3 POST (Floodplain Hydrograph No. 67)
SL-5	7+00.00	310.68			274.88		
SL-6	8+00.00	310.68	14.13	DA 2 Pre (Floodplain Hydrograph No. 61)	274.88	70.72	DA 2 POST (Floodplain Hydrograph No. 66)
SL-7	9+00.00	296.55			204.16		
SL-8	10+00.00	296.55			204.16		
SL-9	11+00.00	296.55	28.51	DA 1 PRE (Floodplain Hydrograph No. 60)	204.16	12.74	DA 1 POST (Floodplain Hydrograph No. 65)
SL-10	11+90.35	268.04		PRE COMBINED AT CONFLUENCE (Floodplain Hydrograph No. 30)	191.42		POST ROUTED POND TOTALS + DA 0 POST (Floodplain Hydrograph Nos. 56 & 64)

Please note the reduction in post-developed flow rates beginning at SL-10 due to planned upland detention which reduces the peak flow in the post developed condition.

100 Year Floodplain Elevations:

The 100-year floodplain elevations associated with the development of Glade Spring Crossing are shown below. As previously mentioned, the report shows no reportable elevation increase. All elevations are based on NAVD 88 datum.

Glade Spring Crossing 100 Year Elevations							
		Pre Developed FLOW	Pre-Developed WSE	Post Developed FLOW	Post-Developed WSE	100-YR ELEVATION RISE	
Cross Section	Stream Station		100 Yr Elevation		100 Yr Elevation		Notes
Unnamed Toms Creek Tributary/Glade Spring Crossing Stream B Reach							
SL-1	2+00.00	335.07	1996.0	296.70	1996.0	0.0	
SL-2	3+00.00	335.07	1996.8	296.70	1996.7	-0.1	
SL-3	5+00.00	331.30	1998.7	292.93	1998.6	-0.1	
SL-4	6+00.00	331.30	1999.6	292.93	1999.5	-0.1	
SL-5	7+00.00	310.68	2000.8	274.88	2000.7	-0.1	
SL-6	8+00.00	310.68	2001.9	274.88	2001.8	-0.1	
SL-7	9+00.00	296.55	2003.0	204.16	2002.7	-0.3	
SL-8	10+00.00	296.55	2006.0	204.16	2005.9	-0.1	
SL-9	11+00.00	296.55	2007.9	204.16	2007.7	-0.2	
SL-10	11+90.35	268.04	2009.9	191.42	2009.6	-0.3	

APPENDIX

SECTION A: FEMA Mapping

National Flood Hazard Layer FIRMette

FEMA

80°26'40"W 37°14'34"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

10

80°26'2"W 37°14'6"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/9/2022 at 8:57 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 17. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

BASE MAP SOURCE: Base map files were provided in digital format by the Commonwealth of Virginia and Montgomery County to include the Towns of Christiansburg and Blacksburg. Political boundary and road data are from the Montgomery County Planning and GIS Services and the Towns of Christiansburg and Blacksburg. Adjustments may have been made to some base map features to align with the 1:200 and 1:400 scale VBMP orthophotography (2002-2003).

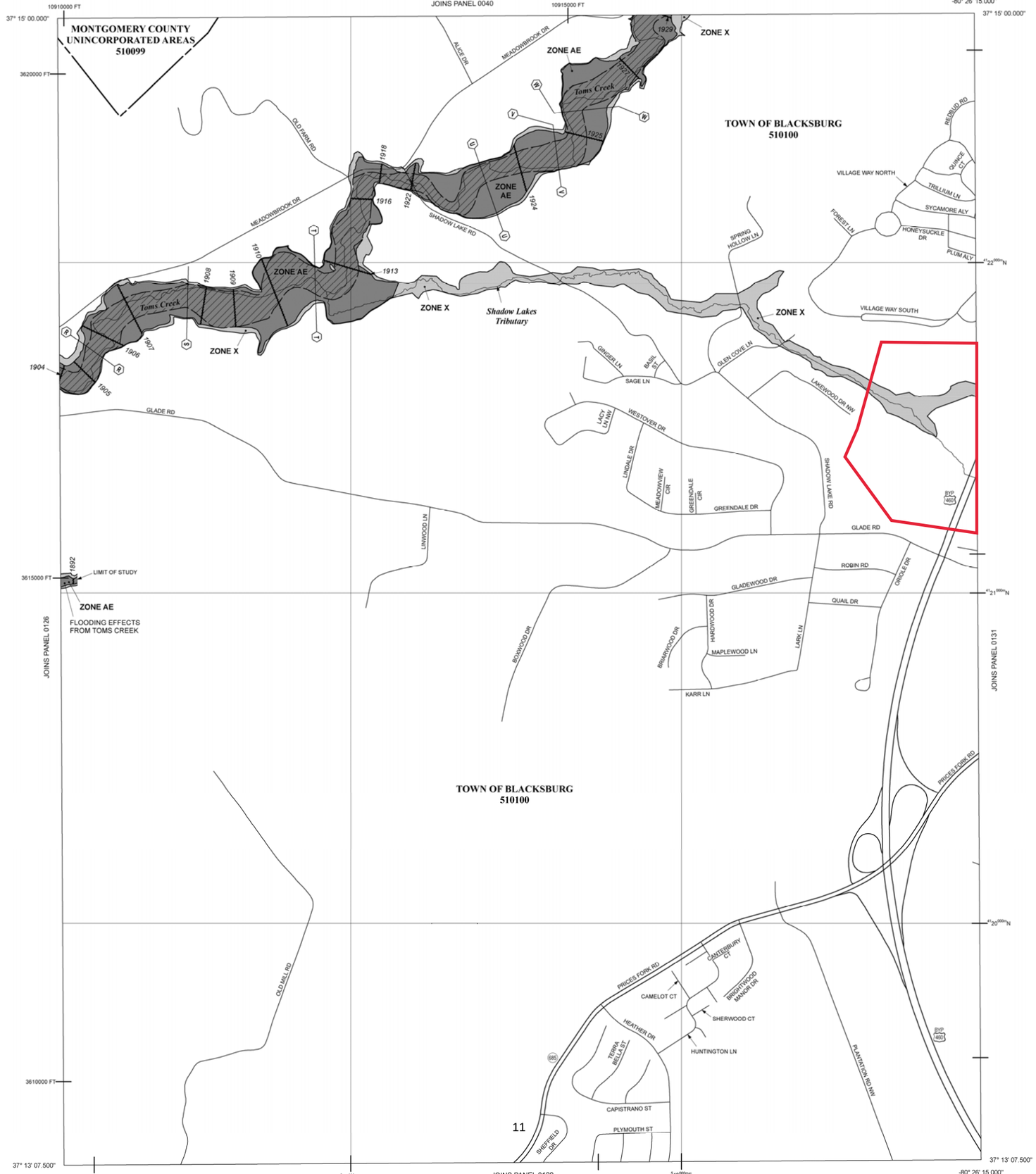
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data)may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and /or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

	Bridge
	Footbridge
	Culvert
A A	Cross section line
23 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000 M	1000-meter Universal Transverse Mercator grid values, zone 17
600000 FT	5000-foot grid ticks: Virginia State Plane coordinate system (FIPSZONE 4502), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP

SEPTEMBER 25, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

PANEL 0127C

FIRM
FLOOD INSURANCE RATE MAP

MONTGOMERY COUNTY, VIRGINIA
AND INCORPORATED AREAS

PANEL 127 OF 345
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLACKSBURG, TOWN OF	510100	0127	C
MONTGOMERY COUNTY	510099	0127	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
51121C0127C
EFFECTIVE DATE

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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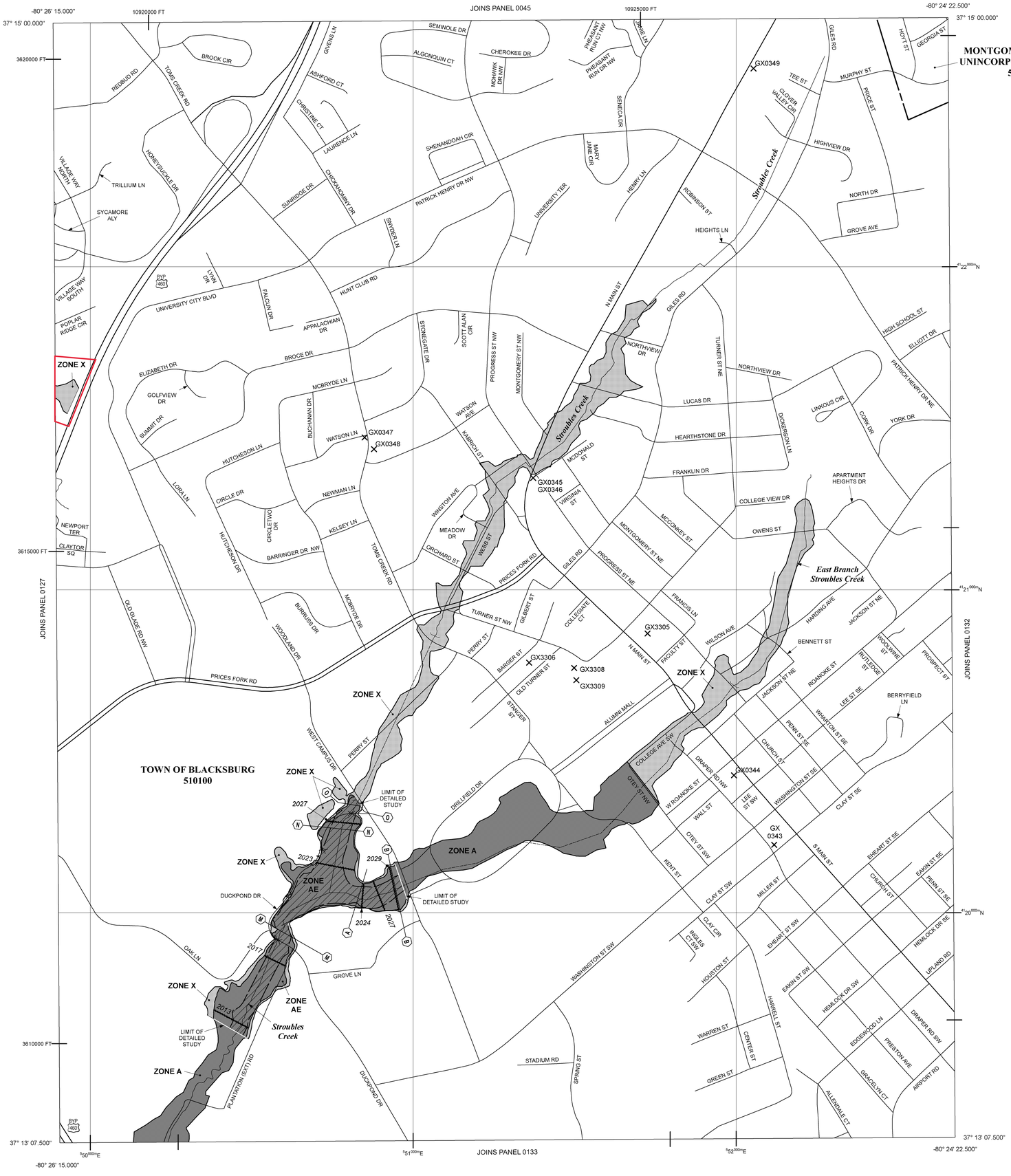

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

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ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL. 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

	Bridge
	Footbridge
	Culvert
A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276 000 M	1000-meter Universal Transverse Mercator grid values, zone 17
600000 FT	5000-foot grid ticks: Virginia State Plane coordinate system (FIPSZONE 4502), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

SEPTEMBER 25, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0131C

FIRM
FLOOD INSURANCE RATE MAP

MONTGOMERY COUNTY, VIRGINIA
AND INCORPORATED AREAS

PANEL 131 OF 345

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BLACKSBURG, TOWN OF	510100	0131	C
MONTGOMERY COUNTY	510099	0131	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
51121C0131C

EFFECTIVE DATE
SEPTEMBER 25, 2009

Federal Emergency Management Agency

SECTION B: Site Mapping

SECTION B: Site Mapping

B1. Floodplain and Creek Valley Overlay Results

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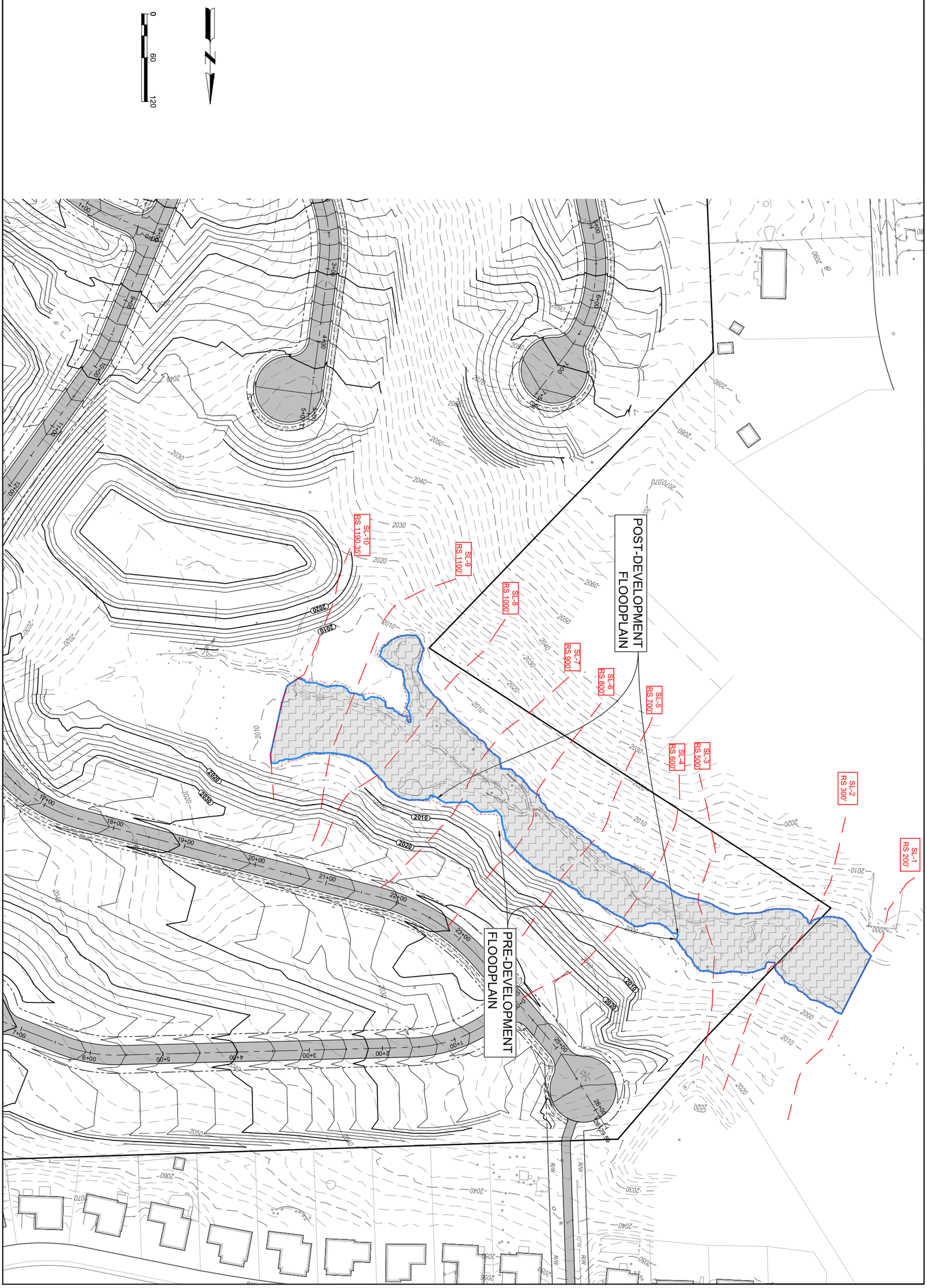

Sheet No. 1 of 1	Checked By: ---	Drawn By: MSF	PROPOSED DEVELOPMENT OF **GLADE SPRING CROSSING** PROPERTY OF GLADE HGTS, LLC - TAX PARCELS 225-(A)-3, 225-(A)-4, & 224-(A)-57; 45.0976 AC. TOWN OF BLACKSBURG - PRICES FORK DISTRICT MONTGOMERY COUNTY, VIRGINIA	**FLOODPLAIN EXHIBIT**	EDEN & ASSOCIATES engineering • planning • development 1700 KRAFT DRIVE, SUITE 2350 BLACKSBURG, VIRGINIA 24060 VOICE 276-632-6231 FAX. 276-632-3648
2	Date: 04/28/2023	Scale: AS SHOWN		COMMONWEALTH OF VIRGINIA PAUL BROWN Lic. No. 036148 PROFESSIONAL ENGINEER 04/28/2023	No. Revision Issue Date

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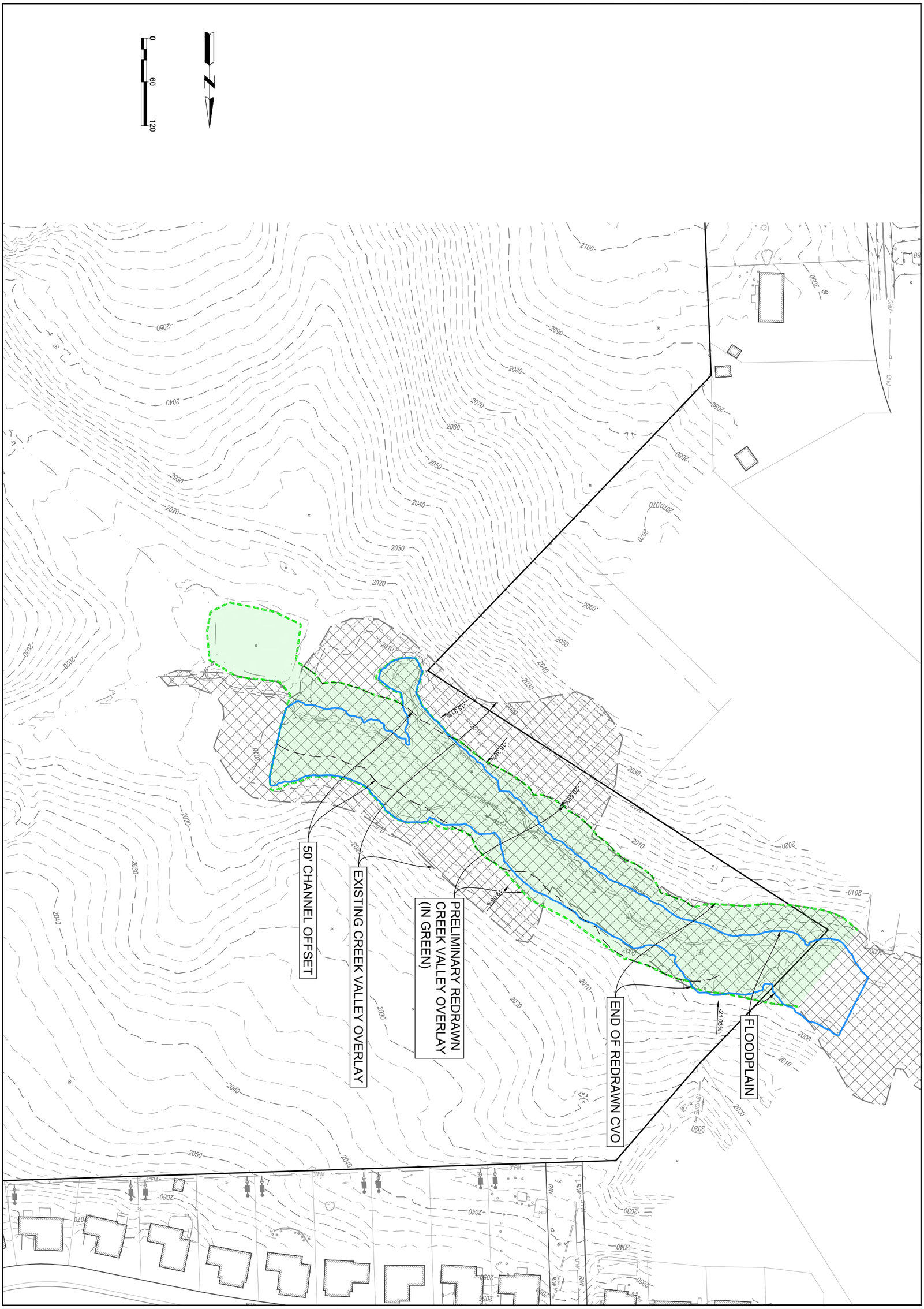

Sheet No.	1 of 1
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Drawn By:	MSF
Date:	04/28/2023
Scale:	AS SHOWN

PROPOSED DEVELOPMENT OF

GLADE SPRING CROSSING

PROPERTY OF GLADE HGTS, LLC - TAX PARCELS
225-(A)-3, 225-(A)-4, & 224-(A)-57; 45.0976 AC.

TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

PROPOSED CREEK VALLEY OVERLAY MODIFICATION EXHIBIT

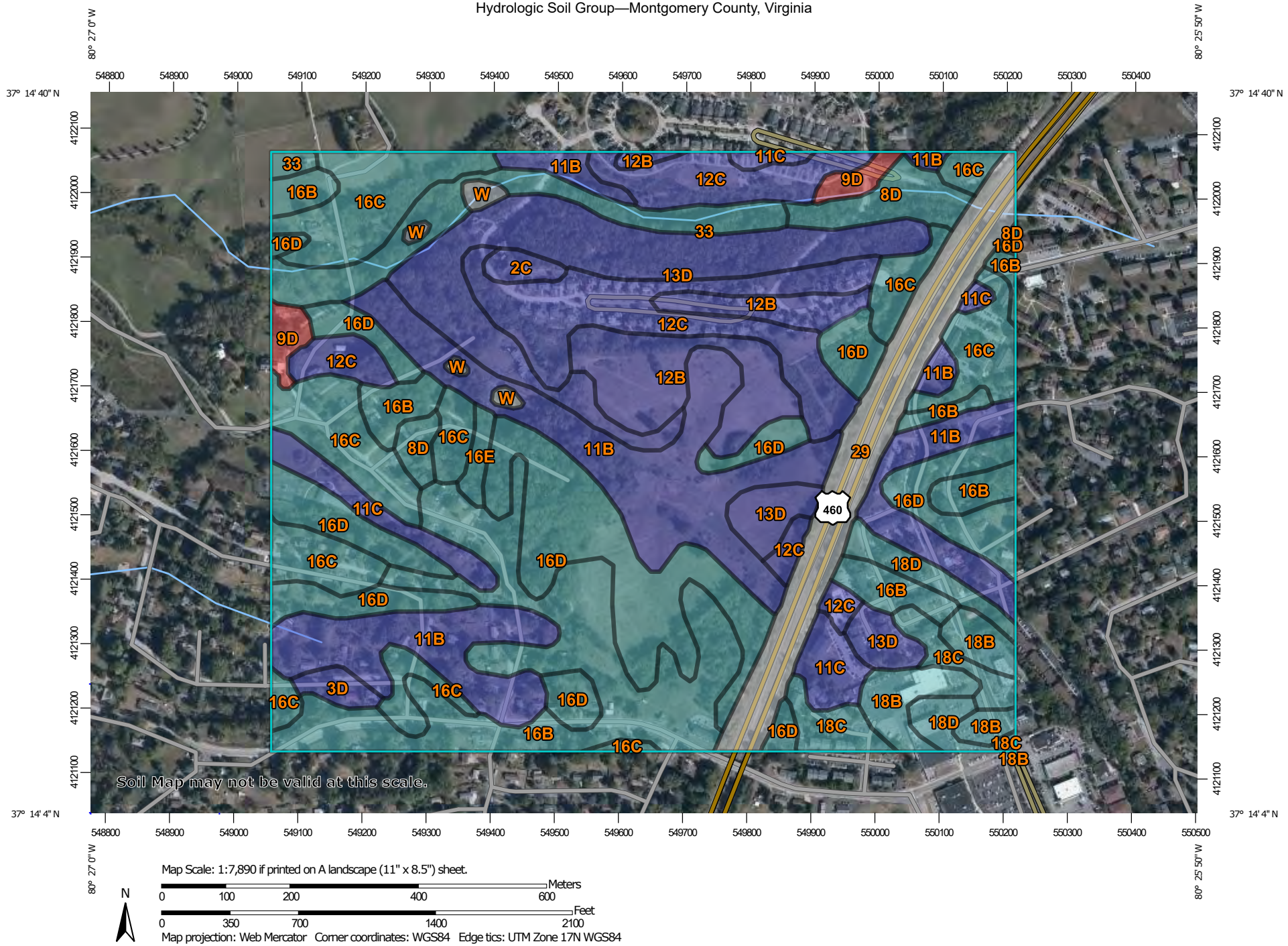
COMMONWEALTH OF VIRGINIA
PAUL BROWN
Lic. No. 036148
04/28/2023
PROFESSIONAL ENGINEER

No.	Revision Issue	Date

EDEN & ASSOCIATES
engineering • planning • development
1700 KRAFT DRIVE, SUITE 2350
BLACKSBURG, VIRGINIA 24060
VOICE 276-632-6231
FAX. 276-632-3648

SECTION B: Site Mapping

B2. Contributing Drainage Areas



Map Scale: 1:7,890 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N 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 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Montgomery County, Virginia
Survey Area Data: Version 13, Jun 5, 2020

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

Date(s) aerial images were photographed: Sep 29, 2019—Oct 4, 2019

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
2C	Berks-Groseclose complex, 7 to 15 percent slopes	B	1.3	0.5%
3D	Berks-Lowell-Rayne complex, 15 to 25 percent slopes	B	1.4	0.5%
8D	Caneyville-Opequon-Rock outcrop complex, 7 to 25 percent slopes	C	5.6	2.1%
9D	Carbo and Chilhowie soils, 15 to 25 percent slopes	D	2.6	1.0%
11B	Duffield-Ernest complex, 2 to 7 percent slopes	B	39.6	14.8%
11C	Duffield-Ernest complex, 7 to 15 percent slopes	B	7.4	2.8%
12B	Frederick and Vertrees silt loams, 2 to 7 percent slopes	B	13.1	4.9%
12C	Frederick and Vertrees silt loams, 7 to 15 percent slopes	B	25.3	9.4%
13D	Frederick and Vertrees gravelly silt loams, 15 to 25 percent slopes	B	25.0	9.3%
16B	Groseclose and Poplimento soils, 2 to 7 percent slopes	C	35.5	13.2%
16C	Groseclose and Poplimento soils, 7 to 15 percent slopes	C	30.3	11.3%
16D	Groseclose and Poplimento soils, 15 to 25 percent slopes	C	37.2	13.9%
16E	Groseclose and Poplimento soils, 25 to 60 percent slopes	C	1.2	0.4%
18B	Groseclose-Urban land complex, 2 to 7 percent slopes	C	6.3	2.4%
18C	Groseclose-Urban land complex, 7 to 15 percent slopes	C	4.8	1.8%
18D	Groseclose-Urban land complex, 15 to 25 percent slopes	C	4.3	1.6%

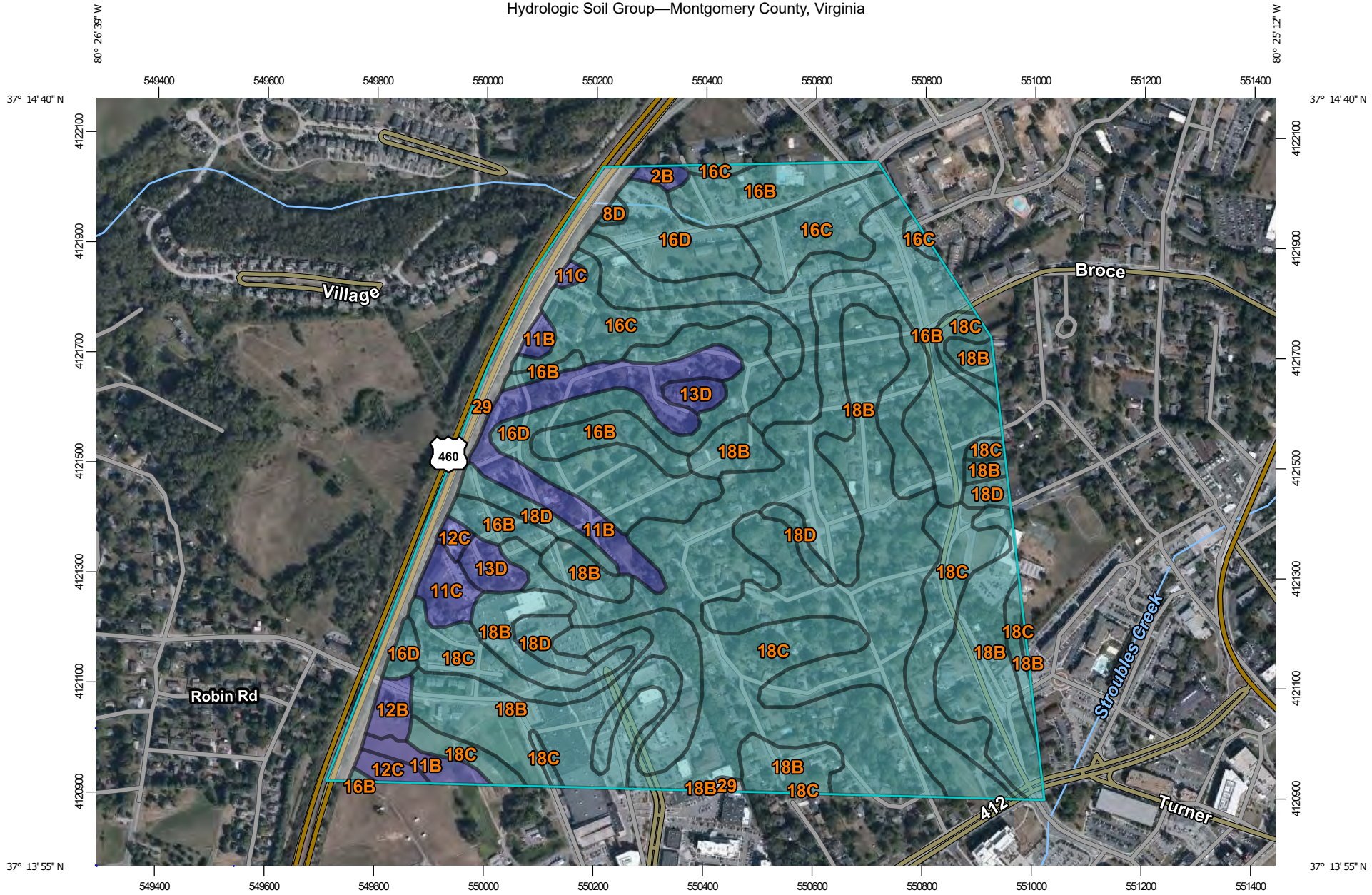
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
29	Udorthents and Urban land		16.2	6.1%
33	Weaver soils	C	9.6	3.6%
W	Water		1.3	0.5%
Totals for Area of Interest			**268.1**	**100.0%**

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher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80° 25' 12" W
37° 14' 40" N
37° 13' 55" N
549400
549600
549800
550000
550200
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550600
550800
551000
551200
551400
4122100
4121900
4121700
4121500
4121300
4121100
4120900
Village
Broce
Robin Rd
Stroubles Creek
Turner
460
412
2B
16C
16B
8D
16D
11C
11B
13D
29
12C
18B
18C
18D
12B
Map Scale: 1:9,840 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 100 200 400 600
Feet
0 450 900 1800 2700
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N 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 1:15,800.

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: Montgomery County, Virginia
Survey Area Data: Version 13, Jun 5, 2020

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

Date(s) aerial images were photographed: Sep 29, 2019—Oct 4, 2019

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
2B	Berks-Groseclose complex, 2 to 7 percent slopes	B	0.8	0.3%
8D	Caneyville-Opequon-Rock outcrop complex, 7 to 25 percent slopes	C	0.4	0.1%
11B	Duffield-Ernest complex, 2 to 7 percent slopes	B	15.1	5.4%
11C	Duffield-Ernest complex, 7 to 15 percent slopes	B	3.2	1.1%
12B	Frederick and Vertrees silt loams, 2 to 7 percent slopes	B	1.9	0.7%
12C	Frederick and Vertrees silt loams, 7 to 15 percent slopes	B	2.0	0.7%
13D	Frederick and Vertrees gravelly silt loams, 15 to 25 percent slopes	B	3.4	1.2%
16B	Groseclose and Poplimento soils, 2 to 7 percent slopes	C	36.4	13.0%
16C	Groseclose and Poplimento soils, 7 to 15 percent slopes	C	18.1	6.4%
16D	Groseclose and Poplimento soils, 15 to 25 percent slopes	C	25.9	9.2%
18B	Groseclose-Urban land complex, 2 to 7 percent slopes	C	79.7	28.4%
18C	Groseclose-Urban land complex, 7 to 15 percent slopes	C	75.6	26.9%
18D	Groseclose-Urban land complex, 15 to 25 percent slopes	C	7.1	2.5%
29	Udorthents and Urban land		11.1	3.9%
Totals for Area of Interest			**280.8**	**100.0%**

Description

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.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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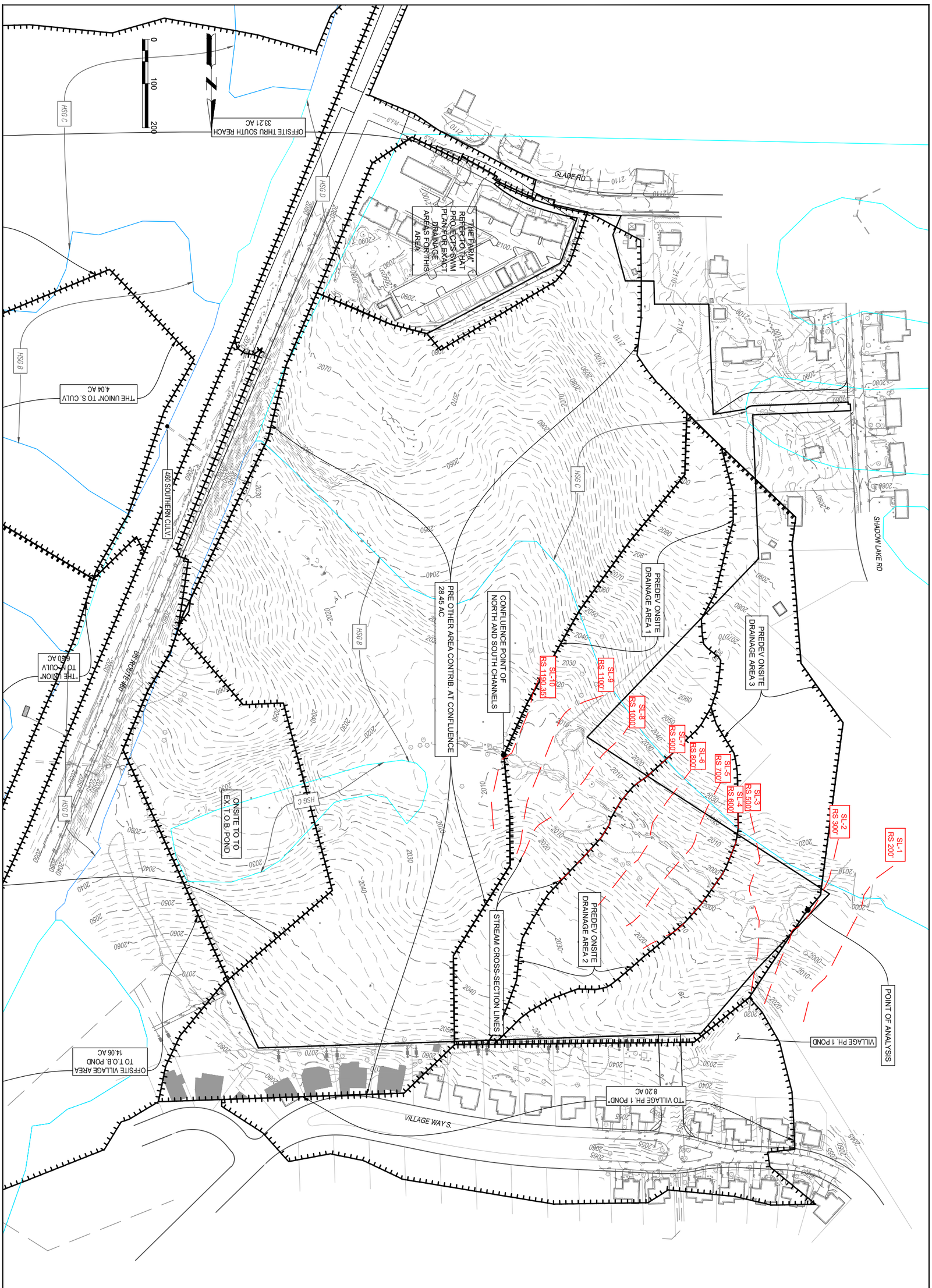

Sheet No. 1 of 1	Checked By: ---	Drawn By: MSF	PROPOSED DEVELOPMENT OF
D2	Date: 04/28/2023	Scale: AS SHOWN	GLADE SPRING CROSSING

PROPERTY OF GLADE HGTS, LLC - TAX PARCELS
225-(A)-3, 225-(A)-4, & 224-(A)-57; 45.0976 AC.

TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

PREDEVELOPMENT ONSITE DRAINAGE AREAS

COMMONWEALTH OF VIRGINIA
PAUL BROWN
Lic. No. 036148
04/28/2023
PROFESSIONAL ENGINEER

No.	Revision Issue	Date

EDEN & ASSOCIATES
engineering • planning • development
1700 KRAFT DRIVE, SUITE 2350
BLACKSBURG, VIRGINIA 24060
VOICE 276-632-6231
FAX. 276-632-3648

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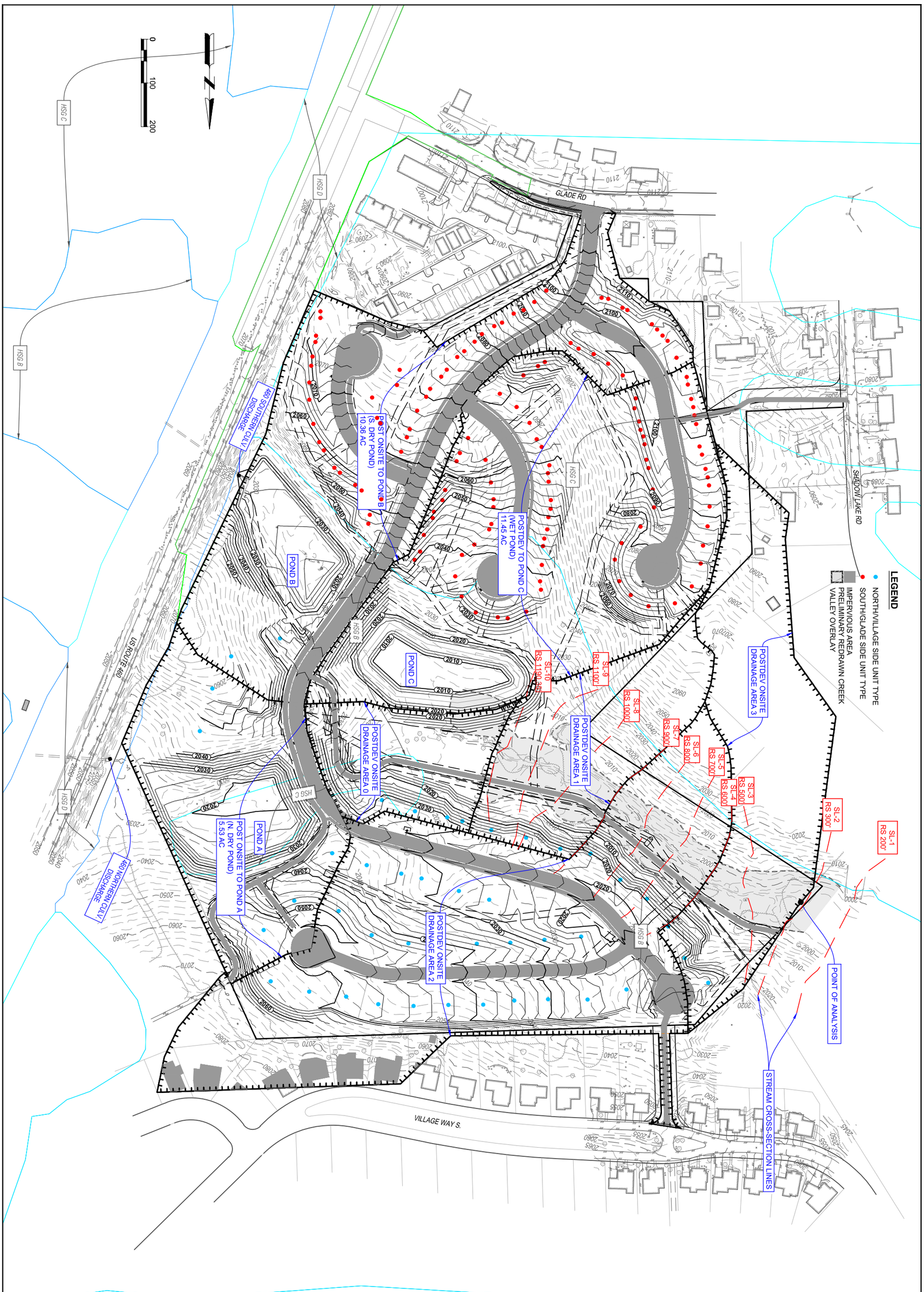


Sheet No. 1 of 1	Checked By: ---	Drawn By: MSF	PROPOSED DEVELOPMENT OF
D3	Date: 04/28/2023	Scale: AS SHOWN	GLADE SPRING CROSSING

PROPERTY OF GLADE HGTS, LLC - TAX PARCELS 225-(A)-3, 225-(A)-4, & 224-(A)-57; 45.0976 AC.

TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

POSTDEVELOPMENT ONSITE DRAINAGE AREAS

COMMONWEALTH OF VIRGINIA
PAUL BROWN
Lic. No. 036148
04/28/2023
PROFESSIONAL ENGINEER

No.	Revision/ Issue	Date

EDEN & ASSOCIATES
engineering • planning • development
1700 KRAFT DRIVE, SUITE 2350
BLACKSBURG, VIRGINIA 24060
VOICE 276-632-6231
FAX. 276-632-3648

SECTION C:
Base Flows for Floodplain Model

SECTION C:

Base Flows for Floodplain Model

C1. Pre-development

Documentation of analyzed flows:

The chart below summarizes the flow rate for the 100-year storm event of each tributary and where site flow is introduced in the analysis. A complete chart is provided in the appendix.

100-YEAR FLOW RATES FOR ANALYSIS							
Cross Section	Stream Station	Pre Developed FLOW	Pre-Dev ADDED FLOW	Pre-Dev Notes	Post Developed FLOW	Post Dev ADDED FLOW	Post-Dev Notes
Unnamed Toms Creek Tributary/Glade Spring Crossing Stream B Reach							
SL-1	2+00.00	335.07			296.70		
SL-2	3+00.00	335.07	3.77	Village Ph1 Pond 1 Out (Floodplain Hydrograph No. 25)	296.70	3.77	Village Ph1 Pond 1 Out (Floodplain Hydrograph No. 25)
SL-3	5+00.00	331.30			292.93		
SL-4	6+00.00	331.30	20.62	DA 3 Pre (Floodplain Hydrograph No. 62)	292.93	18.05	DA 3 POST (Floodplain Hydrograph No. 67)
SL-5	7+00.00	310.68			274.88		
SL-6	8+00.00	310.68	14.13	DA 2 Pre (Floodplain Hydrograph No. 61)	274.88	70.72	DA 2 POST (Floodplain Hydrograph No. 66)
SL-7	9+00.00	296.55			204.16		
SL-8	10+00.00	296.55			204.16		
SL-9	11+00.00	296.55	28.51	DA 1 PRE (Floodplain Hydrograph No. 60)	204.16	12.74	DA 1 POST (Floodplain Hydrograph No. 65)
SL-10	12+05.80	268.04		PRE COMBINED AT CONFLUENCE (Floodplain Hydrograph No. 30)	191.42		POST ROUTED POND TOTALS + DA 0 POST (Floodplain Hydrograph Nos. 56 & 64)

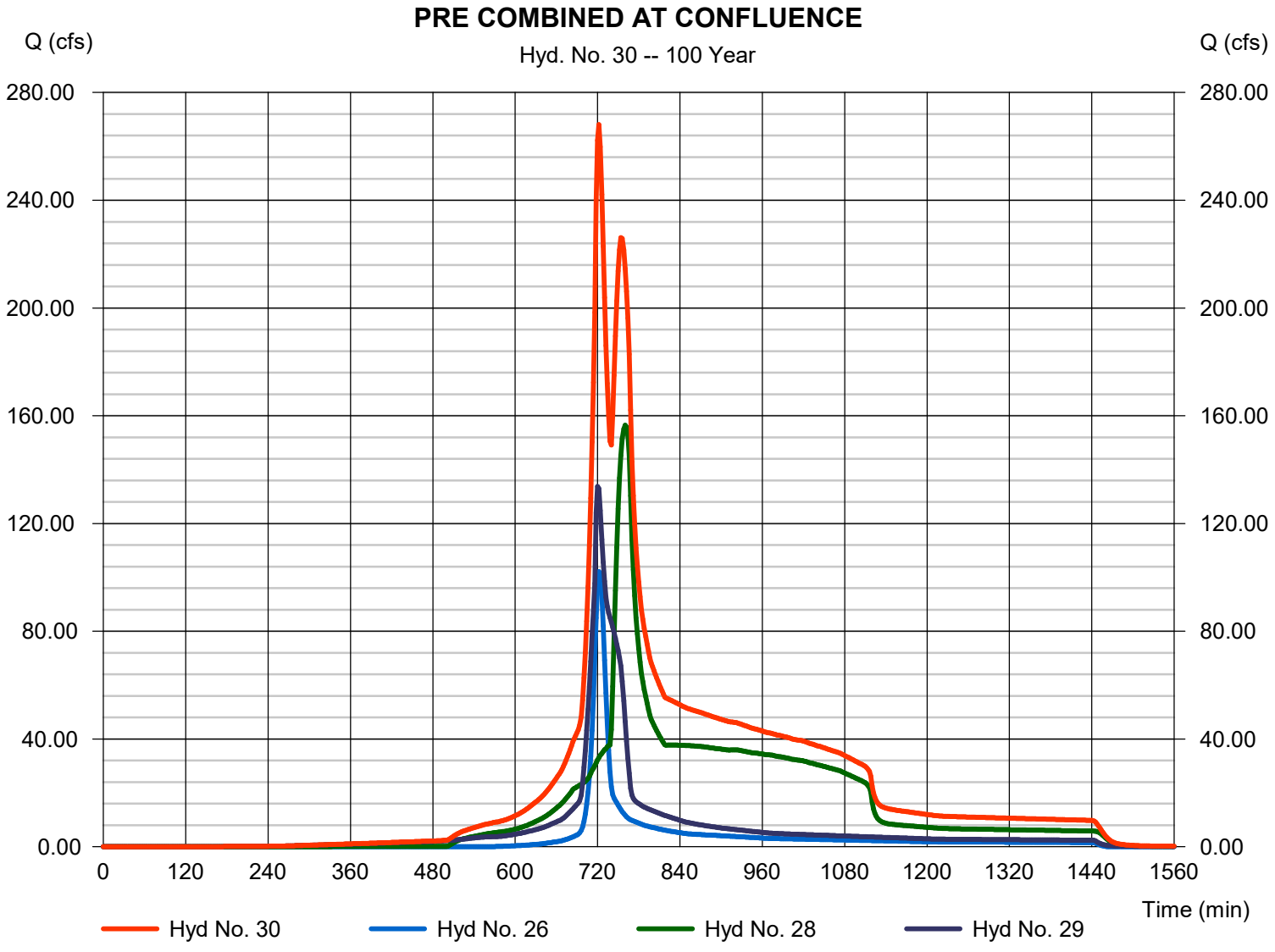
Please note the reduction in post-developed flow rates beginning at SL-10 due to planned upland detention which reduces the peak flow in the post developed condition.

Hydrograph Report

Hyd. No. 30

PRE COMBINED AT CONFLUENCE

Hydrograph type	=	Combine	Peak discharge	=	268.04 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	2,237,189 cuft
Inflow hyds.	=	26, 28, 29	Contrib. drain. area	=	28.430 ac



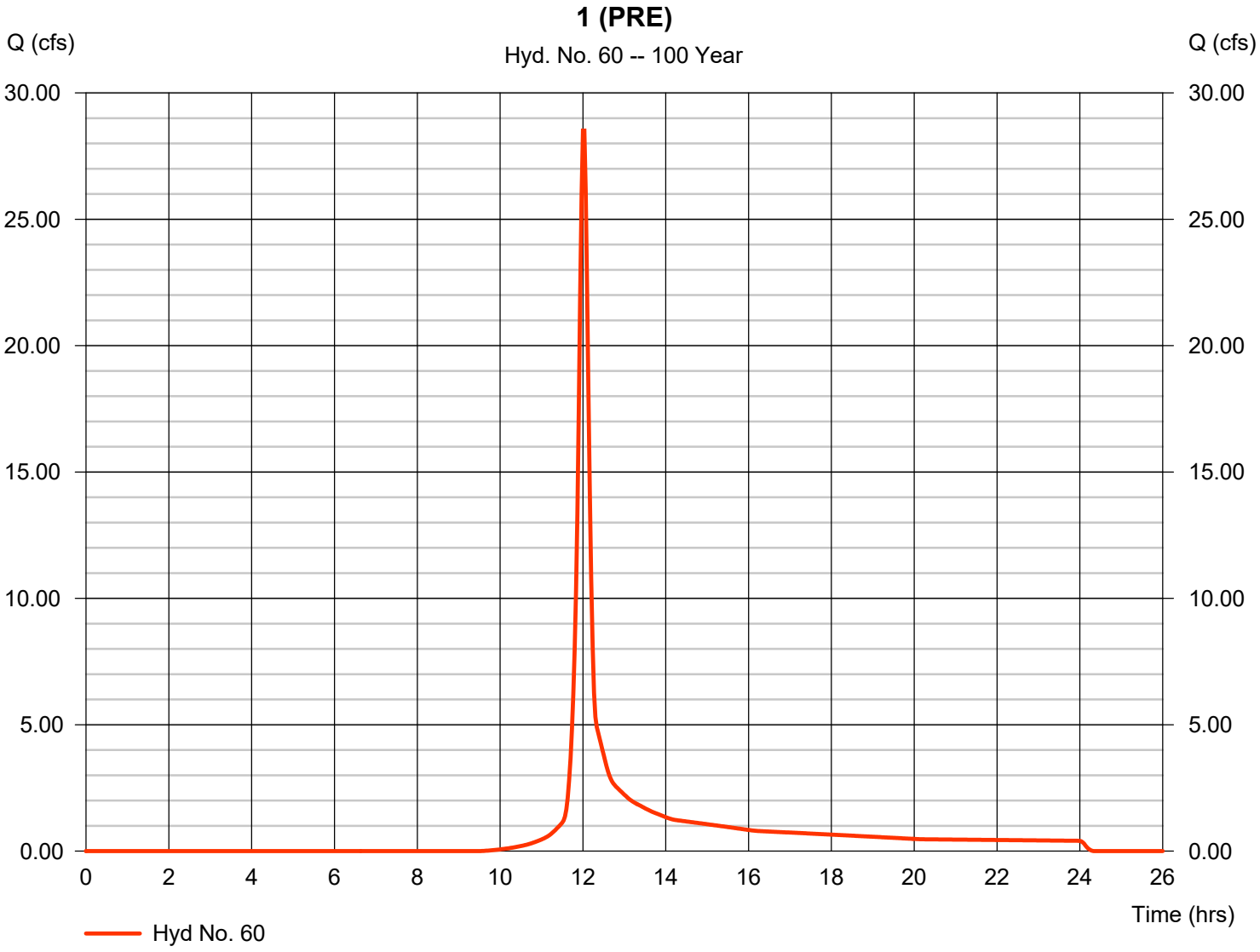
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 60

1 (PRE)

Hydrograph type	= SCS Runoff	Peak discharge	= 28.51 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 74,582 cuft
Drainage area	= 7.190 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.30 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



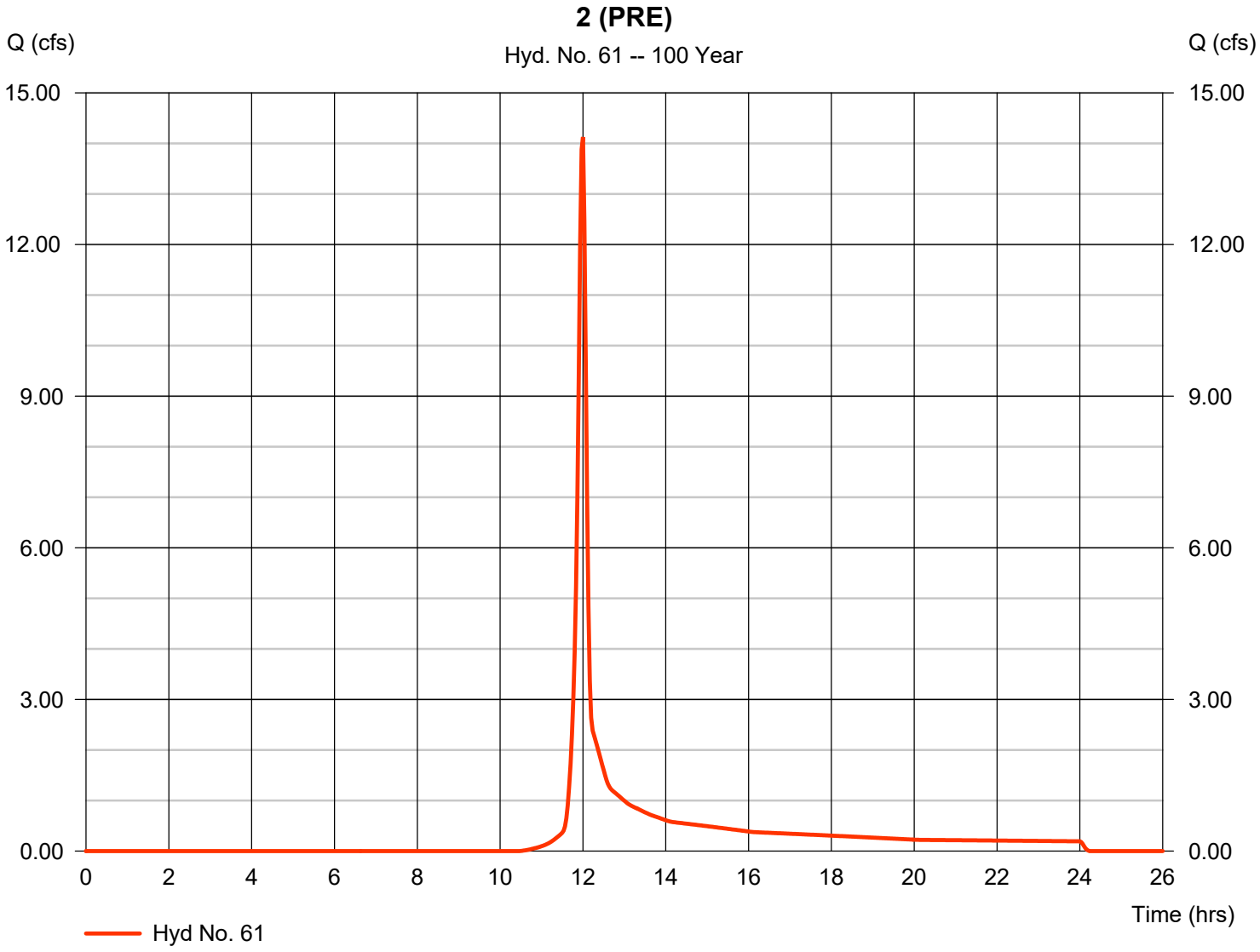
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 61

2 (PRE)

Hydrograph type	= SCS Runoff	Peak discharge	= 14.13 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 32,471 cuft
Drainage area	= 3.880 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.70 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



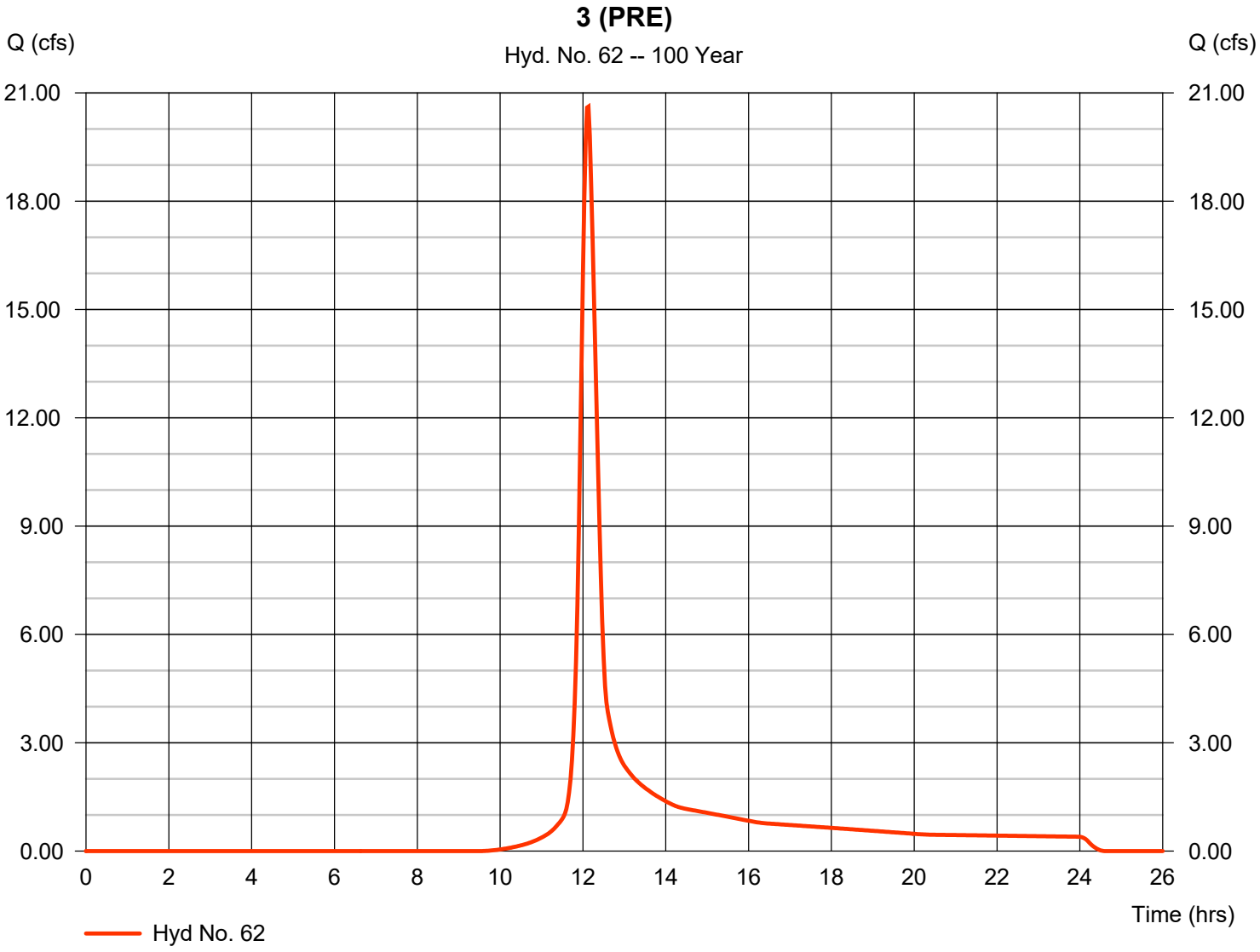
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 62

3 (PRE)

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.62 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	72,487 cuft
Drainage area	=	7.080 ac	Curve number	=	66
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	20.60 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

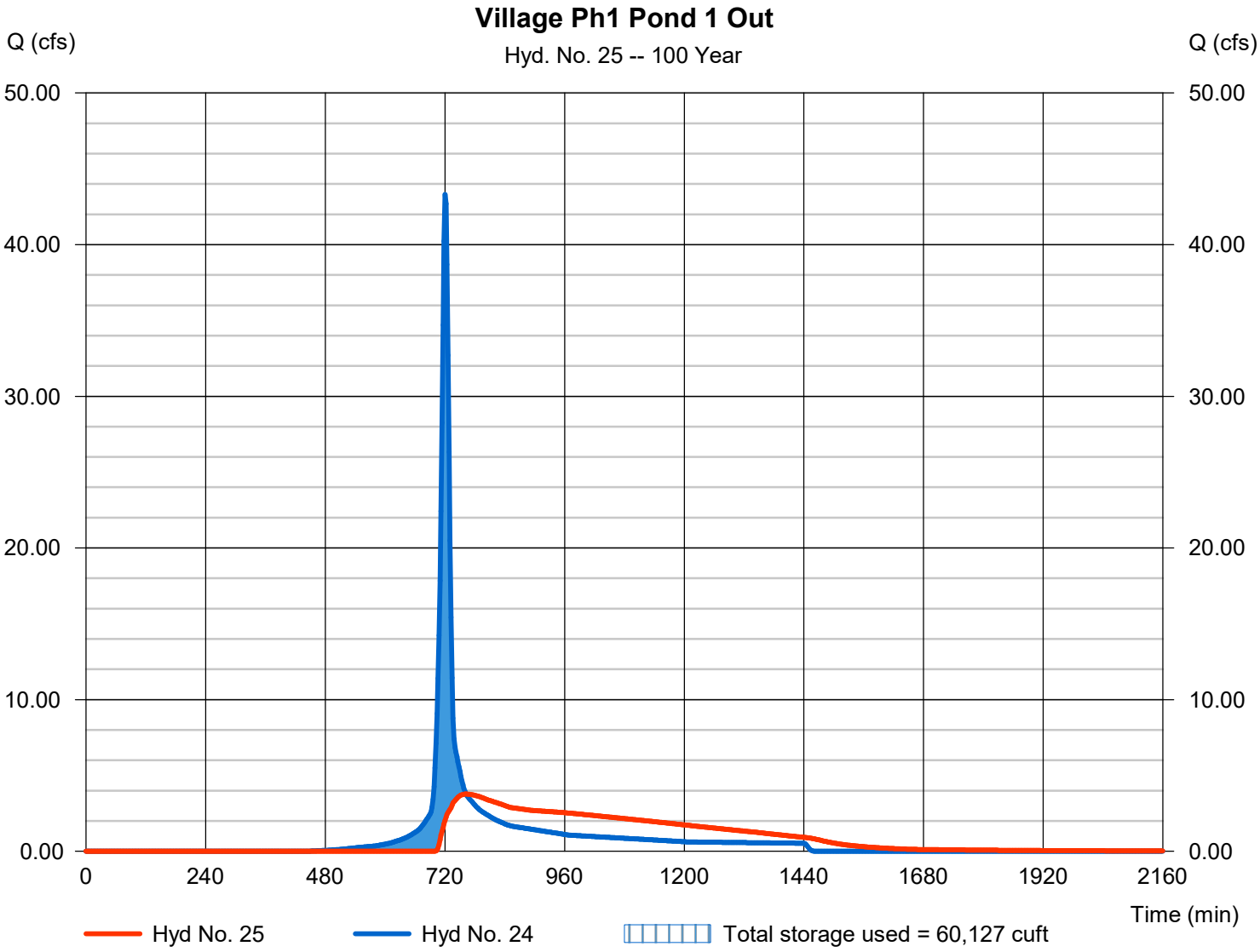
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 25

Village Ph1 Pond 1 Out

Hydrograph type	= Reservoir	Peak discharge	= 3.771 cfs
Storm frequency	= 100 yrs	Time to peak	= 762 min
Time interval	= 2 min	Hyd. volume	= 102,179 cuft
Inflow hyd. No.	= 24 - To Village Ph1 Pond 1	Max. Elevation	= 2024.91 ft
Reservoir name	= Ex. Village Ph.1 Pond 1	Max. Storage	= 60,127 cuft

Storage Indication method used.



SECTION C:

Base Flows for Floodplain Model

C2. Post-development

Documentation of analyzed flows:

The chart below summarizes the flow rate for the 100-year storm event of each tributary and where site flow is introduced in the analysis. A complete chart is provided in the appendix.

100-YEAR FLOW RATES FOR ANALYSIS							
Cross Section	Stream Station	Pre Developed FLOW	Pre-Dev ADDED FLOW	Pre-Dev Notes	Post Developed FLOW	Post Dev ADDED FLOW	Post-Dev Notes
Unnamed Toms Creek Tributary/Glade Spring Crossing Stream B Reach							
SL-1	2+00.00	335.07			296.70		
SL-2	3+00.00	335.07	3.77	Village Ph1 Pond 1 Out (Floodplain Hydrograph No. 25)	296.70	3.77	Village Ph1 Pond 1 Out (Floodplain Hydrograph No. 25)
SL-3	5+00.00	331.30			292.93		
SL-4	6+00.00	331.30	20.62	DA 3 Pre (Floodplain Hydrograph No. 62)	292.93	18.05	DA 3 POST (Floodplain Hydrograph No. 67)
SL-5	7+00.00	310.68			274.88		
SL-6	8+00.00	310.68	14.13	DA 2 Pre (Floodplain Hydrograph No. 61)	274.88	70.72	DA 2 POST (Floodplain Hydrograph No. 66)
SL-7	9+00.00	296.55			204.16		
SL-8	10+00.00	296.55			204.16		
SL-9	11+00.00	296.55	28.51	DA 1 PRE (Floodplain Hydrograph No. 60)	204.16	12.74	DA 1 POST (Floodplain Hydrograph No. 65)
SL-10	12+05.80	268.04		PRE COMBINED AT CONFLUENCE (Floodplain Hydrograph No. 30)	191.42		POST ROUTED POND TOTALS + DA 0 POST (Floodplain Hydrograph Nos. 56 & 64)

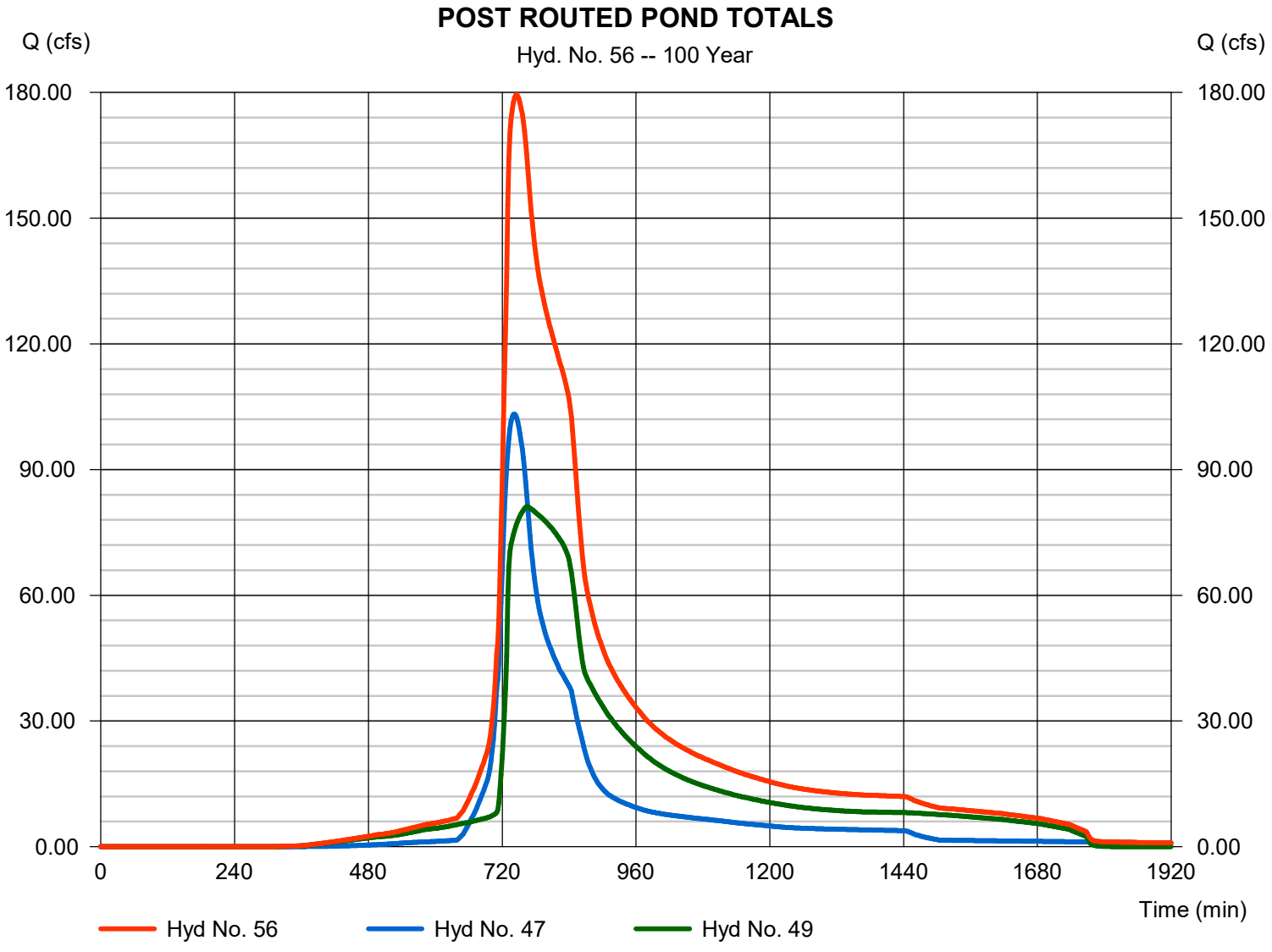
Please note the reduction in post-developed flow rates beginning at SL-10 due to planned upland detention which reduces the peak flow in the post developed condition.

Hydrograph Report

Hyd. No. 56

POST ROUTED POND TOTALS

Hydrograph type	= Combine	Peak discharge	= 179.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 2,273,620 cuft
Inflow hyds.	= 47, 49	Contrib. drain. area	= 0.000 ac

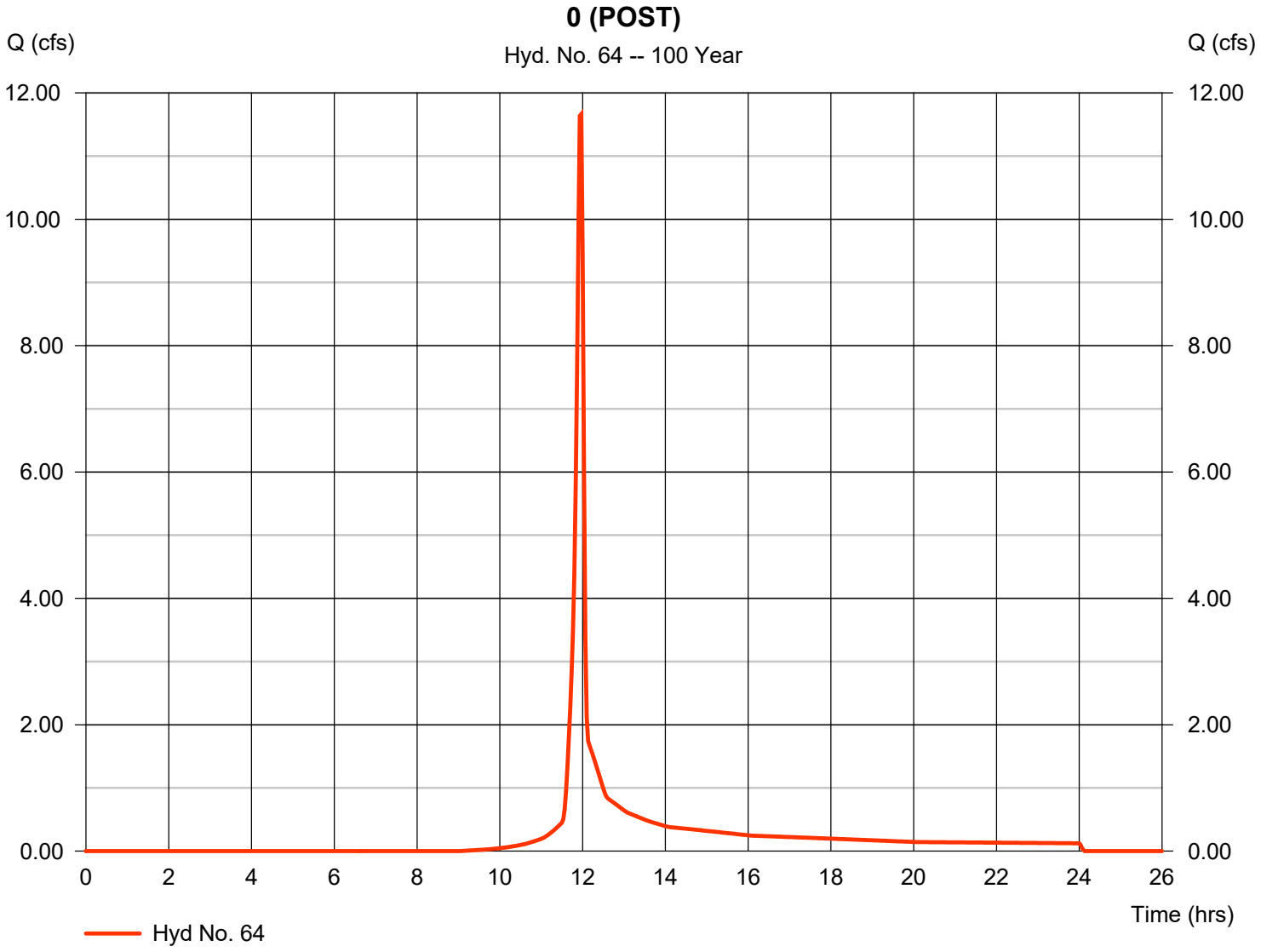


Hydrograph Report

Hyd. No. 64

0 (POST)

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.66 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	23,495 cuft
Drainage area	=	2.330 ac	Curve number	=	68
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.20 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

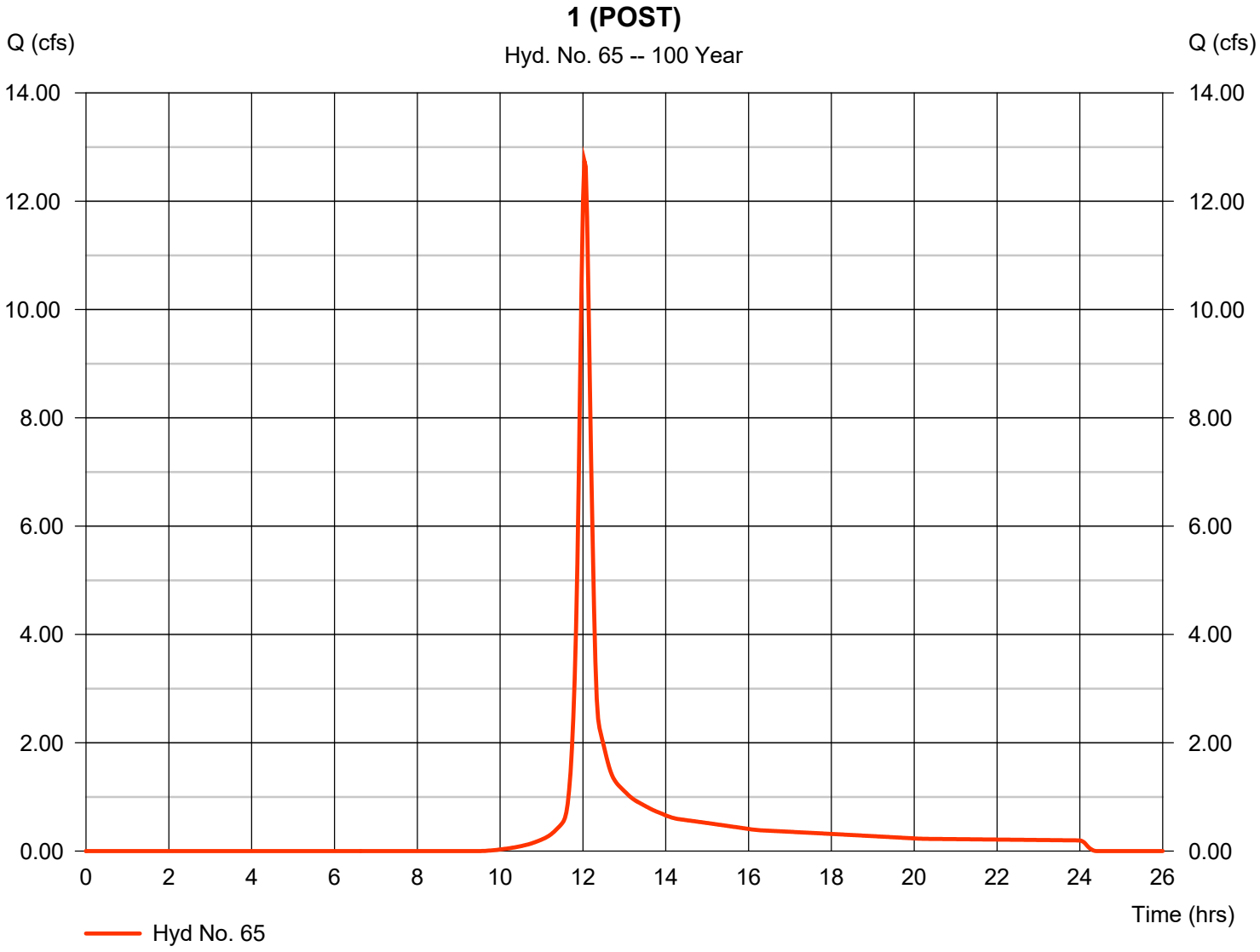


Hydrograph Report

Hyd. No. 65

1 (POST)

Hydrograph type	= SCS Runoff	Peak discharge	= 12.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 36,090 cuft
Drainage area	= 3.680 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

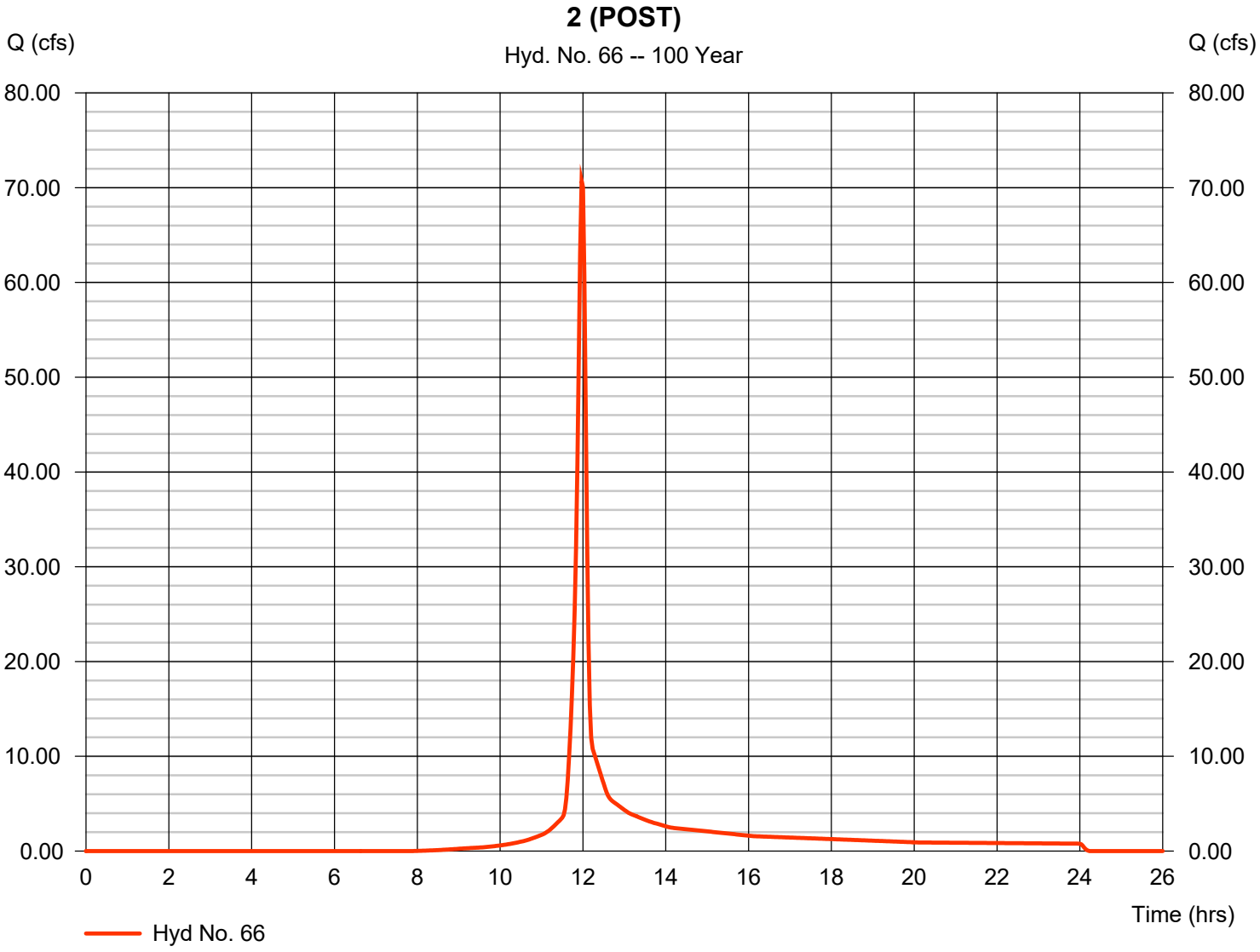


Hydrograph Report

Hyd. No. 66

2 (POST)

Hydrograph type	=	SCS Runoff	Peak discharge	=	70.72 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	161,887 cuft
Drainage area	=	12.900 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	8.50 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



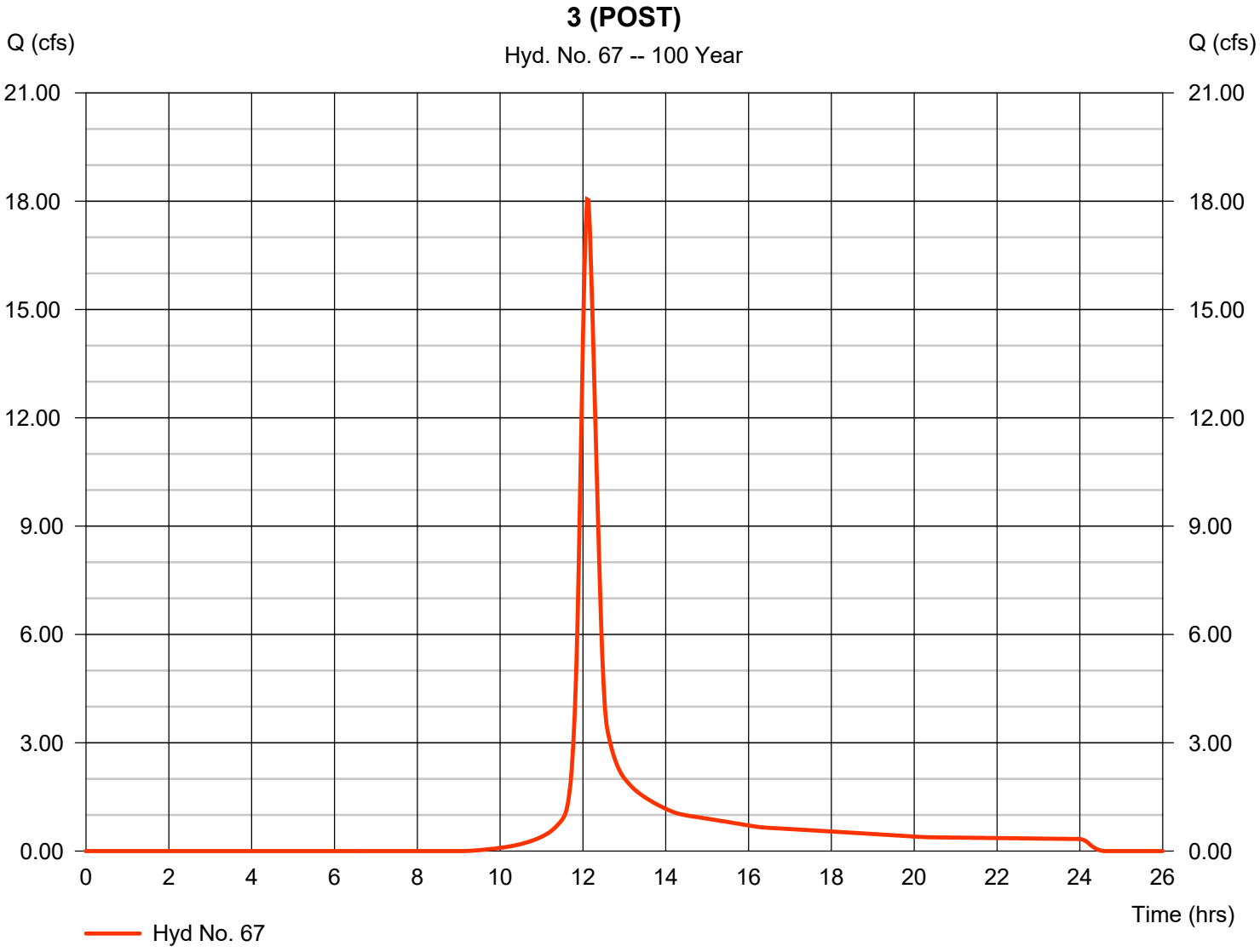
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 67

3 (POST)

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.05 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	63,060 cuft
Drainage area	=	5.760 ac	Curve number	=	68
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	20.60 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



SECTION D:
Individual Drainage Area Computations

SECTION D:

Individual Drainage Area Computations

D1. Pre-development

NOAA Atlas 14, Volume 2, Version 3
Location name: Blacksburg, Virginia, USA*
Latitude: 37.2393°, Longitude: -80.4395°
Elevation: 2009.87 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

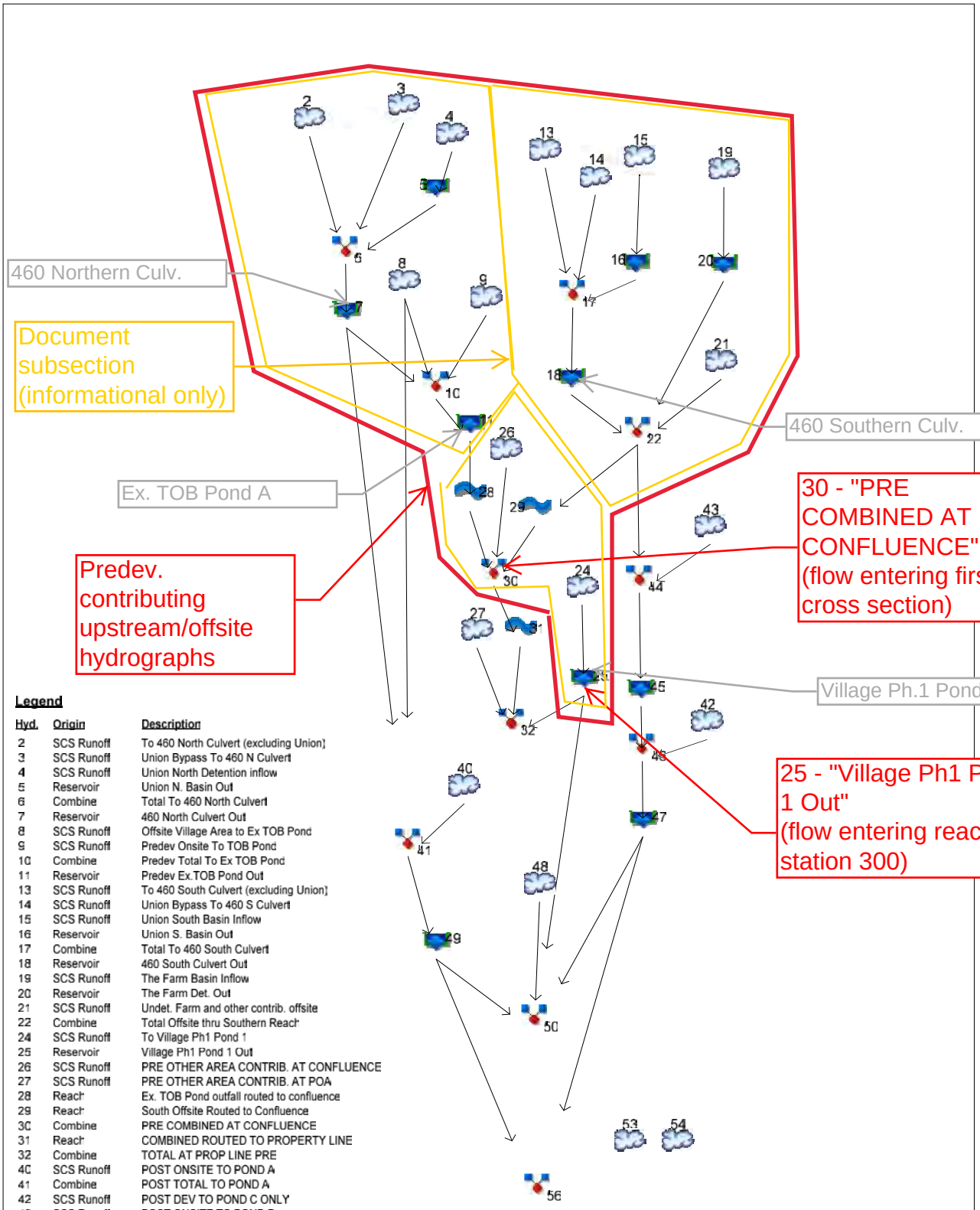
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.294** (0.267-0.326)	**0.351** (0.318-0.389)	**0.421** (0.380-0.466)	**0.471** (0.424-0.521)	**0.533** (0.476-0.589)	**0.575** (0.510-0.636)	**0.616** (0.542-0.684)	**0.653** (0.569-0.729)	**0.697** (0.599-0.785)	**0.729** (0.618-0.827)
10-min	**0.470** (0.426-0.520)	**0.561** (0.508-0.622)	**0.674** (0.609-0.746)	**0.754** (0.679-0.833)	**0.849** (0.759-0.938)	**0.915** (0.812-1.01)	**0.979** (0.861-1.09)	**1.03** (0.902-1.16)	**1.10** (0.947-1.24)	**1.15** (0.973-1.30)
15-min	**0.588** (0.533-0.651)	**0.706** (0.639-0.782)	**0.853** (0.771-0.944)	**0.953** (0.859-1.05)	**1.08** (0.962-1.19)	**1.16** (1.03-1.28)	**1.24** (1.09-1.37)	**1.31** (1.14-1.46)	**1.39** (1.19-1.56)	**1.44** (1.22-1.63)
30-min	**0.806** (0.731-0.892)	**0.975** (0.882-1.08)	**1.21** (1.10-1.34)	**1.38** (1.24-1.53)	**1.59** (1.43-1.76)	**1.75** (1.55-1.93)	**1.90** (1.67-2.11)	**2.03** (1.77-2.27)	**2.21** (1.90-2.49)	**2.33** (1.98-2.65)
60-min	**1.00** (0.911-1.11)	**1.22** (1.11-1.36)	**1.55** (1.40-1.72)	**1.80** (1.62-1.99)	**2.12** (1.90-2.35)	**2.37** (2.10-2.62)	**2.61** (2.30-2.90)	**2.85** (2.48-3.18)	**3.17** (2.72-3.57)	**3.41** (2.89-3.86)
2-hr	**1.17** (1.06-1.29)	**1.42** (1.29-1.57)	**1.81** (1.64-1.99)	**2.10** (1.90-2.32)	**2.49** (2.23-2.75)	**2.79** (2.49-3.09)	**3.10** (2.73-3.44)	**3.40** (2.97-3.80)	**3.81** (3.27-4.29)	**4.11** (3.48-4.67)
3-hr	**1.25** (1.14-1.38)	**1.52** (1.38-1.67)	**1.92** (1.75-2.11)	**2.23** (2.02-2.46)	**2.65** (2.38-2.91)	**2.97** (2.65-3.28)	**3.30** (2.92-3.65)	**3.64** (3.18-4.05)	**4.08** (3.50-4.59)	**4.42** (3.74-5.02)
6-hr	**1.53** (1.42-1.68)	**1.85** (1.71-2.02)	**2.31** (2.13-2.53)	**2.69** (2.46-2.94)	**3.20** (2.91-3.51)	**3.62** (3.26-3.97)	**4.06** (3.60-4.47)	**4.52** (3.95-5.00)	**5.16** (4.41-5.76)	**5.66** (4.75-6.39)
12-hr	**1.86** (1.72-2.03)	**2.23** (2.06-2.44)	**2.78** (2.57-3.04)	**3.25** (2.98-3.54)	**3.91** (3.54-4.26)	**4.46** (3.99-4.87)	**5.05** (4.46-5.54)	**5.69** (4.94-6.28)	**6.62** (5.59-7.40)	**7.39** (6.11-8.34)
24-hr	**2.26** (2.10-2.44)	**2.73** (2.54-2.94)	**3.47** (3.22-3.73)	**4.06** (3.77-4.37)	**4.93** (4.54-5.29)	**5.65** (5.18-6.07)	**6.44** (5.85-6.90)	**7.28** (6.56-7.82)	**8.51** (7.56-9.16)	**9.54** (8.39-10.3)
2-day	**2.68** (2.51-2.89)	**3.25** (3.03-3.50)	**4.09** (3.80-4.40)	**4.78** (4.43-5.13)	**5.75** (5.30-6.17)	**6.55** (6.01-7.03)	**7.41** (6.75-7.95)	**8.32** (7.52-8.94)	**9.63** (8.60-10.4)	**10.7** (9.46-11.6)
3-day	**2.85** (2.67-3.07)	**3.45** (3.22-3.71)	**4.33** (4.04-4.65)	**5.05** (4.69-5.41)	**6.06** (5.60-6.49)	**6.89** (6.34-7.38)	**7.77** (7.11-8.33)	**8.71** (7.90-9.35)	**10.0** (9.00-10.8)	**11.1** (9.87-12.0)
4-day	**3.02** (2.83-3.24)	**3.65** (3.41-3.91)	**4.58** (4.28-4.90)	**5.32** (4.96-5.70)	**6.37** (5.90-6.81)	**7.23** (6.67-7.73)	**8.14** (7.46-8.71)	**9.10** (8.27-9.75)	**10.5** (9.40-11.3)	**11.6** (10.3-12.5)
7-day	**3.52** (3.29-3.78)	**4.24** (3.96-4.55)	**5.25** (4.90-5.63)	**6.05** (5.64-6.50)	**7.17** (6.65-7.69)	**8.07** (7.45-8.64)	**8.99** (8.27-9.66)	**9.96** (9.10-10.7)	**11.3** (10.2-12.2)	**12.4** (11.1-13.4)
10-day	**4.05** (3.79-4.33)	**4.86** (4.56-5.19)	**5.94** (5.56-6.34)	**6.76** (6.32-7.21)	**7.88** (7.33-8.40)	**8.75** (8.11-9.32)	**9.63** (8.89-10.3)	**10.5** (9.66-11.2)	**11.7** (10.7-12.6)	**12.7** (11.5-13.6)
20-day	**5.51** (5.21-5.84)	**6.56** (6.19-6.94)	**7.85** (7.40-8.30)	**8.85** (8.33-9.36)	**10.2** (9.57-10.8)	**11.2** (10.5-11.9)	**12.3** (11.4-13.0)	**13.3** (12.4-14.2)	**14.7** (13.6-15.7)	**15.8** (14.5-16.9)
30-day	**6.85** (6.48-7.24)	**8.10** (7.66-8.56)	**9.51** (8.99-10.0)	**10.6** (9.98-11.2)	**12.0** (11.2-12.6)	**13.0** (12.2-13.7)	**14.0** (13.1-14.8)	**15.0** (14.0-15.9)	**16.3** (15.1-17.3)	**17.2** (15.9-18.4)
45-day	**8.67** (8.23-9.13)	**10.2** (9.68-10.7)	**11.8** (11.2-12.4)	**13.0** (12.3-13.7)	**14.5** (13.7-15.2)	**15.6** (14.7-16.4)	**16.7** (15.7-17.5)	**17.7** (16.6-18.6)	**18.9** (17.7-20.0)	**19.8** (18.5-21.0)
60-day	**10.4** (9.93-11.0)	**12.2** (11.6-12.8)	**13.9** (13.3-14.6)	**15.2** (14.5-16.0)	**16.8** (15.9-17.6)	**17.9** (17.0-18.8)	**18.9** (17.9-19.9)	**19.9** (18.8-21.0)	**21.1** (19.8-22.3)	**21.9** (20.6-23.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

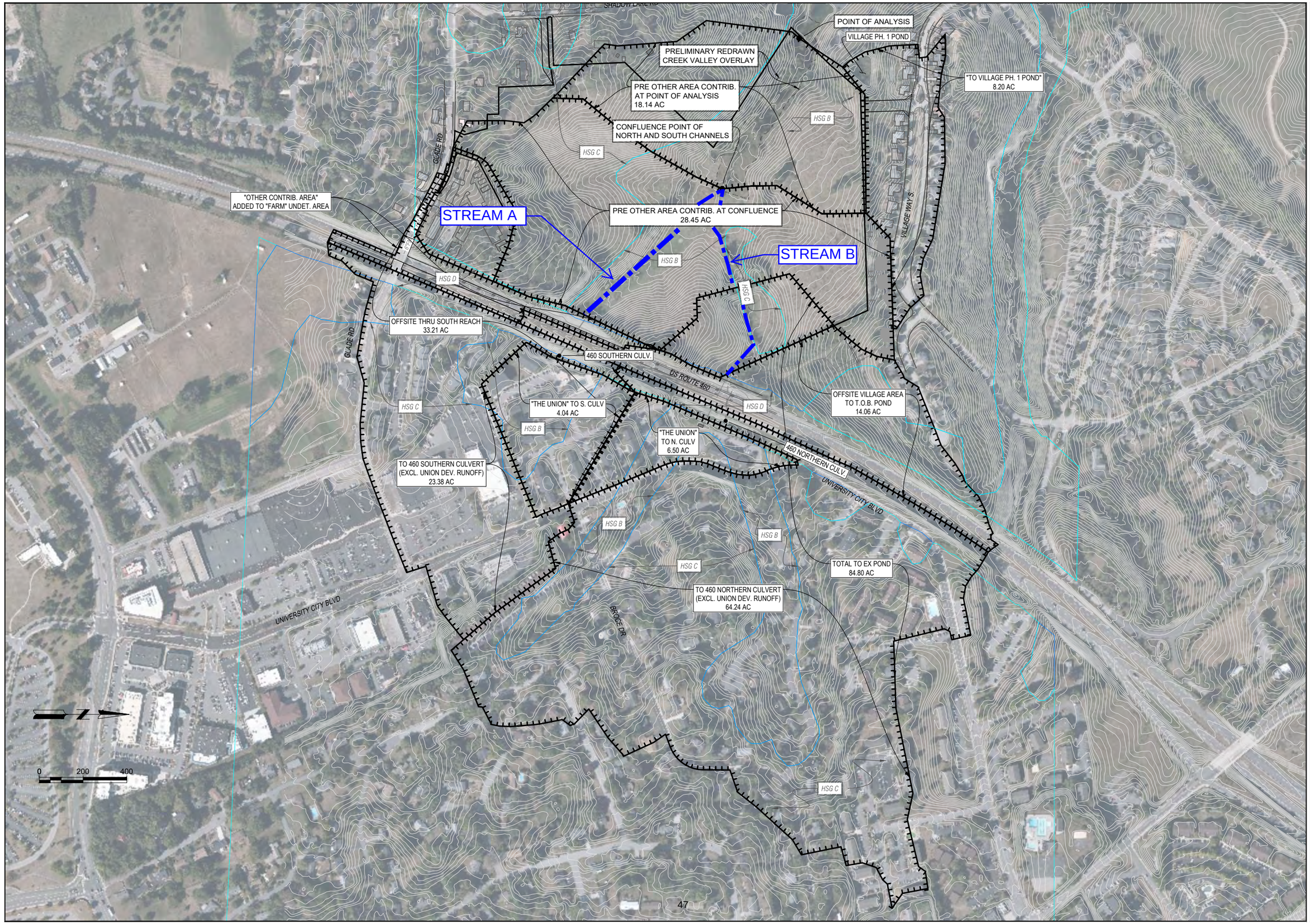
Please refer to NOAA Atlas 14 document for more information.

Watershed Model Schematic



Legend

Hyd.	Origin	Description
2	SCS Runoff	To 460 North Culvert (excluding Union)
3	SCS Runoff	Union Bypass To 460 N Culvert
4	SCS Runoff	Union North Detention inflow
5	Reservoir	Union N. Basin Out
6	Combine	Total To 460 North Culvert
7	Reservoir	460 North Culvert Out
8	SCS Runoff	Offsite Village Area to Ex TOB Pond
9	SCS Runoff	Predev Onsite To TOB Pond
10	Combine	Predev Total To Ex TOB Pond
11	Reservoir	Predev Ex.TOB Pond Out
13	SCS Runoff	To 460 South Culvert (excluding Union)
14	SCS Runoff	Union Bypass To 460 S Culvert
15	SCS Runoff	Union South Basin Inflow
16	Reservoir	Union S. Basin Out
17	Combine	Total To 460 South Culvert
18	Reservoir	460 South Culvert Out
19	SCS Runoff	The Farm Basin Inflow
20	Reservoir	The Farm Det. Out
21	SCS Runoff	Undet. Farm and other contrib. offsite
22	Combine	Total Offsite thru Southern Reach
24	SCS Runoff	To Village Ph1 Pond 1
25	Reservoir	Village Ph1 Pond 1 Out
26	SCS Runoff	PRE OTHER AREA CONTRIB. AT CONFLUENCE
27	SCS Runoff	PRE OTHER AREA CONTRIB. AT POA
28	Reach	Ex. TOB Pond outfall routed to confluence
29	Reach	South Offsite Routed to Confluence
30	Combine	PRE COMBINED AT CONFLUENCE
31	Reach	COMBINED ROUTED TO PROPERTY LINE
32	Combine	TOTAL AT PROP LINE PRE
40	SCS Runoff	POST ONSITE TO POND A
41	Combine	POST TOTAL TO POND A
42	SCS Runoff	POST DEV TO POND C ONLY
43	SCS Runoff	POST ONSITE TO POND B
44	Combine	TOTAL TO SOUTH DET POND B
45	Reservoir	S DET POND B ROUTE
46	Combine	TOTAL TO WET POND C
47	Reservoir	WET POND C ROUTED
48	SCS Runoff	POST UNDETAINED CONTRIB. AREA
49	Reservoir	UPGRADED POND A ROUTED
50	Combine	POST TOTAL ROUTED TO PROP LINE
53	SCS Runoff	Onsite Only Total Predev
54	SCS Runoff	Onsite Only Total Postdev
56	Combine	POST ROUTED POND TOTALS



EDEN & ASSOCIATES
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BLACKSBURG, VIRGINIA 24060
VOICE 276-632-6231
FAX. 276-632-3648

No.	Revision / Issue	Date

COMMONWEALTH OF VIRGINIA
PAUL J. BROWN
Lic. No. 036148
PROFESSIONAL ENGINEER
04/28/2023

PREDEVELOPMENT OFFSITE CONTRIBUTING DRAINAGE AREAS

PROPOSED DEVELOPMENT OF

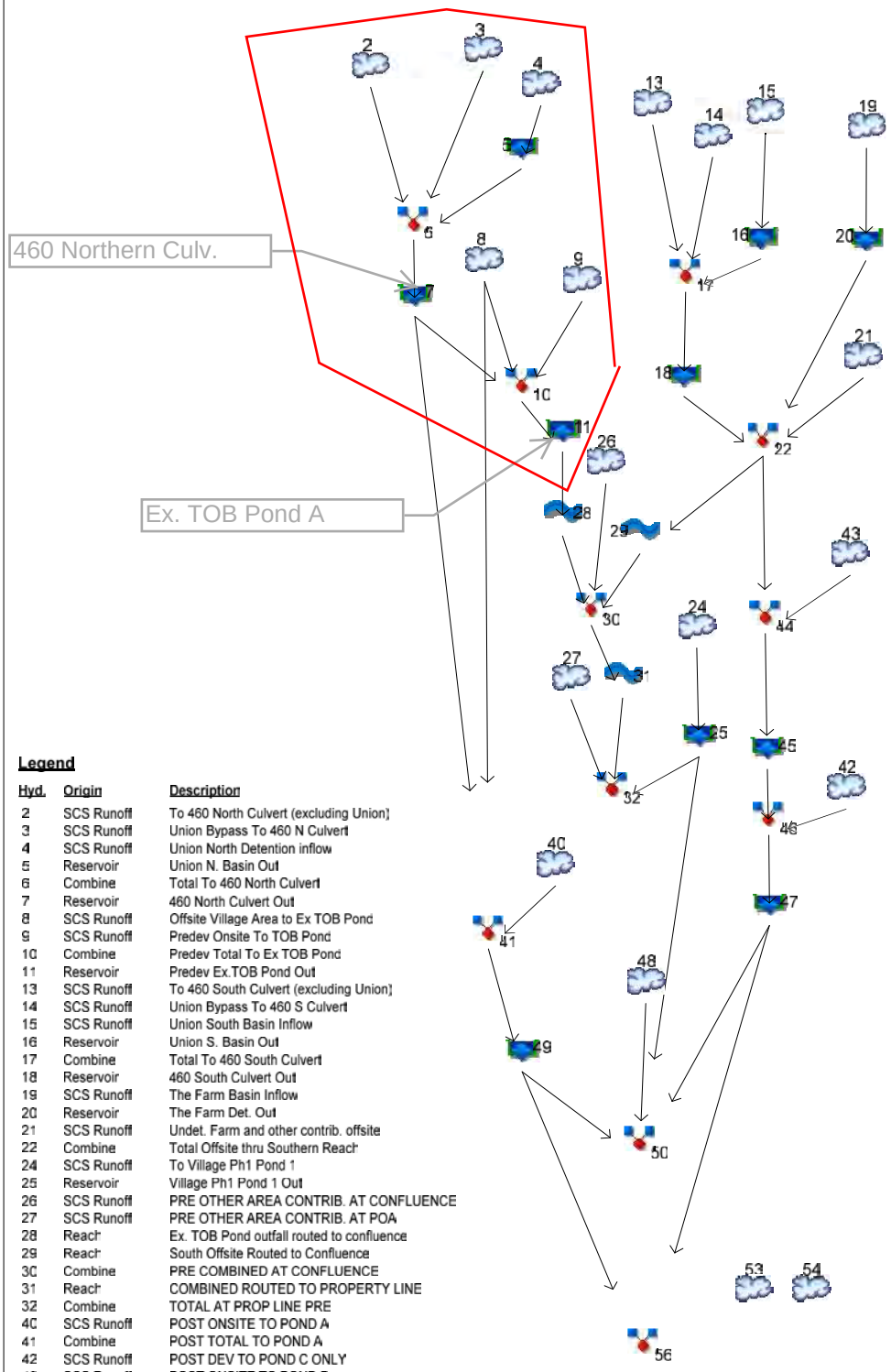
GLADE SPRING CROSSING

PROPERTY OF GLADE HGTS, LLC - TAX PARCELS
225-(A)-3, 225-(A)-4, & 224-(A)-57; 45.0976 AC.
TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

Drawn By:	Scale:
MSF	AS SHOWN
Checked By:	Date:
---	04/28/2023
Sheet No.	
1 of 1	D1

C:\DROPBOX\E&A\CARY HOPPER\GLADE SPRING\CAD\DRAINAGE-RZ PREDEV.DWG
11/3/2022 1:44:56 PM

Watershed Model Schematic



Legend

Hyd.	Origin	Description
2	SCS Runoff	To 460 North Culvert (excluding Union)
3	SCS Runoff	Union Bypass To 460 N Culvert
4	SCS Runoff	Union North Detention inflow
5	Reservoir	Union N. Basin Out
6	Combine	Total To 460 North Culvert
7	Reservoir	460 North Culvert Out
8	SCS Runoff	Offsite Village Area to Ex TOB Pond
9	SCS Runoff	Predev Onsite To TOB Pond
10	Combine	Predev Total To Ex TOB Pond
11	Reservoir	Predev Ex.TOB Pond Out
13	SCS Runoff	To 460 South Culvert (excluding Union)
14	SCS Runoff	Union Bypass To 460 S Culvert
15	SCS Runoff	Union South Basin Inflow
16	Reservoir	Union S. Basin Out
17	Combine	Total To 460 South Culvert
18	Reservoir	460 South Culvert Out
19	SCS Runoff	The Farm Basin Inflow
20	Reservoir	The Farm Det. Out
21	SCS Runoff	Undet. Farm and other contrib. offsite
22	Combine	Total Offsite thru Southern Reach
24	SCS Runoff	To Village Ph1 Pond 1
25	Reservoir	Village Ph1 Pond 1 Out
26	SCS Runoff	PRE OTHER AREA CONTRIB. AT CONFLUENCE
27	SCS Runoff	PRE OTHER AREA CONTRIB. AT POA
28	Reach	Ex. TOB Pond outfall routed to confluence
29	Reach	South Offsite Routed to Confluence
30	Combine	PRE COMBINED AT CONFLUENCE
31	Reach	COMBINED ROUTED TO PROPERTY LINE
32	Combine	TOTAL AT PROP LINE PRE
40	SCS Runoff	POST ONSITE TO POND A
41	Combine	POST TOTAL TO POND A
42	SCS Runoff	POST DEV TO POND C ONLY
43	SCS Runoff	POST ONSITE TO POND B
44	Combine	TOTAL TO SOUTH DET POND B
45	Reservoir	S DET POND B ROUTE
46	Combine	TOTAL TO WET POND C
47	Reservoir	WET POND C ROUTED
48	SCS Runoff	POST UNDETAINED CONTRIB. AREA
49	Reservoir	UPGRADED POND A ROUTED
50	Combine	POST TOTAL ROUTED TO PROP LINE
53	SCS Runoff	Onsite Only Total Predev
54	SCS Runoff	Onsite Only Total Postdev
56	Combine	POST ROUTED POND TOTALS

Drainage Area Runoff and Time of Concentration

Drainage Area: **To 460 northern culvert crossing (excl. Union)**

PREDEVELOPMENT

Composite Curve Number (CN)						**Notes:**
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	-	Impervious	98	22.09	2164.39	
CN_2	B	Managed Turf	61	7.75	472.64	
CN_3	C	Managed Turf	74	31.99	2367.60	
CN_4	D	Managed Turf	80	0.07	5.41	
CN_5	B	Brush (Good)	48	0.00	0.00	
CN_6	C	Brush (Good)	65	0.00	0.00	
CN_7	D	Brush (Good)	73	2.34	171.16	
CN_8					0.00	
CN_9					0.00	
CN_{10}					0.00	
			Total	**64.24**	**5181.21**	
				Composite CN =	**81**	

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Grass	100	0.24	0.022	14.9
2	Shallow Conc.	Unpaved	452		0.086	1.6
3	Channel	Concrete	244	0.013	0.029	0.5
4	Channel	30" Concrete Pipe	1238	0.013	0.028	2.4
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**19.3**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	81	81	81
Storage (in.) S=1000/CN-10	2.35	2.35	2.35
Initial abstraction (in.), I_a=0.2S	0.47	0.47	0.47
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.78	2.17	4.29
Runoff volume (ac-ft), RV = Q/12*A	4.15	11.63	22.95
Flow rate (cfs), q_{peak} from hydrograph	55.43	161.91	

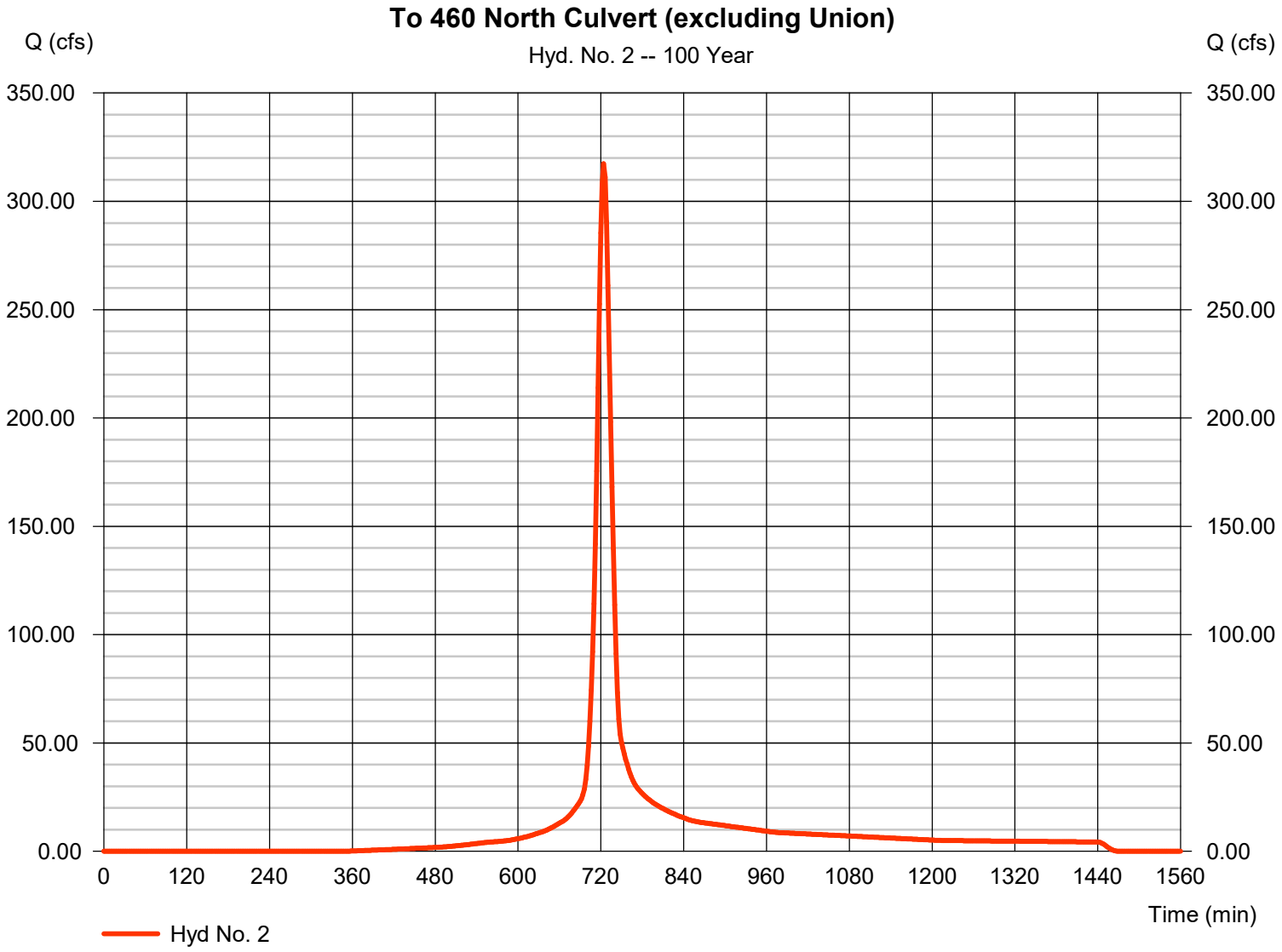
Hydrograph Number: 2

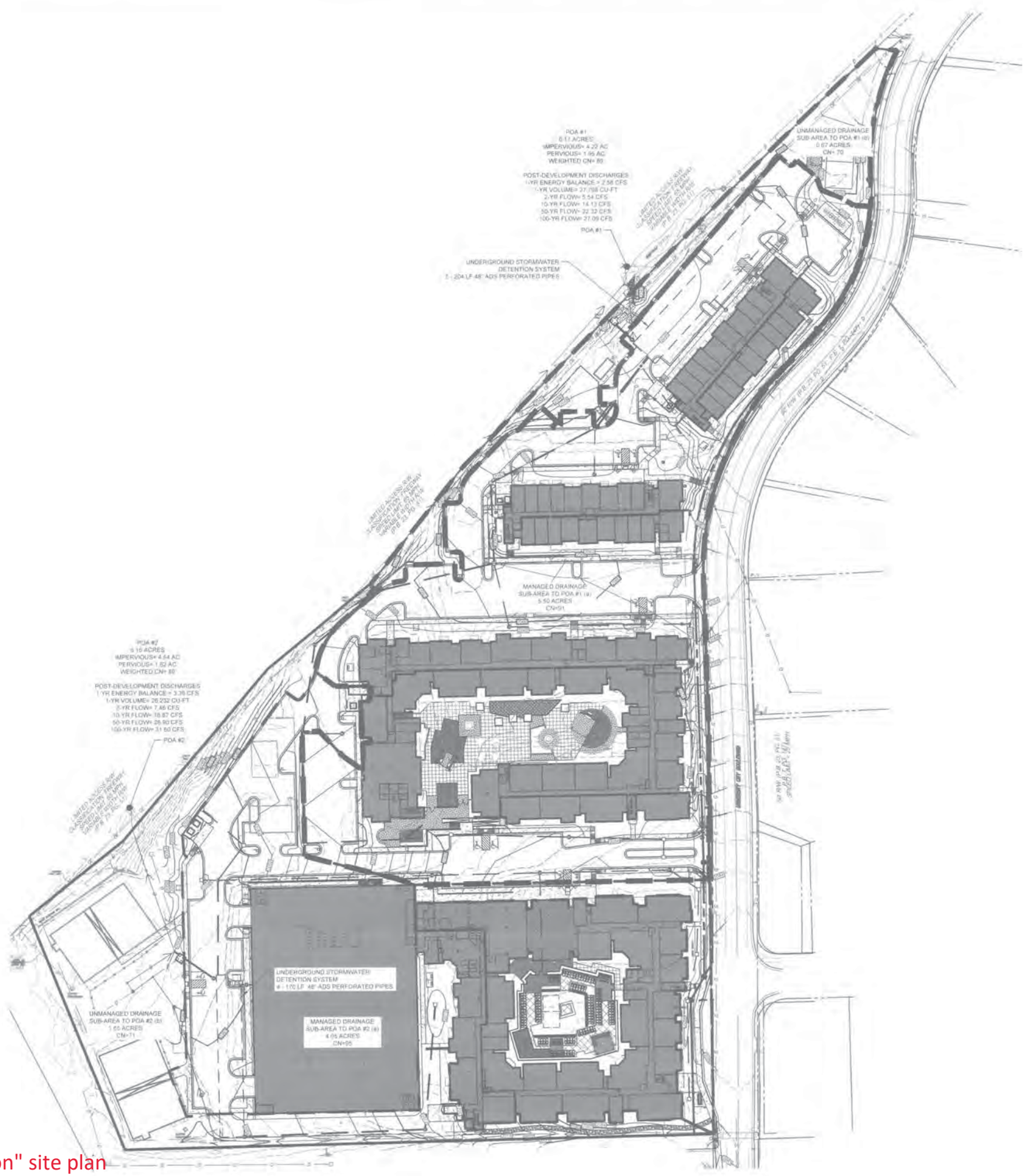
Hydrograph Report

Hyd. No. 2

To 460 North Culvert (excluding Union)

Hydrograph type	= SCS Runoff	Peak discharge	= 317.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 999,640 cuft
Drainage area	= 64.240 ac	Curve number	= 81
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.30 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484





Source: 1001 UCB "The Union" site plan

Not to scale

NOT FOR CONSTRUCTION

Pennoni
Firm License # - 1297
PENNONI ASSOCIATES INC.
5430 Wade Park Boulevard, #106
Raleigh, NC 27607
T 919.929.1173 F 919.493.6548

ALL DIMENSIONS MUST BE VERIFIED BY CONTRACTOR AND OWNER MUST BE NOTIFIED OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK

COMMONWEALTH OF VIRGINIA
JUSTIN J. BROWN
Lic. No. 60879
PROFESSIONAL ENGINEER

1001 UCB SITE PLANS
1001 UNIVERSITY CITY BOULEVARD
BLACKSBURG, VIRGINIA 24060

POST-DEVELOPMENT WATERSHED PLAN

GEDR BLACKSBURG, LLC
521 MOREHEAD STREET, SUITE 400
CHARLOTTE, NC 28202

7	08/25/2020	KNB	Per Site Plan Administrative Comments
6	07/09/2020	KNB	Site Plan Amendment and HFC Revs
5	06/11/2020	KNB	Final Auth. coordination and alt. stormwater design
4	04/08/2020	KNB	Per Town Comments
3	03/03/2020	CSB	Per HFC Town and VDOT comments
2	12/20/2019	CSB	Per VDOT comments
NO.	DATE	BY	REVISIONS

PROJECT	TNHSE19001
DATE	2019-07-26
DRAWING SCALE	1"=50'
DRAWN BY	CSB
APPROVED BY	JJB

CS9202
SHEET D.2 OF 4

SP-S-1053a

WORKSHEET FOR SCS HYDROLOGIC PARAMETERS

Site Conditions:		Existing	**Project:** Sturbridge Apartments
	X	Proposed	**Subarea Number:** 1b Bypass - No Detention
Off-Site Land Use:		Existing	**By:** Justin Brown
	X	Proposed	**Date:** 4/13/2020

RUNOFF CURVE NUMBER

Soil Group	Land Use or Zoning		Area (acres)	RCN	RCN x Area
B	On-Site	Impervious	0.00	98	0.098
B	On-Site	Open Space	0.25	61	15.25
C	On-Site	Impervious	0.00	98	0
C	On-Site	Open Space	0.42	74	31.08
D	On-Site	Impervious	0.00	80	0
D	On-Site	Open Space	0.00	80	0

Total Area 0.67 ac 0.001 sq. mi **Weighted RCN =** 69

Notes:
Time of Concentration = 8.28 minutes (See Attached)

TR 55 Worksheet: Time of Concentration (Tc) **PROJECT: TNHSE19001** **PN: (Post-DEVELOPMENT: POA#1 (b))**

	1	2	3	4	5	6	6	
Sheet Flow								
Surface description (Table 3-1)	Dense Grasses							
Manning's roughness coeff., n (Table 3-1)	0.24							
Flow length, L (total L < 100 ft) ..... ft	100.00							
Two-year 24-hour rainfall, P2..... in	2.74							
Land slope, S ..... ft/ft	0.1500							
$T_t = (0.007\ (nL)^{0.8})/(P_2^{0.5} s^{0.4})$ ..... hr	0.11	0.00	0.00	0.00	0.00	0.00	0.00	
Shallow Concetrated Flow								
Surface description (paved=1 or unpaved=0)	0	0	0	0	0	0	0	
Flow length, L ..... ft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Watercourse slope, S ..... ft/ft	0.0180	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	
Average velocity, V ..... ft/s	-	-	-	-	-	-	-	
Unpaved $V = 16.1345\ (s)^{0.5}$	2.16	1.61	1.61	1.61	1.61	1.61	1.61	
Paved $V = 20.3282\ (s)^{0.5}$								
$T_t = L/3600V$ ..... hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Channel Flow	**CHANNEL**							
Cross sectional flow area, A ..... ft^2	3.00							
Wetted perimeter, Pw..... ft	6.00							
Hydraulic radius, r = A/Pw.....ft	0.50	0.00	0.00	0.00	0.00	0.00	0.00	
Channel slope, s..... ft/ft	0.068							
Manning's roughness coefficient, n.....	0.070	0.035	0.069	0.013	0.013	0.013	0.013	
Velocity, $V=(1.49/n)R^{2/3}s^{1/2}$ ..... ft	3.50	0.00	0.00	0.00	0.00	0.00	0.00	
Flow length, L ..... ft	293.0							
$T_t = L/3600V$ ..... hr	**0.023**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	
Sub Basin Tc = $T_{sheetflow}+T_{shallow\ concentrated}+T_{channel}$ =	0.14 hr	0.00 hr	0.00 hr	0.00 hr	0.00 hr	0.00 hr	0.00 hr	
Sub Basin Tc = $T_{sheetflow}+T_{shallow\ concentrated}+T_{channel}$ =	8.28 min	0.00 min	0.00 min	0.00 min	0.00 min	0.00 min	0.00 min	**8.28 min**

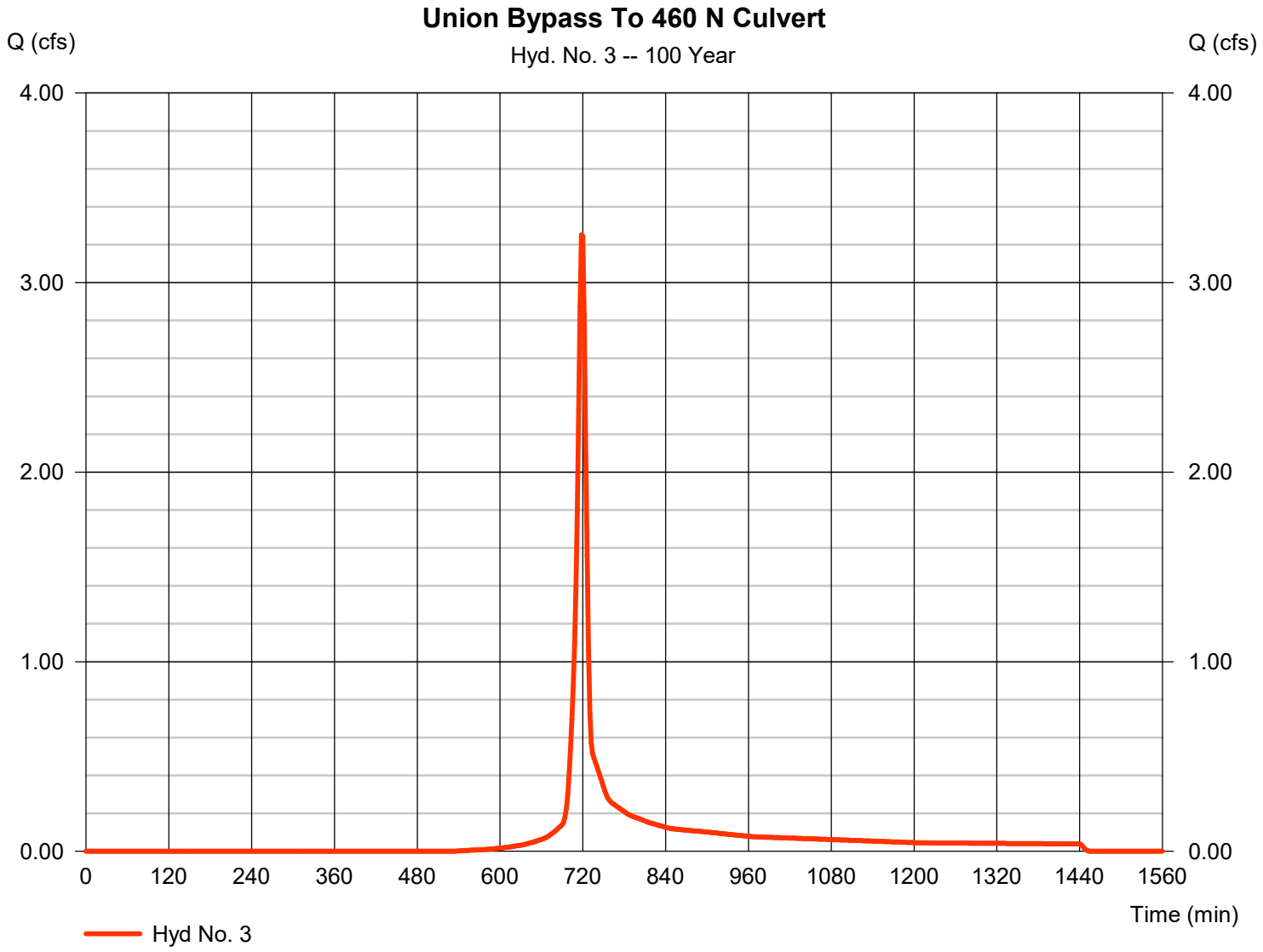
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 3

Union Bypass To 460 N Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 3.251 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 7,443 cuft
Drainage area	= 0.670 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.30 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



WORKSHEET FOR SCS HYDROLOGIC PARAMETERS

Site Conditions:		Existing	**Project:** Sturbridge Apartments
	X	Proposed	**Subarea Number:** 1a Detention
Off-Site Land Use:		Existing	**By:** Justin Brown
	X	Proposed	**Date:** 4/13/2020

RUNOFF CURVE NUMBER

Soil Group	Land Use or Zoning		Area (acres)	RCN	RCN x Area
B	On-Site	Impervious	1.54	98	150.92
B	On-Site	Open Space	0.45	61	27.45
C	On-Site	Impervious	2.76	98	270.48
C	On-Site	Open Space	1.08	74	79.55
D	On-Site	Impervious	0.00	80	0
D	On-Site	Open Space	0.00	80	0

Total Area 5.83 ac 0.009 sq. mi **Weighted RCN =** 91

Notes:
Time of Concentration = 13.63 minutes (See Attached)

TR 55 Worksheet: Time of Concentration (Tc) **PROJECT: TNHSE19001** **PN: (Post-DEVELOPMENT: POA#1 (a))**

	1	2	3	4	5	6	6	
Sheet Flow								
Surface description (Table 3-1)	Dense Grasses							
Manning's roughness coeff., n (Table 3-1)	0.24							
Flow length, L (total L < 100 ft) ..... ft	100.00							
Two-year 24-hour rainfall, P2..... in	2.74							
Land slope, S ..... ft/ft	0.0880							
$T_t = (0.007 (nL)^{0.8})/(P_2^{0.5} s^{0.4})$ ..... hr	0.14	0.00	0.00	0.00	0.00	0.00	0.00	
Shallow Concetrated Flow								
Surface description (paved=1 or unpaved=0)	0	1	0	0	0	0	0	
Flow length, L ..... ft	155.0	190.0	0.0	0.0	0.0	0.0	0.0	
Watercourse slope, S ..... ft/ft	0.0840	0.0210	0.0100	0.0100	0.0100	0.0100	0.0100	
Average velocity, V ..... ft/s	-	-	-	-	-	-	-	
Unpaved $V = 16.1345 (s)^{0.5}$	4.68		1.61	1.61	1.61	1.61	1.61	
Paved $V = 20.3282 (s)^{0.5}$		2.95						
$T_t = L/3600V$ ..... hr	0.01	0.02	0.00	0.00	0.00	0.00	0.00	
Channel Flow	**CHANNEL**							
Cross sectional flow area, A ..... ft^2	3.10							
Wetted perimeter, Pw..... ft	6.30							
Hydraulic radius, r = A/Pw.....ft	0.49	0.00	0.00	0.00	0.00	0.00	0.00	
Channel slope, s..... ft/ft	0.010							
Manning's roughness coefficient, n.....	0.045	0.035	0.069	0.013	0.013	0.013	0.013	
Velocity, $V=(1.49/n)R^{2/3}s^{1/2}$ ..... ft	2.06	0.00	0.00	0.00	0.00	0.00	0.00	
Flow length, L ..... ft	431.0							
$T_t = L/3600V$ ..... hr	**0.058**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	
Sub Basin Tc = $T_{sheetflow}+T_{shallow\ concentrated}+T_{channel}$ =	0.21 hr	0.02 hr	0.00 hr	0.00 hr	0.00 hr	0.00 hr	0.00 hr	
Sub Basin Tc = $T_{sheetflow}+T_{shallow\ concentrated}+T_{channel}$ =	12.56 min	1.07 min	0.00 min	0.00 min	0.00 min	0.00 min	0.00 min	**13.63 min**

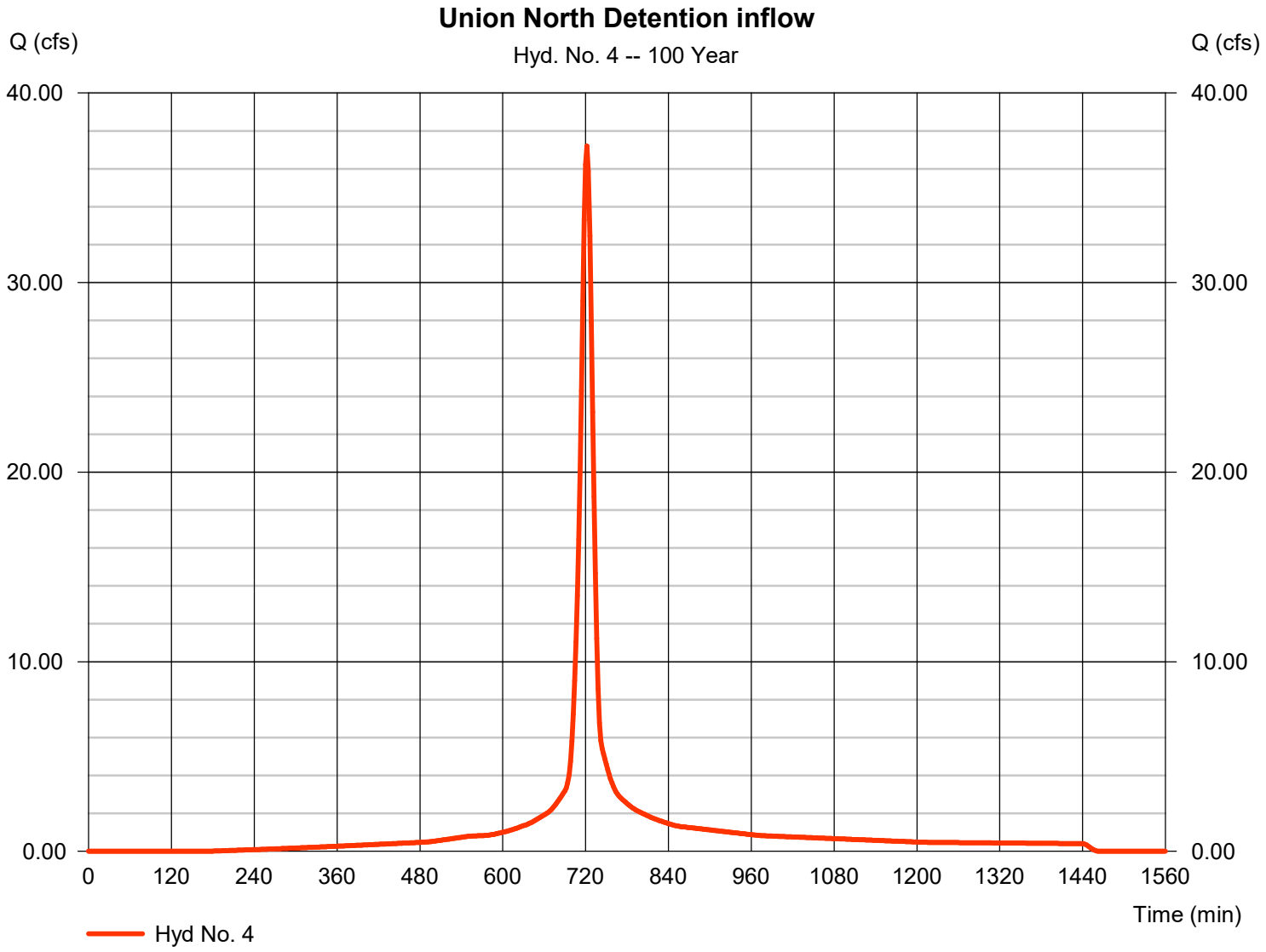
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 4

Union North Detention inflow

Hydrograph type	= SCS Runoff	Peak discharge	= 37.21 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 111,184 cuft
Drainage area	= 5.830 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Pond Report

Pond No. 10 - Union North Underground Det.

Pond Data

UG Chambers -Invert elev. = 2041.00 ft, Rise x Span = 4.00 x 4.00 ft, Barrel Len = 204.00 ft, No. Barrels = 5, Slope = 0.50%, Headers = Yes
Encasement -Invert elev. = 2040.50 ft, Width = 6.50 ft, Height = 5.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2040.50	n/a	0	0
0.65	2041.15	n/a	613	613
1.30	2041.80	n/a	2,016	2,629
1.96	2042.46	n/a	2,971	5,600
2.61	2043.11	n/a	3,384	8,985
3.26	2043.76	n/a	3,509	12,493
3.91	2044.41	n/a	3,432	15,925
4.56	2045.06	n/a	3,103	19,028
5.22	2045.72	n/a	2,379	21,407
5.87	2046.37	n/a	1,893	23,300
6.52	2047.02	n/a	1,840	25,140

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	7.00	5.00	0.00
Span (in)	= 30.00	8.25	72.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 2041.00	2041.00	2043.50	0.00
Length (ft)	= 30.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 18.85	0.33	0.00	0.00
Crest El. (ft)	= 2047.52	2045.20	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2040.50	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.07	61	2040.56	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.13	123	2040.63	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.20	184	2040.70	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.26	245	2040.76	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.33	307	2040.83	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.39	368	2040.89	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.46	429	2040.96	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.52	491	2041.02	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.003
0.59	552	2041.09	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.038
0.65	613	2041.15	0.10 ic	0.10 ic	0.00	---	0.00	0.00	---	---	---	---	0.098
0.72	815	2041.22	0.18 ic	0.18 ic	0.00	---	0.00	0.00	---	---	---	---	0.180
0.78	1,017	2041.28	0.29 ic	0.28 ic	0.00	---	0.00	0.00	---	---	---	---	0.277
0.85	1,218	2041.35	0.39 ic	0.39 ic	0.00	---	0.00	0.00	---	---	---	---	0.391
0.91	1,420	2041.41	0.52 ic	0.52 ic	0.00	---	0.00	0.00	---	---	---	---	0.517
0.98	1,621	2041.48	0.66 ic	0.66 ic	0.00	---	0.00	0.00	---	---	---	---	0.663
1.04	1,823	2041.54	0.84 ic	0.81 ic	0.00	---	0.00	0.00	---	---	---	---	0.812
1.11	2,025	2041.61	0.97 ic	0.95 ic	0.00	---	0.00	0.00	---	---	---	---	0.950
1.17	2,226	2041.67	1.04 ic	1.04 ic	0.00	---	0.00	0.00	---	---	---	---	1.044
1.24	2,428	2041.74	1.13 ic	1.12 ic	0.00	---	0.00	0.00	---	---	---	---	1.125
1.30	2,629	2041.80	1.21 ic	1.21 ic	0.00	---	0.00	0.00	---	---	---	---	1.206
1.37	2,926	2041.87	1.29 ic	1.29 ic	0.00	---	0.00	0.00	---	---	---	---	1.285
1.43	3,224	2041.93	1.37 ic	1.36 ic	0.00	---	0.00	0.00	---	---	---	---	1.360
1.50	3,521	2042.00	1.46 ic	1.43 ic	0.00	---	0.00	0.00	---	---	---	---	1.427
1.56	3,818	2042.06	1.55 ic	1.49 ic	0.00	---	0.00	0.00	---	---	---	---	1.491
1.63	4,115	2042.13	1.56 ic	1.56 ic	0.00	---	0.00	0.00	---	---	---	---	1.564
1.70	4,412	2042.19	1.65 ic	1.63 ic	0.00	---	0.00	0.00	---	---	---	---	1.628
1.76	4,709	2042.26	1.76 ic	1.68 ic	0.00	---	0.00	0.00	---	---	---	---	1.684
1.83	5,006	2042.32	1.76 ic	1.75 ic	0.00	---	0.00	0.00	---	---	---	---	1.755
1.89	5,303	2042.39	1.86 ic	1.81 ic	0.00	---	0.00	0.00	---	---	---	---	1.807
1.96	5,600	2042.46	1.87 ic	1.87 ic	0.00	---	0.00	0.00	---	---	---	---	1.869
2.02	5,939	2042.52	1.97 ic	1.92 ic	0.00	---	0.00	0.00	---	---	---	---	1.921

Continues on next page...

Union North Underground Det.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.09	6,277	2042.59	1.98 ic	1.98 ic	0.00	---	0.00	0.00	---	---	---	---	1.980
2.15	6,616	2042.65	2.09 ic	2.03 ic	0.00	---	0.00	0.00	---	---	---	---	2.029
2.22	6,954	2042.72	2.09 ic	2.09 ic	0.00	---	0.00	0.00	---	---	---	---	2.088
2.28	7,292	2042.78	2.21 ic	2.13 ic	0.00	---	0.00	0.00	---	---	---	---	2.131
2.35	7,631	2042.85	2.21 ic	2.19 ic	0.00	---	0.00	0.00	---	---	---	---	2.188
2.41	7,969	2042.91	2.23 ic	2.23 ic	0.00	---	0.00	0.00	---	---	---	---	2.232
2.48	8,308	2042.98	2.33 ic	2.28 ic	0.00	---	0.00	0.00	---	---	---	---	2.283
2.54	8,646	2043.04	2.33 ic	2.33 ic	0.00	---	0.00	0.00	---	---	---	---	2.334
2.61	8,985	2043.11	2.46 ic	2.37 ic	0.00	---	0.00	0.00	---	---	---	---	2.374
2.67	9,335	2043.17	2.46 ic	2.42 ic	0.00	---	0.00	0.00	---	---	---	---	2.424
2.74	9,686	2043.24	2.47 ic	2.47 ic	0.00	---	0.00	0.00	---	---	---	---	2.470
2.80	10,037	2043.30	2.59 ic	2.51 ic	0.00	---	0.00	0.00	---	---	---	---	2.510
2.87	10,388	2043.37	2.59 ic	2.56 ic	0.00	---	0.00	0.00	---	---	---	---	2.558
2.93	10,739	2043.43	2.60 ic	2.60 ic	0.00	---	0.00	0.00	---	---	---	---	2.602
3.00	11,090	2043.50	2.73 ic	2.64 ic	0.00	---	0.00	0.00	---	---	---	---	2.639
3.06	11,441	2043.56	3.02 ic	2.66 ic	0.33 ic	---	0.00	0.00	---	---	---	---	2.994
3.13	11,791	2043.63	3.64 ic	2.66 ic	0.95 ic	---	0.00	0.00	---	---	---	---	3.610
3.19	12,142	2043.69	4.52 ic	2.64 ic	1.76 ic	---	0.00	0.00	---	---	---	---	4.394
3.26	12,493	2043.76	5.33 ic	2.62 ic	2.71 ic	---	0.00	0.00	---	---	---	---	5.333
3.33	12,836	2043.82	6.39 ic	2.60 ic	3.79 ic	---	0.00	0.00	---	---	---	---	6.393
3.39	13,180	2043.89	7.56 ic	2.58 ic	4.98 ic	---	0.00	0.00	---	---	---	---	7.562
3.46	13,523	2043.96	8.55 ic	2.57 ic	5.99 ic	---	0.00	0.00	---	---	---	---	8.554
3.52	13,866	2044.02	9.31 ic	2.58 ic	6.73 ic	---	0.00	0.00	---	---	---	---	9.305
3.59	14,209	2044.09	10.06 ic	2.59 ic	7.40 ic	---	0.00	0.00	---	---	---	---	9.985
3.65	14,552	2044.15	10.61 ic	2.60 ic	8.01 ic	---	0.00	0.00	---	---	---	---	10.61
3.72	14,896	2044.22	11.19 ic	2.62 ic	8.58 ic	---	0.00	0.00	---	---	---	---	11.19
3.78	15,239	2044.28	11.75 ic	2.63 ic	9.11 ic	---	0.00	0.00	---	---	---	---	11.75
3.85	15,582	2044.35	12.27 ic	2.66 ic	9.62 ic	---	0.00	0.00	---	---	---	---	12.27
3.91	15,925	2044.41	12.79 ic	2.68 ic	10.10 ic	---	0.00	0.00	---	---	---	---	12.78
3.98	16,236	2044.48	13.35 ic	2.70 ic	10.55 ic	---	0.00	0.00	---	---	---	---	13.25
4.04	16,546	2044.54	13.91 ic	2.72 ic	10.99 ic	---	0.00	0.00	---	---	---	---	13.71
4.11	16,856	2044.61	14.19 ic	2.75 ic	11.41 ic	---	0.00	0.00	---	---	---	---	14.16
4.17	17,166	2044.67	14.74 ic	2.77 ic	11.82 ic	---	0.00	0.00	---	---	---	---	14.59
4.24	17,477	2044.74	15.02 ic	2.80 ic	12.21 ic	---	0.00	0.00	---	---	---	---	15.01
4.30	17,787	2044.80	15.57 ic	2.82 ic	12.59 ic	---	0.00	0.00	---	---	---	---	15.41
4.37	18,097	2044.87	15.85 ic	2.85 ic	12.96 ic	---	0.00	0.00	---	---	---	---	15.81
4.43	18,408	2044.93	16.19 ic	2.87 ic	13.32 ic	---	0.00	0.00	---	---	---	---	16.19
4.50	18,718	2045.00	16.66 ic	2.90 ic	13.67 ic	---	0.00	0.00	---	---	---	---	16.57
4.56	19,028	2045.06	16.94 ic	2.93 ic	14.02 ic	---	0.00	0.00	---	---	---	---	16.94
4.63	19,266	2045.13	17.46 ic	2.95 ic	14.35 ic	---	0.00	0.00	---	---	---	---	17.30
4.69	19,504	2045.19	17.72 ic	2.98 ic	14.67 ic	---	0.00	0.00	---	---	---	---	17.65
4.76	19,742	2045.26	18.01 ic	3.00 ic	14.99 ic	---	0.00	0.02	---	---	---	---	18.01
4.82	19,980	2045.32	18.50 ic	3.03 ic	15.30 ic	---	0.00	0.05	---	---	---	---	18.38
4.89	20,218	2045.39	18.76 ic	3.05 ic	15.61 ic	---	0.00	0.09	---	---	---	---	18.76
4.96	20,456	2045.45	19.24 ic	3.07 ic	15.91 ic	---	0.00	0.14	---	---	---	---	19.13
5.02	20,694	2045.52	19.50 ic	3.10 ic	16.20 ic	---	0.00	0.20	---	---	---	---	19.50
5.09	20,932	2045.58	20.01 oc	3.11 ic	16.49 ic	---	0.00	0.26	---	---	---	---	19.87
5.15	21,169	2045.65	20.30 oc	3.13 ic	16.78 ic	---	0.00	0.33	---	---	---	---	20.24
5.22	21,407	2045.72	20.71 oc	3.15 ic	17.06 ic	---	0.00	0.41	---	---	---	---	20.61
5.28	21,597	2045.78	21.08 oc	3.16 ic	17.33 ic	---	0.00	0.49	---	---	---	---	20.98
5.35	21,786	2045.85	21.42 oc	3.17 ic	17.60 ic	---	0.00	0.57	---	---	---	---	21.34
5.41	21,975	2045.91	21.72 oc	3.19 ic	17.87 ic	---	0.00	0.66	---	---	---	---	21.71
5.48	22,164	2045.98	22.15 oc	3.19 ic	18.13 ic	---	0.00	0.75	---	---	---	---	22.07
5.54	22,354	2046.04	22.48 oc	3.19 ic	18.39 ic	---	0.00	0.85	---	---	---	---	22.43
5.61	22,543	2046.11	22.80 oc	3.19 ic	18.64 ic	---	0.00	0.95	---	---	---	---	22.79
5.67	22,732	2046.17	23.10 oc	3.15 ic	18.89 ic	---	0.00	1.05	---	---	---	---	23.10
5.74	22,921	2046.24	23.48 oc	3.18 ic	19.14 ic	---	0.00	1.16	---	---	---	---	23.48
5.80	23,111	2046.30	23.87 oc	3.20 ic	19.39 ic	---	0.00	1.27	---	---	---	---	23.86
5.87	23,300	2046.37	24.25 oc	3.23 ic	19.63 ic	---	0.00	1.39	---	---	---	---	24.25
5.93	23,484	2046.43	24.63 oc	3.25 ic	19.87 ic	---	0.00	1.51	---	---	---	---	24.63
6.00	23,668	2046.50	25.01 oc	3.28 ic	20.11 ic	---	0.00	1.63	---	---	---	---	25.01
6.06	23,852	2046.56	25.39 oc	3.30 ic	20.34 ic	---	0.00	1.75	---	---	---	---	25.39
6.13	24,036	2046.63	25.78 oc	3.33 ic	20.57 ic	---	0.00	1.88	---	---	---	---	25.78
6.19	24,220	2046.69	26.16 oc	3.35 ic	20.80 ic	---	0.00	2.01	---	---	---	---	26.16
6.26	24,404	2046.76	26.54 oc	3.37 ic	21.03 ic	---	0.00	2.14	---	---	---	---	26.54
6.32	24,588	2046.82	26.86 oc	3.40 ic	21.19 ic	---	0.00	2.28	---	---	---	---	26.86
6.39	24,772	2046.89	27.18 oc	3.42 ic	21.34 ic	---	0.00	2.41	---	---	---	---	27.18
6.45	24,956	2046.95	27.50 oc	3.45 ic	21.50 ic	---	0.00	2.55	---	---	---	---	27.50
6.52	25,140	2047.02	27.82 oc	3.47 ic	21.65 ic	---	0.00	2.70	---	---	---	---	27.82

...End

Hydrograph Report

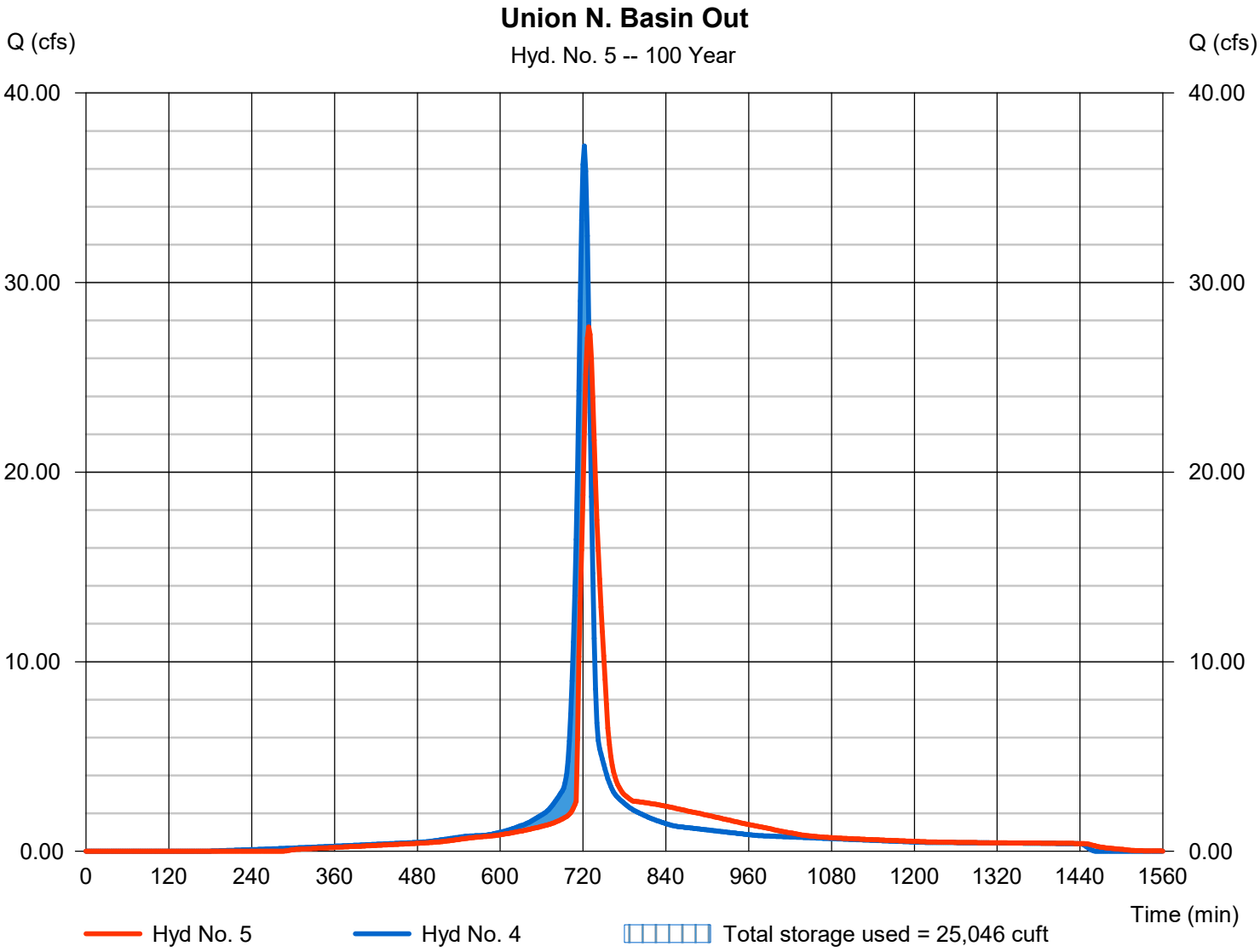
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 5

Union N. Basin Out

Hydrograph type	=	Reservoir	Peak discharge	=	27.66 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	110,736 cuft
Inflow hyd. No.	=	4 - Union North Detention inflow	Max. Elevation	=	2046.99 ft
Reservoir name	=	Union North Underground Det.	Max. Storage	=	25,046 cuft

Storage Indication method used.

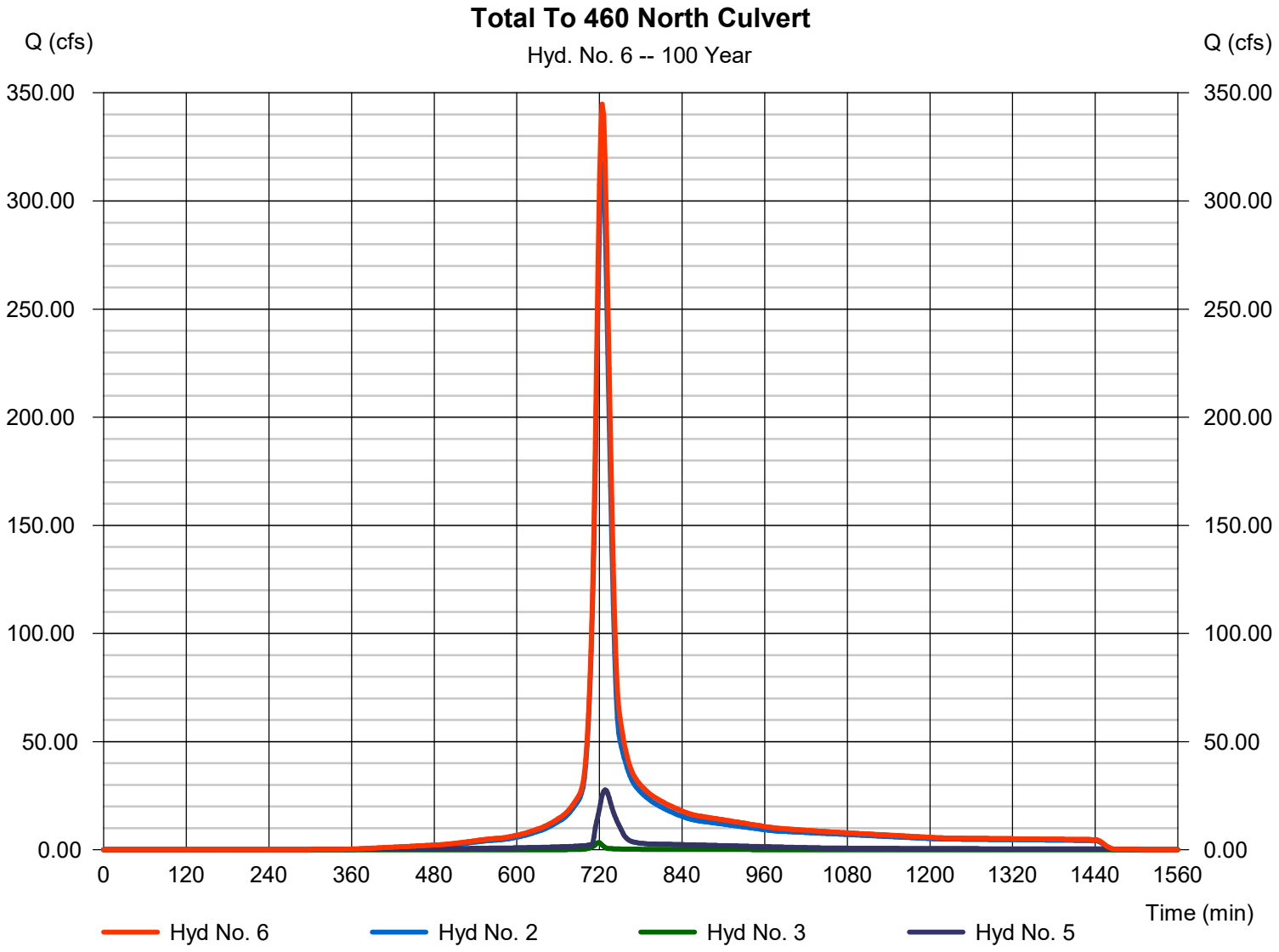


Hydrograph Report

Hyd. No. 6

Total To 460 North Culvert

Hydrograph type	= Combine	Peak discharge	= 344.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,117,819 cuft
Inflow hyds.	= 2, 3, 5	Contrib. drain. area	= 64.910 ac



Pond Report

Pond No. 8 - 460 North Culvert HW Storage

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 2033.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2033.00	00	0	0
2.00	2035.00	271	271	271
3.00	2036.00	997	634	905
4.00	2037.00	1,787	1,392	2,297
5.00	2038.00	3,429	2,608	4,905
6.00	2039.00	4,748	4,089	8,994
7.00	2040.00	7,034	5,891	14,885
8.00	2041.00	8,939	7,987	22,871
9.00	2042.00	11,317	10,128	32,999
10.00	2043.00	13,359	12,338	45,337
11.00	2044.00	15,556	14,458	59,795
12.00	2045.00	18,050	16,803	76,598

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 48.00	0.00	0.00	0.00
Span (in)	= 48.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 2033.10	0.00	0.00	0.00
Length (ft)	= 160.50	0.00	0.00	0.00
Slope (%)	= 2.69	0.00	0.00	n/a
N-Value	= .024	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2033.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.20	27	2033.20	0.09 ic	---	---	---	---	---	---	---	---	---	0.091
0.40	54	2033.40	0.80 ic	---	---	---	---	---	---	---	---	---	0.804
0.60	81	2033.60	2.19 ic	---	---	---	---	---	---	---	---	---	2.195
0.80	108	2033.80	4.22 ic	---	---	---	---	---	---	---	---	---	4.217
1.00	136	2034.00	6.86 ic	---	---	---	---	---	---	---	---	---	6.857
1.20	163	2034.20	10.03 ic	---	---	---	---	---	---	---	---	---	10.03
1.40	190	2034.40	13.78 ic	---	---	---	---	---	---	---	---	---	13.78
1.60	217	2034.60	17.99 ic	---	---	---	---	---	---	---	---	---	17.99
1.80	244	2034.80	22.63 ic	---	---	---	---	---	---	---	---	---	22.63
2.00	271	2035.00	27.66 ic	---	---	---	---	---	---	---	---	---	27.66
2.10	334	2035.10	30.31 ic	---	---	---	---	---	---	---	---	---	30.31
2.20	398	2035.20	32.98 ic	---	---	---	---	---	---	---	---	---	32.98
2.30	461	2035.30	35.78 ic	---	---	---	---	---	---	---	---	---	35.78
2.40	525	2035.40	38.63 ic	---	---	---	---	---	---	---	---	---	38.63
2.50	588	2035.50	41.58 ic	---	---	---	---	---	---	---	---	---	41.58
2.60	651	2035.60	44.49 ic	---	---	---	---	---	---	---	---	---	44.49
2.70	715	2035.70	47.47 ic	---	---	---	---	---	---	---	---	---	47.47
2.80	778	2035.80	50.51 ic	---	---	---	---	---	---	---	---	---	50.51
2.90	842	2035.90	53.53 ic	---	---	---	---	---	---	---	---	---	53.53
3.00	905	2036.00	56.62 ic	---	---	---	---	---	---	---	---	---	56.62
3.10	1,044	2036.10	59.65 ic	---	---	---	---	---	---	---	---	---	59.65
3.20	1,183	2036.20	62.66 ic	---	---	---	---	---	---	---	---	---	62.66
3.30	1,323	2036.30	65.66 ic	---	---	---	---	---	---	---	---	---	65.66
3.40	1,462	2036.40	68.61 ic	---	---	---	---	---	---	---	---	---	68.61
3.50	1,601	2036.50	71.49 ic	---	---	---	---	---	---	---	---	---	71.49
3.60	1,740	2036.60	74.27 ic	---	---	---	---	---	---	---	---	---	74.27
3.70	1,879	2036.70	76.97 ic	---	---	---	---	---	---	---	---	---	76.97
3.80	2,019	2036.80	79.50 ic	---	---	---	---	---	---	---	---	---	79.50
3.90	2,158	2036.90	81.85 ic	---	---	---	---	---	---	---	---	---	81.85
4.00	2,297	2037.00	83.93 ic	---	---	---	---	---	---	---	---	---	83.93

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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
4.10	2,558	2037.10	85.56 ic	---	---	---	---	---	---	---	---	---	85.56
4.20	2,819	2037.20	87.67 ic	---	---	---	---	---	---	---	---	---	87.67
4.30	3,079	2037.30	89.74 ic	---	---	---	---	---	---	---	---	---	89.74
4.40	3,340	2037.40	91.75 ic	---	---	---	---	---	---	---	---	---	91.75
4.50	3,601	2037.50	93.73 ic	---	---	---	---	---	---	---	---	---	93.73
4.60	3,862	2037.60	95.66 ic	---	---	---	---	---	---	---	---	---	95.66
4.70	4,123	2037.70	97.55 ic	---	---	---	---	---	---	---	---	---	97.55
4.80	4,383	2037.80	99.41 ic	---	---	---	---	---	---	---	---	---	99.41
4.90	4,644	2037.90	101.24 ic	---	---	---	---	---	---	---	---	---	101.24
5.00	4,905	2038.00	103.03 ic	---	---	---	---	---	---	---	---	---	103.03
5.10	5,314	2038.10	104.79 ic	---	---	---	---	---	---	---	---	---	104.79
5.20	5,723	2038.20	106.52 ic	---	---	---	---	---	---	---	---	---	106.52
5.30	6,132	2038.30	108.23 ic	---	---	---	---	---	---	---	---	---	108.23
5.40	6,540	2038.40	109.90 ic	---	---	---	---	---	---	---	---	---	109.90
5.50	6,949	2038.50	111.56 ic	---	---	---	---	---	---	---	---	---	111.56
5.60	7,358	2038.60	113.18 ic	---	---	---	---	---	---	---	---	---	113.18
5.70	7,767	2038.70	114.79 ic	---	---	---	---	---	---	---	---	---	114.79
5.80	8,176	2038.80	116.37 ic	---	---	---	---	---	---	---	---	---	116.37
5.90	8,585	2038.90	117.94 ic	---	---	---	---	---	---	---	---	---	117.94
6.00	8,994	2039.00	119.48 ic	---	---	---	---	---	---	---	---	---	119.48
6.10	9,583	2039.10	121.00 ic	---	---	---	---	---	---	---	---	---	121.00
6.20	10,172	2039.20	122.50 ic	---	---	---	---	---	---	---	---	---	122.50
6.30	10,761	2039.30	123.99 ic	---	---	---	---	---	---	---	---	---	123.99
6.40	11,350	2039.40	125.45 ic	---	---	---	---	---	---	---	---	---	125.45
6.50	11,939	2039.50	126.90 ic	---	---	---	---	---	---	---	---	---	126.90
6.60	12,528	2039.60	128.34 ic	---	---	---	---	---	---	---	---	---	128.34
6.70	13,117	2039.70	129.69 oc	---	---	---	---	---	---	---	---	---	129.69
6.80	13,706	2039.80	130.63 oc	---	---	---	---	---	---	---	---	---	130.63
6.90	14,295	2039.90	131.55 oc	---	---	---	---	---	---	---	---	---	131.55
7.00	14,885	2040.00	132.47 oc	---	---	---	---	---	---	---	---	---	132.47
7.10	15,683	2040.10	133.39 oc	---	---	---	---	---	---	---	---	---	133.39
7.20	16,482	2040.20	134.30 oc	---	---	---	---	---	---	---	---	---	134.30
7.30	17,280	2040.30	135.20 oc	---	---	---	---	---	---	---	---	---	135.20
7.40	18,079	2040.40	136.10 oc	---	---	---	---	---	---	---	---	---	136.10
7.50	18,878	2040.50	136.99 oc	---	---	---	---	---	---	---	---	---	136.99
7.60	19,676	2040.60	137.87 oc	---	---	---	---	---	---	---	---	---	137.87
7.70	20,475	2040.70	138.75 oc	---	---	---	---	---	---	---	---	---	138.75
7.80	21,274	2040.80	139.62 oc	---	---	---	---	---	---	---	---	---	139.62
7.90	22,072	2040.90	140.49 oc	---	---	---	---	---	---	---	---	---	140.49
8.00	22,871	2041.00	141.35 oc	---	---	---	---	---	---	---	---	---	141.35
8.10	23,884	2041.10	142.21 oc	---	---	---	---	---	---	---	---	---	142.21
8.20	24,897	2041.20	143.06 oc	---	---	---	---	---	---	---	---	---	143.06
8.30	25,909	2041.30	143.91 oc	---	---	---	---	---	---	---	---	---	143.91
8.40	26,922	2041.40	144.75 oc	---	---	---	---	---	---	---	---	---	144.75
8.50	27,935	2041.50	145.59 oc	---	---	---	---	---	---	---	---	---	145.59
8.60	28,948	2041.60	146.42 oc	---	---	---	---	---	---	---	---	---	146.42
8.70	29,961	2041.70	147.25 oc	---	---	---	---	---	---	---	---	---	147.25
8.80	30,973	2041.80	148.07 oc	---	---	---	---	---	---	---	---	---	148.07
8.90	31,986	2041.90	148.89 oc	---	---	---	---	---	---	---	---	---	148.89
9.00	32,999	2042.00	149.71 oc	---	---	---	---	---	---	---	---	---	149.71
9.10	34,233	2042.10	150.52 oc	---	---	---	---	---	---	---	---	---	150.52
9.20	35,467	2042.20	151.32 oc	---	---	---	---	---	---	---	---	---	151.32
9.30	36,700	2042.30	152.12 oc	---	---	---	---	---	---	---	---	---	152.12
9.40	37,934	2042.40	152.92 oc	---	---	---	---	---	---	---	---	---	152.92
9.50	39,168	2042.50	153.71 oc	---	---	---	---	---	---	---	---	---	153.71
9.60	40,402	2042.60	154.50 oc	---	---	---	---	---	---	---	---	---	154.50
9.70	41,636	2042.70	155.29 oc	---	---	---	---	---	---	---	---	---	155.29
9.80	42,869	2042.80	156.07 oc	---	---	---	---	---	---	---	---	---	156.07
9.90	44,103	2042.90	156.85 oc	---	---	---	---	---	---	---	---	---	156.85
10.00	45,337	2043.00	157.62 oc	---	---	---	---	---	---	---	---	---	157.62
10.10	46,783	2043.10	158.39 oc	---	---	---	---	---	---	---	---	---	158.39
10.20	48,229	2043.20	159.15 oc	---	---	---	---	---	---	---	---	---	159.15
10.30	49,674	2043.30	159.92 oc	---	---	---	---	---	---	---	---	---	159.92
10.40	51,120	2043.40	160.67 oc	---	---	---	---	---	---	---	---	---	160.67
10.50	52,566	2043.50	161.43 oc	---	---	---	---	---	---	---	---	---	161.43
10.60	54,012	2043.60	162.18 oc	---	---	---	---	---	---	---	---	---	162.18
10.70	55,457	2043.70	162.93 oc	---	---	---	---	---	---	---	---	---	162.93
10.80	56,903	2043.80	163.67 oc	---	---	---	---	---	---	---	---	---	163.67
10.90	58,349	2043.90	164.41 oc	---	---	---	---	---	---	---	---	---	164.41
11.00	59,795	2044.00	165.15 oc	---	---	---	---	---	---	---	---	---	165.15
11.10	61,475	2044.10	165.89 oc	---	---	---	---	---	---	---	---	---	165.89
11.20	63,155	2044.20	166.62 oc	---	---	---	---	---	---	---	---	---	166.62

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Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
11.30	64,835	2044.30	167.35 oc	---	---	---	---	---	---	---	---	---	167.35
11.40	66,516	2044.40	168.07 oc	---	---	---	---	---	---	---	---	---	168.07
11.50	68,196	2044.50	168.79 oc	---	---	---	---	---	---	---	---	---	168.79
11.60	69,876	2044.60	169.51 oc	---	---	---	---	---	---	---	---	---	169.51
11.70	71,557	2044.70	170.23 oc	---	---	---	---	---	---	---	---	---	170.23
11.80	73,237	2044.80	170.94 oc	---	---	---	---	---	---	---	---	---	170.94
11.90	74,917	2044.90	171.65 oc	---	---	---	---	---	---	---	---	---	171.65
12.00	76,598	2045.00	172.36 oc	---	---	---	---	---	---	---	---	---	172.36

...End

Hydrograph Report

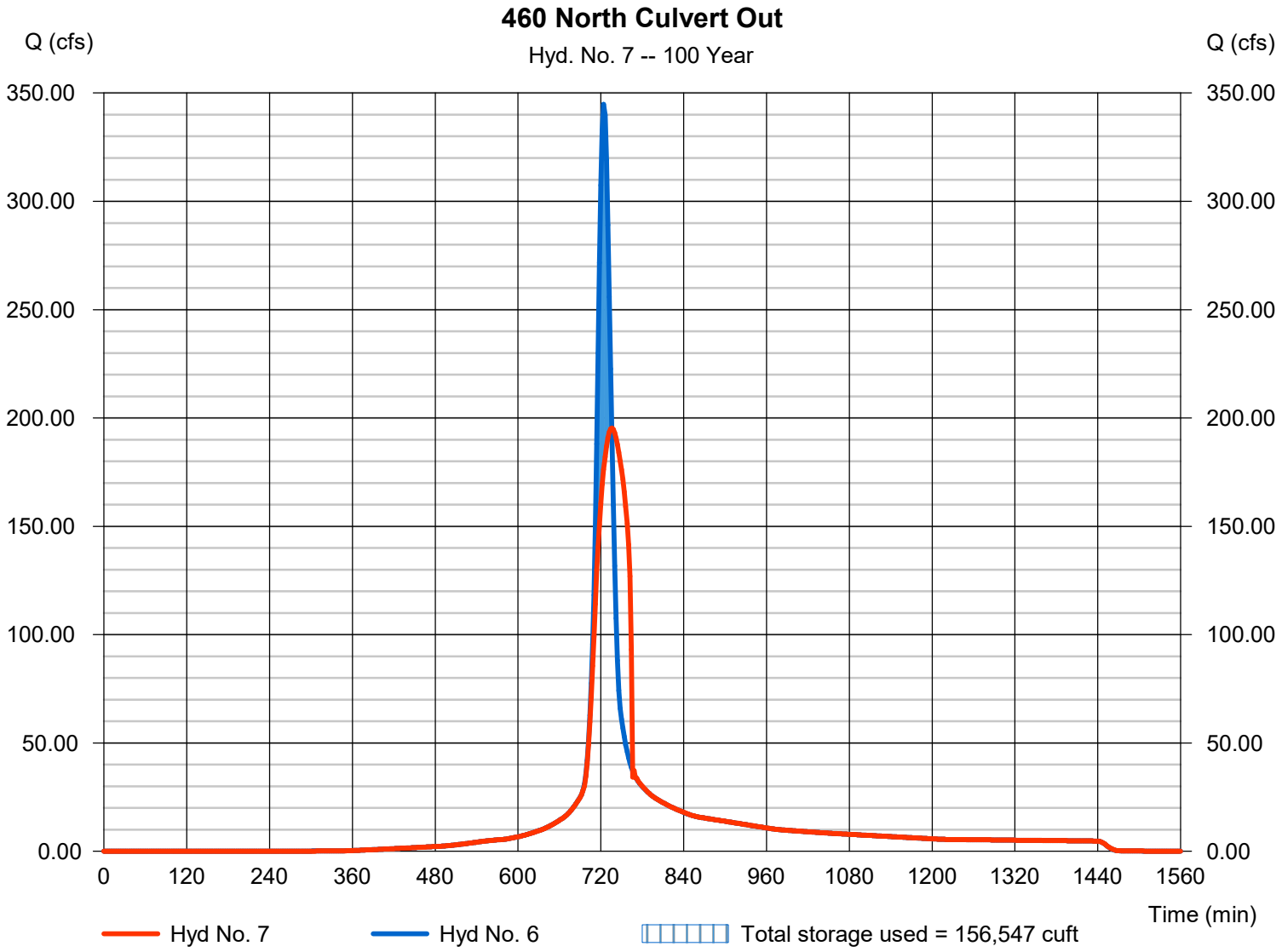
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 7

460 North Culvert Out

Hydrograph type	=	Reservoir	Peak discharge	=	195.32 cfs
Storm frequency	=	100 yrs	Time to peak	=	736 min
Time interval	=	2 min	Hyd. volume	=	1,117,818 cuft
Inflow hyd. No.	=	6 - Total To 460 North Culvert	Max. Elevation	=	2048.47 ft
Reservoir name	=	460 North Culvert HW Storage	Max. Storage	=	156,547 cuft

Storage Indication method used.



Drainage Area Runoff and Time of Concentration

Drainage Area: **Offsite Village area to Ex TOB Pond**

PREDEVELOPMENT

Composite Curve Number (CN)						Notes:
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	-	Impervious	98	2.26	221.76	
CN_2	B	Managed Turf	61	0.47	28.64	
CN_3	C	Managed Turf	74	0.75	55.57	
CN_4	D	Managed Turf	80	2.35	188.06	
CN_5	B	Brush (Good)	48	2.59	124.15	Includes adjacent 460 runoff
CN_6	C	Brush (Good)	65	3.37	219.10	
CN_7	D	Brush (Good)	73	2.27	165.87	
CN_8					0.00	
CN_9					0.00	
CN_{10}					0.00	
				Total	**14.06**	**1003.15**
					Composite CN =	**71**

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Grass	100	0.24	0.07	9.4
2	Shallow Conc.	Unpaved	40		0.35	0.1
3	Channel	Grass	1234	0.03	0.032	4.3
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**13.7**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	71	71	71
Storage (in.) S=1000/CN-10	4.08	4.08	4.08
Initial abstraction (in.), I_a=0.2S	0.82	0.82	0.82
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.38	1.44	3.26
Runoff volume (ac-ft), RV = Q/12*A	0.44	1.68	3.82
Flow rate (cfs), q_{peak} from hydrograph	5.15	24.66	

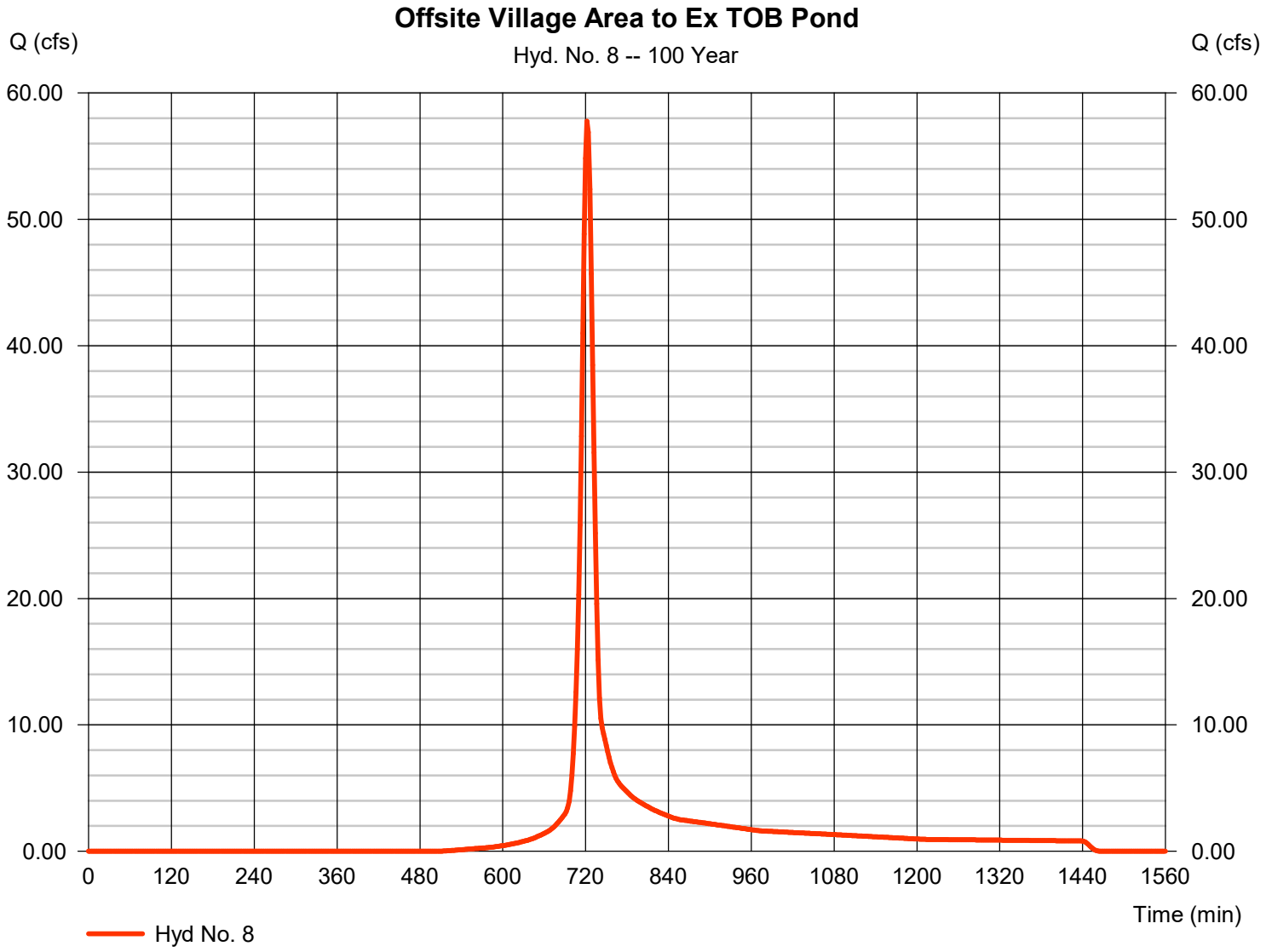
Hydrograph Number: 8

Hydrograph Report

Hyd. No. 8

Offsite Village Area to Ex TOB Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 57.77 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 162,083 cuft
Drainage area	= 14.060 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.70 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Drainage Area Runoff and Time of Concentration

Drainage Area: **Onsite flow into Ex. TOB Pond**

PREDEVELOPMENT

Composite Curve Number (CN)						Notes:
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	-	Impervious	98	0.00	0.00	
CN_2	B	Open Space (Good)	61	3.64	221.94	
CN_3	C	Open Space (Good)	74	1.04	77.04	
CN_4					0.00	
CN_5					0.00	
CN_6					0.00	
CN_7					0.00	
CN_8					0.00	
CN_9					0.00	
CN_{10}					0.00	
			Total	**4.68**	**298.98**	
				Composite CN =	**64**	

Time of Concentration, T_c						
		2 yr. Precip. (in.) =	2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Grass	100	0.24	0.05	10.7
2	Shallow Conc.	Unpaved	380		0.105	1.2
3	Channel	Grass	240	0.03	0.021	1.2
4						
5						
6						
7						
8						
9						
10						
				Total Time of Concentration, T_c (min.) =		**13.2**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	64	64	64
Storage (in.) S=1000/CN-10	5.63	5.63	5.63
Initial abstraction (in.), I_a=0.2S	1.13	1.13	1.13
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.19	1.01	2.58
Runoff volume (ac-ft), RV = Q/12*A	0.07	0.39	1.01
Flow rate (cfs), q_{peak} from hydrograph	0.56	6.28	

Hydrograph Number: 9

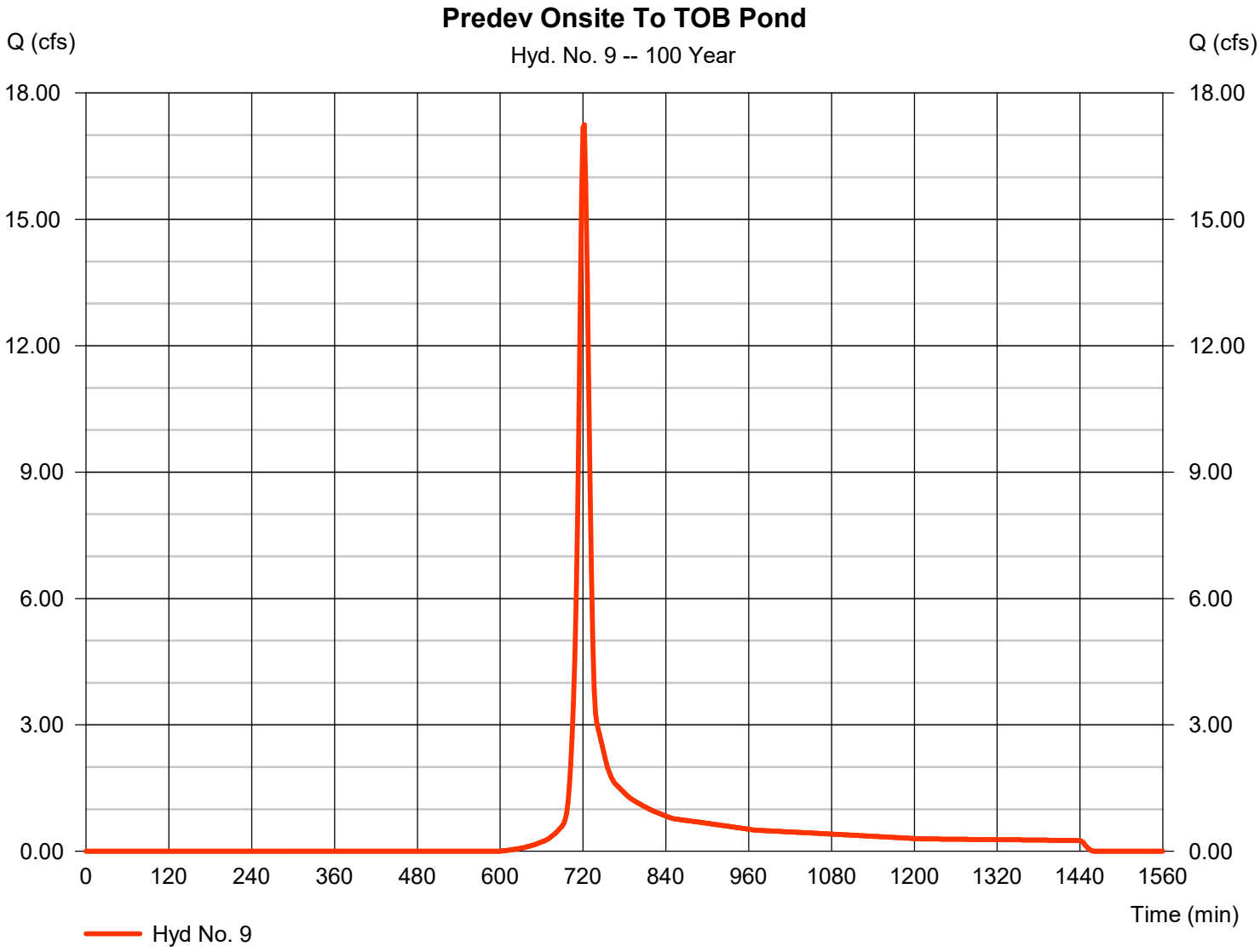
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 9

Predev Onsite To TOB Pond

Hydrograph type	= SCS Runoff	Peak discharge	= 17.24 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 45,238 cuft
Drainage area	= 4.680 ac	Curve number	= 64
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.20 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

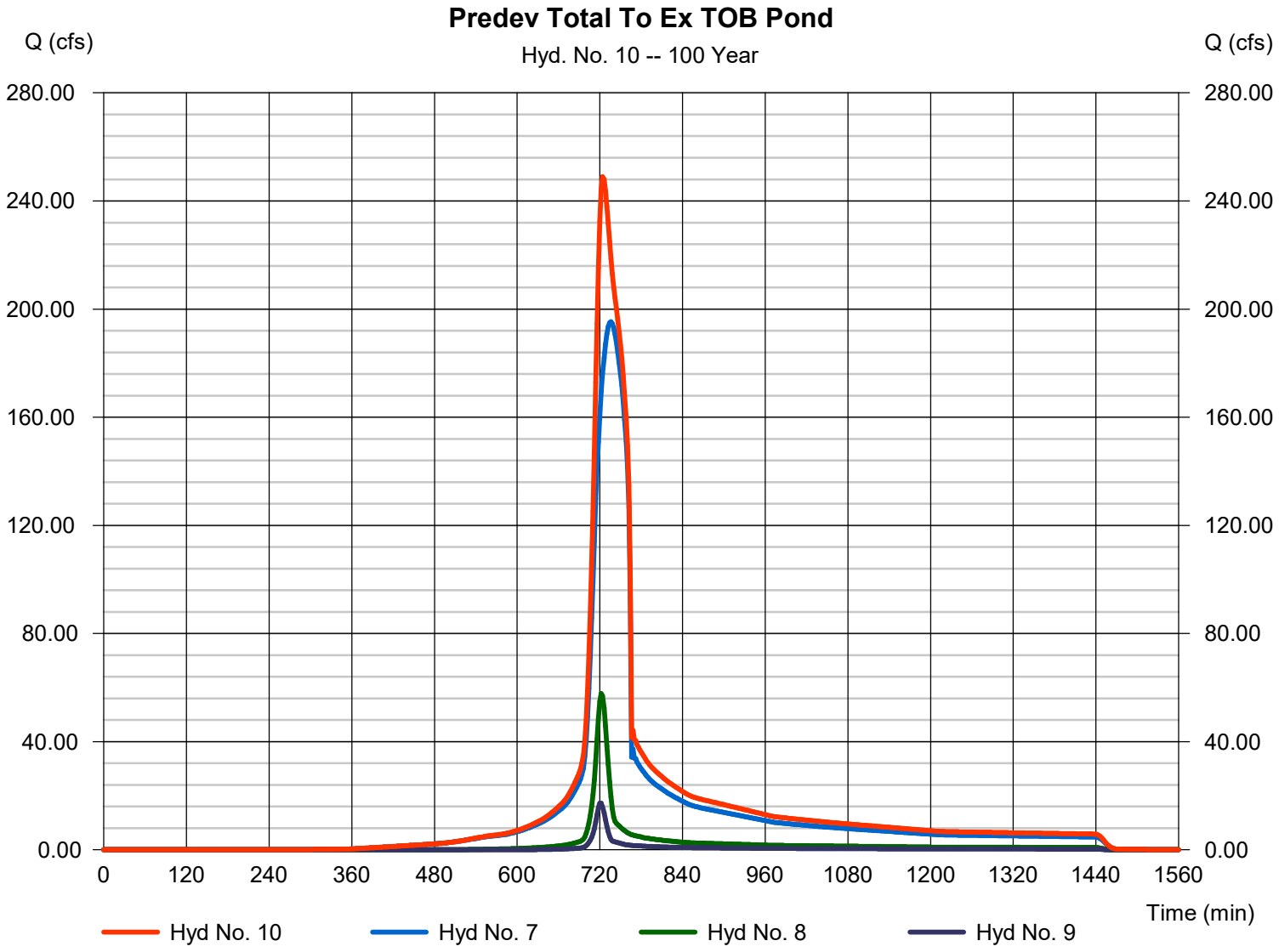


Hydrograph Report

Hyd. No. 10

Predev Total To Ex TOB Pond

Hydrograph type	= Combine	Peak discharge	= 248.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,325,138 cuft
Inflow hyds.	= 7, 8, 9	Contrib. drain. area	= 18.740 ac



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 04 / 29 / 2022

Pond No. 6 - Ex. TOB Pond A

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2018.40 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2018.40	00	0	0
0.60	2019.00	40	8	8
1.60	2020.00	600	265	273
2.60	2021.00	2,410	1,404	1,677
3.60	2022.00	5,600	3,894	5,571
3.70	2022.10	6,095	585	6,156
3.80	2022.20	6,590	634	6,790
3.90	2022.30	7,085	683	7,473
4.00	2022.40	7,580	733	8,206
4.10	2022.50	8,075	783	8,989
4.20	2022.60	8,570	832	9,821
4.30	2022.70	9,065	882	10,703
4.40	2022.80	9,560	931	11,634
4.50	2022.90	10,055	981	12,614
4.60	2023.00	10,550	1,030	13,644
5.60	2024.00	12,758	11,635	25,279
7.60	2026.00	26,128	38,092	63,371
9.60	2028.00	37,922	63,679	127,050
11.60	2030.00	56,606	93,897	220,947
13.60	2032.00	83,164	138,907	359,854
15.60	2034.00	102,699	185,501	545,355

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 21.00	1.70	0.00	0.00
Span (in)	= 21.00	1.70	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 2018.30	2018.50	0.00	0.00
Length (ft)	= 125.00	0.50	0.00	0.00
Slope (%)	= 1.00	1.00	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)	= 9.42	40.00	0.00	0.00
Crest El. (ft)	= 2022.70	2032.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2018.40	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.06	1	2018.46	0.06 ic	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.12	2	2018.52	0.06 ic	0.00 ic	---	---	0.00	0.00	---	---	---	---	0.001
0.18	2	2018.58	0.06 ic	0.01 ic	---	---	0.00	0.00	---	---	---	---	0.009
0.24	3	2018.64	0.06 ic	0.02 ic	---	---	0.00	0.00	---	---	---	---	0.020
0.30	4	2018.70	0.06 ic	0.03 ic	---	---	0.00	0.00	---	---	---	---	0.027
0.36	5	2018.76	0.06 ic	0.03 ic	---	---	0.00	0.00	---	---	---	---	0.033
0.42	6	2018.82	0.06 ic	0.04 ic	---	---	0.00	0.00	---	---	---	---	0.038
0.48	6	2018.88	0.06 ic	0.04 ic	---	---	0.00	0.00	---	---	---	---	0.042
0.54	7	2018.94	0.06 ic	0.05 ic	---	---	0.00	0.00	---	---	---	---	0.046
0.60	8	2019.00	0.06 ic	0.05 ic	---	---	0.00	0.00	---	---	---	---	0.050
0.70	34	2019.10	0.06 ic	0.06 ic	---	---	0.00	0.00	---	---	---	---	0.055
0.80	61	2019.20	0.06 ic	0.06 ic	---	---	0.00	0.00	---	---	---	---	0.060
0.90	87	2019.30	0.07 ic	0.06 ic	---	---	0.00	0.00	---	---	---	---	0.065
1.00	114	2019.40	0.08 ic	0.07 ic	---	---	0.00	0.00	---	---	---	---	0.069
1.10	140	2019.50	0.08 ic	0.07 ic	---	---	0.00	0.00	---	---	---	---	0.073
1.20	167	2019.60	0.08 ic	0.08 ic	---	---	0.00	0.00	---	---	---	---	0.077
1.30	193	2019.70	0.08 ic	0.08 ic	---	---	0.00	0.00	---	---	---	---	0.081
1.40	220	2019.80	0.08 ic	0.08 ic	---	---	0.00	0.00	---	---	---	---	0.084
1.50	246	2019.90	0.09 ic	0.09 ic	---	---	0.00	0.00	---	---	---	---	0.087
1.60	273	2020.00	0.09 ic	0.09 ic	---	---	0.00	0.00	---	---	---	---	0.091
1.70	413	2020.10	0.09 ic	0.09 ic	---	---	0.00	0.00	---	---	---	---	0.094

Continues on next page...

Ex. TOB Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.80	554	2020.20	0.10 ic	0.10 ic	---	---	0.00	0.00	---	---	---	---	0.097
1.90	694	2020.30	0.11 ic	0.10 ic	---	---	0.00	0.00	---	---	---	---	0.100
2.00	835	2020.40	0.11 ic	0.10 ic	---	---	0.00	0.00	---	---	---	---	0.103
2.10	975	2020.50	0.11 ic	0.11 ic	---	---	0.00	0.00	---	---	---	---	0.105
2.20	1,115	2020.60	0.11 ic	0.11 ic	---	---	0.00	0.00	---	---	---	---	0.108
2.30	1,256	2020.70	0.12 ic	0.11 ic	---	---	0.00	0.00	---	---	---	---	0.111
2.40	1,396	2020.80	0.12 ic	0.11 ic	---	---	0.00	0.00	---	---	---	---	0.113
2.50	1,537	2020.90	0.12 ic	0.12 ic	---	---	0.00	0.00	---	---	---	---	0.116
2.60	1,677	2021.00	0.12 ic	0.12 ic	---	---	0.00	0.00	---	---	---	---	0.118
2.70	2,066	2021.10	0.12 ic	0.12 ic	---	---	0.00	0.00	---	---	---	---	0.121
2.80	2,456	2021.20	0.13 ic	0.12 ic	---	---	0.00	0.00	---	---	---	---	0.123
2.90	2,845	2021.30	0.13 ic	0.13 ic	---	---	0.00	0.00	---	---	---	---	0.125
3.00	3,235	2021.40	0.13 ic	0.13 ic	---	---	0.00	0.00	---	---	---	---	0.128
3.10	3,624	2021.50	0.13 ic	0.13 ic	---	---	0.00	0.00	---	---	---	---	0.130
3.20	4,013	2021.60	0.13 ic	0.13 ic	---	---	0.00	0.00	---	---	---	---	0.132
3.30	4,403	2021.70	0.14 ic	0.13 ic	---	---	0.00	0.00	---	---	---	---	0.134
3.40	4,792	2021.80	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.136
3.50	5,182	2021.90	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.138
3.60	5,571	2022.00	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.141
3.61	5,630	2022.01	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.141
3.62	5,688	2022.02	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.141
3.63	5,747	2022.03	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.141
3.64	5,805	2022.04	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.141
3.65	5,863	2022.05	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.142
3.66	5,922	2022.06	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.142
3.67	5,980	2022.07	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.142
3.68	6,039	2022.08	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.142
3.69	6,097	2022.09	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.142
3.70	6,156	2022.10	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.143
3.71	6,219	2022.11	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.143
3.72	6,283	2022.12	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.143
3.73	6,346	2022.13	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.143
3.74	6,409	2022.14	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.143
3.75	6,473	2022.15	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.144
3.76	6,536	2022.16	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.144
3.77	6,600	2022.17	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.144
3.78	6,663	2022.18	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.144
3.79	6,727	2022.19	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.144
3.80	6,790	2022.20	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.145
3.81	6,858	2022.21	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.145
3.82	6,927	2022.22	0.14 ic	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.145
3.83	6,995	2022.23	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.145
3.84	7,063	2022.24	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.145
3.85	7,132	2022.25	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.146
3.86	7,200	2022.26	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.146
3.87	7,268	2022.27	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.146
3.88	7,337	2022.28	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.146
3.89	7,405	2022.29	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.146
3.90	7,473	2022.30	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.147
3.91	7,547	2022.31	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.147
3.92	7,620	2022.32	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.147
3.93	7,693	2022.33	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.147
3.94	7,767	2022.34	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.147
3.95	7,840	2022.35	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.148
3.96	7,913	2022.36	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.148
3.97	7,986	2022.37	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.148
3.98	8,060	2022.38	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.148
3.99	8,133	2022.39	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.148
4.00	8,206	2022.40	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.148
4.01	8,285	2022.41	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.149
4.02	8,363	2022.42	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.149
4.03	8,441	2022.43	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.149
4.04	8,519	2022.44	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.149
4.05	8,598	2022.45	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.149
4.06	8,676	2022.46	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.150
4.07	8,754	2022.47	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.150
4.08	8,832	2022.48	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.150
4.09	8,911	2022.49	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.150
4.10	8,989	2022.50	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.150
4.11	9,072	2022.51	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.151
4.12	9,155	2022.52	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.151
4.13	9,239	2022.53	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.151

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Ex. TOB Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
4.14	9,322	2022.54	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.151
4.15	9,405	2022.55	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.151
4.16	9,488	2022.56	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.152
4.17	9,571	2022.57	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.152
4.18	9,655	2022.58	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.152
4.19	9,738	2022.59	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.152
4.20	9,821	2022.60	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.152
4.21	9,909	2022.61	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.153
4.22	9,997	2022.62	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.153
4.23	10,085	2022.63	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.153
4.24	10,174	2022.64	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.153
4.25	10,262	2022.65	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.153
4.26	10,350	2022.66	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.153
4.27	10,438	2022.67	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.154
4.28	10,526	2022.68	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.154
4.29	10,614	2022.69	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.154
4.30	10,703	2022.70	0.16 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.154
4.31	10,796	2022.71	0.19 ic	0.15 ic	---	---	0.03	0.00	---	---	---	---	0.186
4.32	10,889	2022.72	0.25 ic	0.15 ic	---	---	0.09	0.00	---	---	---	---	0.244
4.33	10,982	2022.73	0.32 ic	0.15 ic	---	---	0.16	0.00	---	---	---	---	0.319
4.34	11,075	2022.74	0.43 ic	0.15 ic	---	---	0.25	0.00	---	---	---	---	0.407
4.35	11,168	2022.75	0.53 ic	0.15 ic	---	---	0.35	0.00	---	---	---	---	0.507
4.36	11,261	2022.76	0.64 ic	0.15 ic	---	---	0.46	0.00	---	---	---	---	0.617
4.37	11,354	2022.77	0.76 ic	0.15 ic	---	---	0.58	0.00	---	---	---	---	0.737
4.38	11,447	2022.78	0.87 ic	0.15 ic	---	---	0.71	0.00	---	---	---	---	0.866
4.39	11,540	2022.79	1.01 ic	0.15 ic	---	---	0.85	0.00	---	---	---	---	1.003
4.40	11,634	2022.80	1.18 ic	0.15 ic	---	---	0.99	0.00	---	---	---	---	1.146
4.41	11,732	2022.81	1.30 ic	0.15 ic	---	---	1.15	0.00	---	---	---	---	1.298
4.42	11,830	2022.82	1.49 ic	0.15 ic	---	---	1.31	0.00	---	---	---	---	1.458
4.43	11,928	2022.83	1.63 ic	0.15 ic	---	---	1.47	0.00	---	---	---	---	1.624
4.44	12,026	2022.84	1.80 ic	0.15 ic	---	---	1.65	0.00	---	---	---	---	1.797
4.45	12,124	2022.85	2.01 ic	0.15 ic	---	---	1.83	0.00	---	---	---	---	1.976
4.46	12,222	2022.86	2.17 ic	0.15 ic	---	---	2.01	0.00	---	---	---	---	2.161
4.47	12,320	2022.87	2.35 ic	0.15 ic	---	---	2.20	0.00	---	---	---	---	2.352
4.48	12,418	2022.88	2.61 ic	0.15 ic	---	---	2.40	0.00	---	---	---	---	2.549
4.49	12,516	2022.89	2.79 ic	0.15 ic	---	---	2.60	0.00	---	---	---	---	2.751
4.50	12,614	2022.90	2.99 ic	0.15 ic	---	---	2.81	0.00	---	---	---	---	2.956
4.51	12,717	2022.91	3.18 ic	0.15 ic	---	---	3.02	0.00	---	---	---	---	3.169
4.52	12,820	2022.92	3.39 ic	0.15 ic	---	---	3.24	0.00	---	---	---	---	3.387
4.53	12,923	2022.93	3.61 ic	0.15 ic	---	---	3.46	0.00	---	---	---	---	3.610
4.54	13,026	2022.94	3.91 ic	0.15 ic	---	---	3.69	0.00	---	---	---	---	3.838
4.55	13,129	2022.95	4.12 ic	0.15 ic	---	---	3.92	0.00	---	---	---	---	4.071
4.56	13,232	2022.96	4.34 ic	0.15 ic	---	---	4.16	0.00	---	---	---	---	4.308
4.57	13,335	2022.97	4.57 ic	0.15 ic	---	---	4.40	0.00	---	---	---	---	4.551
4.58	13,438	2022.98	4.80 ic	0.15 ic	---	---	4.65	0.00	---	---	---	---	4.797
4.59	13,541	2022.99	5.05 ic	0.15 ic	---	---	4.90	0.00	---	---	---	---	5.048
4.60	13,644	2023.00	5.36 ic	0.14 ic	---	---	5.16	0.00	---	---	---	---	5.301
4.70	14,808	2023.10	8.09 ic	0.14 ic	---	---	7.94	0.00	---	---	---	---	8.077
4.80	15,971	2023.20	11.22 ic	0.13 ic	---	---	11.09	0.00	---	---	---	---	11.22
4.90	17,135	2023.30	14.70 ic	0.12 ic	---	---	14.58	0.00	---	---	---	---	14.70
5.00	18,298	2023.40	18.46 oc	0.09 ic	---	---	18.37	0.00	---	---	---	---	18.46
5.10	19,462	2023.50	21.38 oc	0.06 ic	---	---	21.32 s	0.00	---	---	---	---	21.38
5.20	20,625	2023.60	22.11 oc	0.05 ic	---	---	22.06 s	0.00	---	---	---	---	22.11
5.30	21,789	2023.70	22.63 oc	0.04 ic	---	---	22.58 s	0.00	---	---	---	---	22.63
5.40	22,952	2023.80	23.04 oc	0.04 ic	---	---	23.00 s	0.00	---	---	---	---	23.04
5.50	24,116	2023.90	23.40 oc	0.03 ic	---	---	23.36 s	0.00	---	---	---	---	23.40
5.60	25,279	2024.00	23.72 oc	0.03 ic	---	---	23.69 s	0.00	---	---	---	---	23.72
5.80	29,088	2024.20	24.29 oc	0.02 ic	---	---	24.27 s	0.00	---	---	---	---	24.29
6.00	32,898	2024.40	24.81 oc	0.02 ic	---	---	24.79 s	0.00	---	---	---	---	24.81
6.20	36,707	2024.60	25.30 oc	0.02 ic	---	---	25.27 s	0.00	---	---	---	---	25.29
6.40	40,516	2024.80	25.77 oc	0.02 ic	---	---	25.74 s	0.00	---	---	---	---	25.76
6.60	44,325	2025.00	26.22 oc	0.01 ic	---	---	26.19 s	0.00	---	---	---	---	26.20
6.80	48,134	2025.20	26.65 oc	0.01 ic	---	---	26.64 s	0.00	---	---	---	---	26.65
7.00	51,944	2025.40	27.08 oc	0.01 ic	---	---	27.03 s	0.00	---	---	---	---	27.05
7.20	55,753	2025.60	27.49 oc	0.01 ic	---	---	27.46 s	0.00	---	---	---	---	27.47
7.40	59,562	2025.80	27.90 oc	0.01 ic	---	---	27.85 s	0.00	---	---	---	---	27.86
7.60	63,371	2026.00	28.31 oc	0.01 ic	---	---	28.27 s	0.00	---	---	---	---	28.28
7.80	69,739	2026.20	28.70 oc	0.01 ic	---	---	28.64 s	0.00	---	---	---	---	28.65
8.00	76,107	2026.40	29.09 oc	0.01 ic	---	---	29.03 s	0.00	---	---	---	---	29.04
8.20	82,475	2026.60	29.47 oc	0.01 ic	---	---	29.42 s	0.00	---	---	---	---	29.42
8.40	88,843	2026.80	29.85 oc	0.01 ic	---	---	29.80 s	0.00	---	---	---	---	29.81
8.60	95,210	2027.00	30.22 oc	0.01 ic	---	---	30.18 s	0.00	---	---	---	---	30.19

Continues on next page...

Ex. TOB Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
8.80	101,578	2027.20	30.59 oc	0.01 ic	---	---	30.50 s	0.00	---	---	---	---	30.51
9.00	107,946	2027.40	30.96 oc	0.01 ic	---	---	30.90 s	0.00	---	---	---	---	30.91
9.20	114,314	2027.60	31.32 oc	0.01 ic	---	---	31.17 s	0.00	---	---	---	---	31.18
9.40	120,682	2027.80	31.67 oc	0.01 ic	---	---	31.62 s	0.00	---	---	---	---	31.63
9.60	127,050	2028.00	32.02 oc	0.01 ic	---	---	31.96 s	0.00	---	---	---	---	31.97
9.80	136,440	2028.20	32.37 oc	0.01 ic	---	---	32.19 s	0.00	---	---	---	---	32.19
10.00	145,829	2028.40	32.71 oc	0.01 ic	---	---	32.46 s	0.00	---	---	---	---	32.47
10.20	155,219	2028.60	33.05 oc	0.01 ic	---	---	32.96 s	0.00	---	---	---	---	32.96
10.40	164,609	2028.80	33.39 oc	0.00 ic	---	---	33.30 s	0.00	---	---	---	---	33.30
10.60	173,998	2029.00	33.72 oc	0.00 ic	---	---	33.53 s	0.00	---	---	---	---	33.53
10.80	183,388	2029.20	34.05 oc	0.00 ic	---	---	34.01 s	0.00	---	---	---	---	34.01
11.00	192,778	2029.40	34.38 oc	0.00 ic	---	---	34.12 s	0.00	---	---	---	---	34.13
11.20	202,167	2029.60	34.70 oc	0.00 ic	---	---	34.44 s	0.00	---	---	---	---	34.44
11.40	211,557	2029.80	35.02 oc	0.00 ic	---	---	34.67 s	0.00	---	---	---	---	34.68
11.60	220,947	2030.00	35.34 oc	0.00 ic	---	---	34.87 s	0.00	---	---	---	---	34.88
11.80	234,838	2030.20	35.65 oc	0.00 ic	---	---	35.43 s	0.00	---	---	---	---	35.44
12.00	248,728	2030.40	35.96 oc	0.00 ic	---	---	35.96 s	0.00	---	---	---	---	35.96
12.20	262,619	2030.60	36.27 oc	0.00 ic	---	---	35.86 s	0.00	---	---	---	---	35.87
12.40	276,510	2030.80	36.58 oc	0.00 ic	---	---	36.27 s	0.00	---	---	---	---	36.27
12.60	290,400	2031.00	36.88 oc	0.00 ic	---	---	36.63 s	0.00	---	---	---	---	36.63
12.80	304,291	2031.20	37.18 oc	0.00 ic	---	---	37.10 s	0.00	---	---	---	---	37.10
13.00	318,182	2031.40	37.48 oc	0.00 ic	---	---	37.37 s	0.00	---	---	---	---	37.37
13.20	332,073	2031.60	37.78 oc	0.00 ic	---	---	37.57 s	0.00	---	---	---	---	37.58
13.40	345,963	2031.80	38.07 oc	0.00 ic	---	---	37.73 s	0.00	---	---	---	---	37.73
13.60	359,854	2032.00	38.37 oc	0.00 ic	---	---	37.71 s	0.00	---	---	---	---	37.71
13.80	378,404	2032.20	38.66 oc	0.00 ic	---	---	38.61 s	9.30	---	---	---	---	47.91
14.00	396,954	2032.40	38.94 oc	0.00 ic	---	---	38.82 s	26.30	---	---	---	---	65.12
14.20	415,504	2032.60	39.23 oc	0.00 ic	---	---	38.74 s	48.32	---	---	---	---	87.06
14.40	434,055	2032.80	39.51 oc	0.00 ic	---	---	38.58 s	74.39	---	---	---	---	112.97
14.60	452,605	2033.00	39.79 oc	0.00 ic	---	---	39.43 s	103.96	---	---	---	---	143.40
14.80	471,155	2033.20	40.07 oc	0.00 ic	---	---	39.17 s	136.66	---	---	---	---	175.83
15.00	489,705	2033.40	40.35 oc	0.00 ic	---	---	40.00 s	172.21	---	---	---	---	212.22
15.20	508,255	2033.60	40.63 oc	0.00 ic	---	---	39.60 s	210.40	---	---	---	---	250.01
15.40	526,805	2033.80	40.90 oc	0.00 ic	---	---	40.42 s	251.06	---	---	---	---	291.49
15.60	545,355	2034.00	41.17 oc	0.00 ic	---	---	41.07 s	294.16	---	---	---	---	335.23

...End

Hydrograph Report

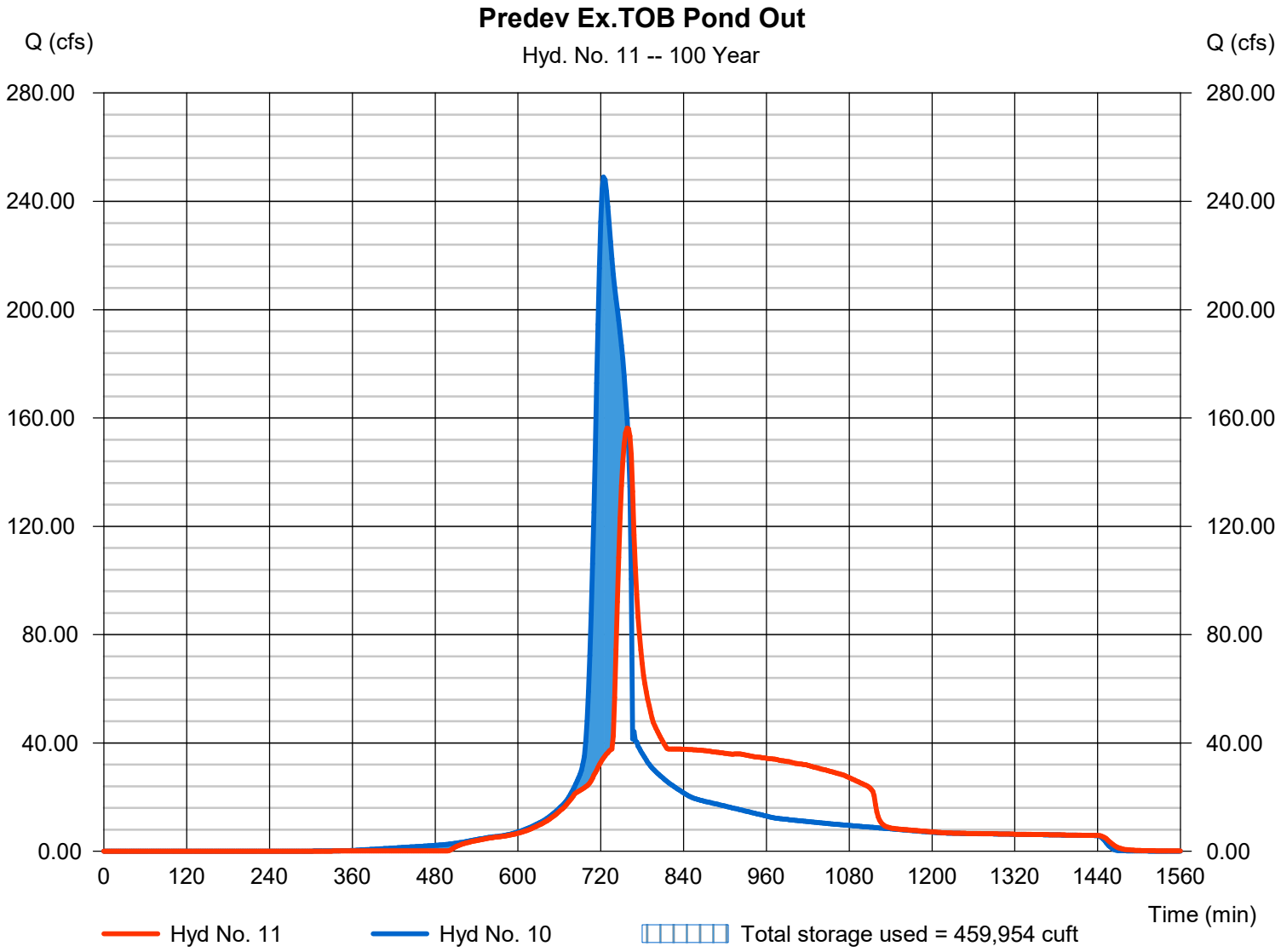
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 11

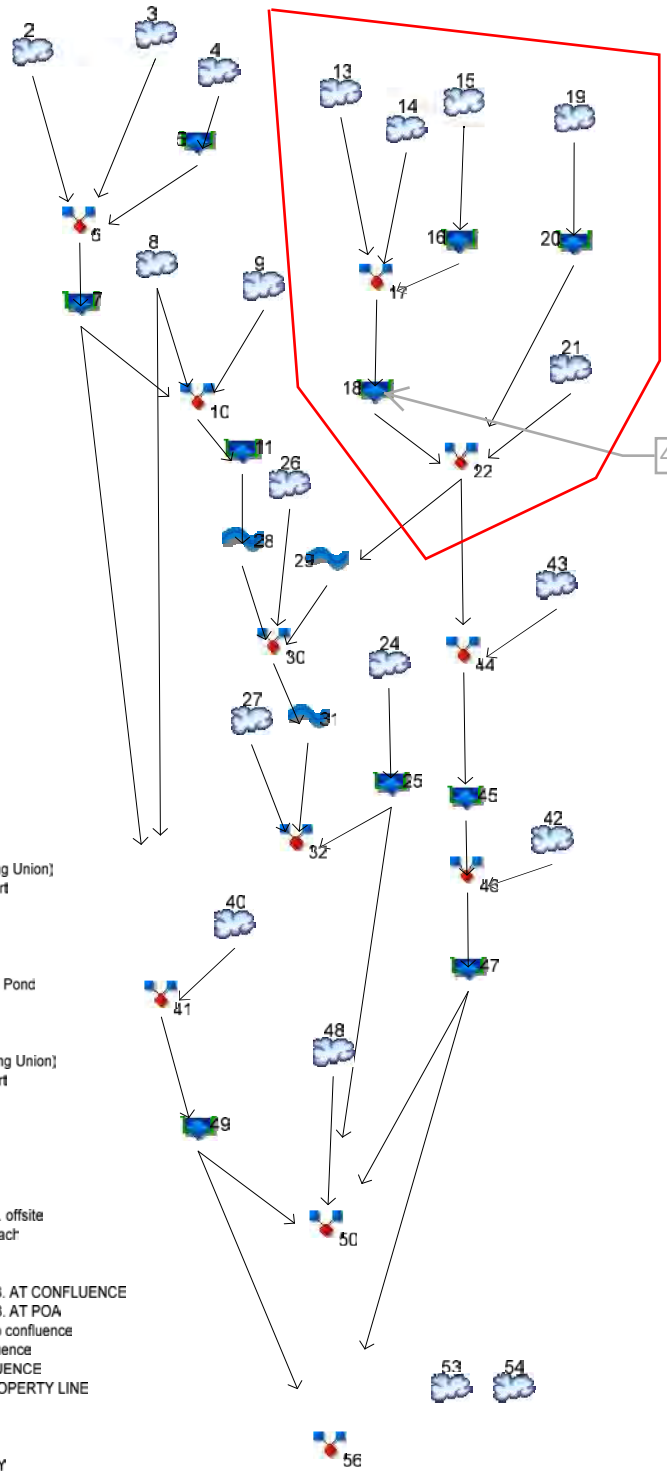
Predev Ex.TOB Pond Out

Hydrograph type	=	Reservoir	Peak discharge	=	156.25 cfs
Storm frequency	=	100 yrs	Time to peak	=	758 min
Time interval	=	2 min	Hyd. volume	=	1,325,137 cuft
Inflow hyd. No.	=	10 - Predev Total To Ex TOB Pond	Max. Elevation	=	2033.08 ft
Reservoir name	=	Ex. TOB Pond	Max. Storage	=	459,954 cuft

Storage Indication method used.



Watershed Model Schematic



Legend

Hyd.	Origin	Description
2	SCS Runoff	To 460 North Culvert (excluding Union)
3	SCS Runoff	Union Bypass To 460 N Culvert
4	SCS Runoff	Union North Detention inflow
5	Reservoir	Union N. Basin Out
6	Combine	Total To 460 North Culvert
7	Reservoir	460 North Culvert Out
8	SCS Runoff	Offsite Village Area to Ex TOB Pond
9	SCS Runoff	Predev Onsite To TOB Pond
10	Combine	Predev Total To Ex TOB Pond
11	Reservoir	Predev Ex.TOB Pond Out
13	SCS Runoff	To 460 South Culvert (excluding Union)
14	SCS Runoff	Union Bypass To 460 S Culvert
15	SCS Runoff	Union South Basin Inflow
16	Reservoir	Union S. Basin Out
17	Combine	Total To 460 South Culvert
18	Reservoir	460 South Culvert Out
19	SCS Runoff	The Farm Basin Inflow
20	Reservoir	The Farm Det. Out
21	SCS Runoff	Undet. Farm and other contrib. offsite
22	Combine	Total Offsite thru Southern Reach
24	SCS Runoff	To Village Ph1 Pond 1
25	Reservoir	Village Ph1 Pond 1 Out
26	SCS Runoff	PRE OTHER AREA CONTRIB. AT CONFLUENCE
27	SCS Runoff	PRE OTHER AREA CONTRIB. AT POA
28	Reach	Ex. TOB Pond outfall routed to confluence
29	Reach	South Offsite Routed to Confluence
30	Combine	PRE COMBINED AT CONFLUENCE
31	Reach	COMBINED ROUTED TO PROPERTY LINE
32	Combine	TOTAL AT PROP LINE PRE
40	SCS Runoff	POST ONSITE TO POND A
41	Combine	POST TOTAL TO POND A
42	SCS Runoff	POST DEV TO POND C ONLY
43	SCS Runoff	POST ONSITE TO POND B
44	Combine	TOTAL TO SOUTH DET POND B
45	Reservoir	S DET POND B ROUTE
46	Combine	TOTAL TO WET POND C
47	Reservoir	WET POND C ROUTED
48	SCS Runoff	POST UNDETAINED CONTRIB. AREA
49	Reservoir	UPGRADED POND A ROUTED
50	Combine	POST TOTAL ROUTED TO PROP LINE
53	SCS Runoff	Onsite Only Total Predev
54	SCS Runoff	Onsite Only Total Postdev
56	Combine	POST ROUTED POND TOTALS

Drainage Area Runoff and Time of Concentration

Drainage Area: **To 460 south culvert crossing (excludes Union area)**

PREDEVELOPMENT

Composite Curve Number (CN)						**Notes:**
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	-	Impervious	98	14.92	1461.92	
CN_2	B	Managed Turf	61	0.53	32.46	
CN_3	C	Managed Turf	74	5.55	410.68	
CN_4	B	Brush (Good)	48	0.72	34.62	
CN_5	C	Brush (Good)	65	1.66	107.68	
CN_6					0.00	
CN_7					0.00	
CN_8					0.00	
CN_9					0.00	
CN_{10}					0.00	
				Total	**23.38**	**2047.36**	
					Composite CN =	**88**	

Time of Concentration, T_c						
		2 yr. Precip. (in.) =	2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Paved	100	0.011	0.030	1.1
2	Shallow Conc.	Paved	131		0.023	0.7
3	Channel	Curb	101	0.011	0.005	0.4
4	Channel	Pipe 30"	394	0.011	0.010	0.9
5	Channel	Grass	865	0.03	0.044	3.1
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**6.2**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	88	88	88
Storage (in.) S=1000/CN-10	1.36	1.36	1.36
Initial abstraction (in.), I_a=0.2S	0.27	0.27	0.27
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	1.18	2.78	5.05
Runoff volume (ac-ft), RV = Q/12*A	2.30	5.42	9.84
Flow rate (cfs), q_{peak} from hydrograph	46.38	106.50	

Hydrograph Number: 13

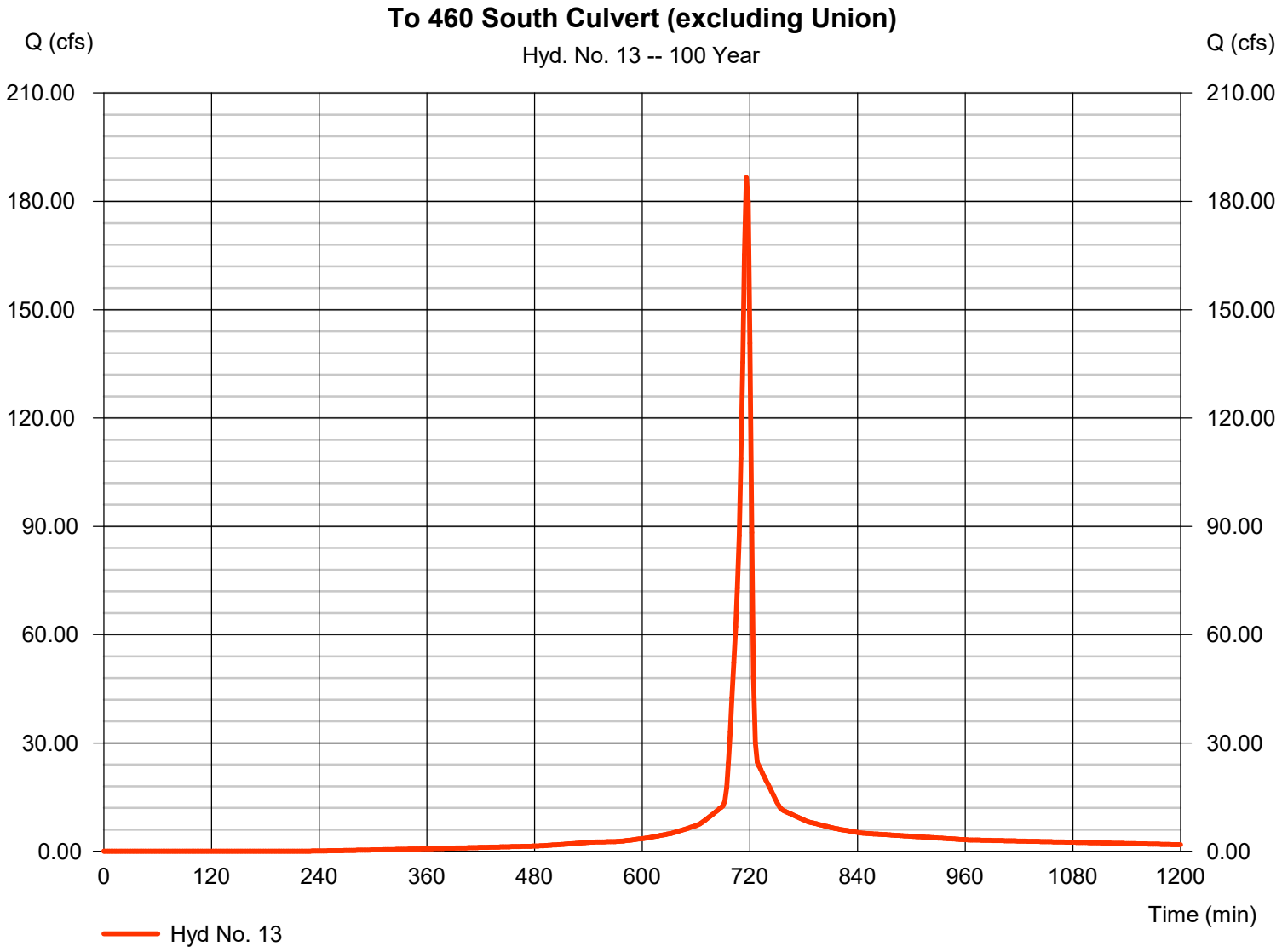
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 13

To 460 South Culvert (excluding Union)

Hydrograph type	= SCS Runoff	Peak discharge	= 186.59 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 401,847 cuft
Drainage area	= 23.380 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.20 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



WORKSHEET FOR SCS HYDROLOGIC PARAMETERS

Site Conditions:		Existing	**Project:** Sturbridge Apartments
	X	Proposed	**Subarea Number:** 2b - No Detention - Bypass
Off-Site Land Use:		Existing	**By:** Justin Brown
	X	Proposed	**Date:** 4/13/2020

RUNOFF CURVE NUMBER

Soil Group	Land Use or Zoning		Area (acres)	RCN	RCN x Area
B	On-Site	Impervious	0.43	98	42.14
B	On-Site	Open Space	1.14	61	69.54
C	On-Site	Impervious	0.00	98	0
C	On-Site	Open Space	0.08	74	5.92

Total Area 1.65 ac 0.003 sq. mi **Weighted RCN =** 71

Notes:
Time of Concentration = 18.39 minutes (See Attached)

TR 55 Worksheet: Time of Concentration (Tc) **PROJECT: TNHSE19001** **PN: (Post-DEVELOPMENT: POI#2 (b))**

	1	2	3	4	5	6	6	
Sheet Flow								
Surface description (Table 3-1)	Dense Grass							
Manning's roughness coeff., n (Table 3-1)	0.24							
Flow length, L (total L < 100 ft) ..... ft	100.00							
Two-year 24-hour rainfall, P2..... in	2.74							
Land slope, S ..... ft/ft	0.0300							
$T_t = (0.007 (nL)^{0.8})/(P_2^{0.5} s^{0.4})$ ..... hr	0.22	0.00	0.00	0.00	0.00	0.00	0.00	
Shallow Concetrated Flow								
Surface description (paved=1 or unpaved=0)	0	0	0	0	0	0	0	
Flow length, L ..... ft	223.0	0.0	0.0	0.0	0.0	0.0	0.0	
Watercourse slope, S ..... ft/ft	0.0540	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	
Average velocity, V ..... ft/s	-	-	-	-	-	-	-	
Unpaved $V = 16.1345 (s)^{0.5}$	3.75	1.61	1.61	1.61	1.61	1.61	1.61	
Paved $V = 20.3282 (s)^{0.5}$								
$T_t = L/3600V$ ..... hr	0.02	0.00	0.00	0.00	0.00	0.00	0.00	
Channel Flow	**CHANNEL**							
Cross sectional flow area, A ..... ft^2	3.00	1.20	3.10					
Wetted perimeter, Pw..... ft	6.00	4.00	6.28					
Hydraulic radius, r = A/Pw.....ft	0.50	0.30	0.49	0.00	0.00	0.00	0.00	
Channel slope, s..... ft/ft	0.050	0.033	0.010					
Manning's roughness coefficient, n.....	0.011	0.035	0.069	0.013	0.013	0.013	0.013	
Velocity, $V=(1.49/n)R^{2/3}s^{1/2}$ ..... ft	19.08	3.47	1.35	0.00	0.00	0.00	0.00	
Flow length, L ..... ft	227.0	223.0	244.0					
$T_t = L/3600V$ ..... hr	**0.003**	**0.018**	**0.050**	**0.000**	**0.000**	**0.000**	**0.000**	
Sub Basin Tc = $T_{sheetflow}+T_{shallow\ concentrated}+T_{channel}$ =	0.24 hr	0.02 hr	0.05 hr	0.00 hr	0.00 hr	0.00 hr	0.00 hr	
Sub Basin Tc = $T_{sheetflow}+T_{shallow\ concentrated}+T_{channel}$ =	14.30 min	1.07 min	3.02 min	0.00 min	0.00 min	0.00 min	0.00 min	**18.39 min**

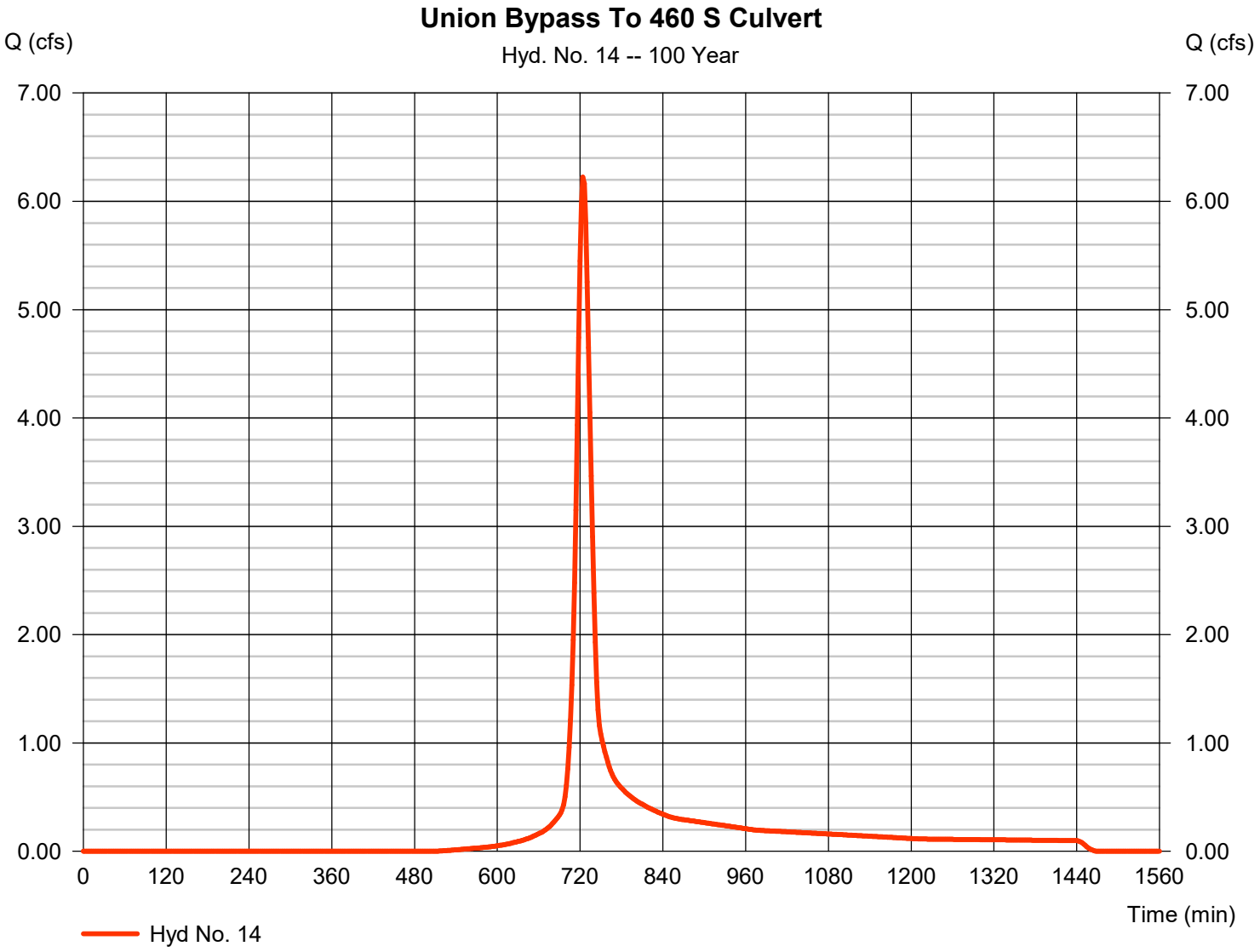
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 14

Union Bypass To 460 S Culvert

Hydrograph type	= SCS Runoff	Peak discharge	= 6.224 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 19,509 cuft
Drainage area	= 1.650 ac	Curve number	= 71
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.40 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



WORKSHEET FOR SCS HYDROLOGIC PARAMETERS

Site Conditions:		Existing	**Project:**	Sturbridge Apartments
	X	Proposed	**Subarea Number:**	2a Detention
Off-Site Land Use:		Existing	**By:**	Justin Brown
	X	Proposed	**Date:**	4/13/2020

RUNOFF CURVE NUMBER

Soil Group	Land Use or Zoning		Area (acres)	RCN	RCN x Area
B	On-Site	Impervious	2.12	98	207.76
B	On-Site	Open Space	0.13	61	7.93
C	On-Site	Impervious	1.31	98	128.38
C	On-Site	Open Space	0.16	74	11.84

Total Area 3.72 ac 0.006 sq. mi **Weighted RCN =** 96

Notes:
Time of Concentration = 5 minutes (Assumed)

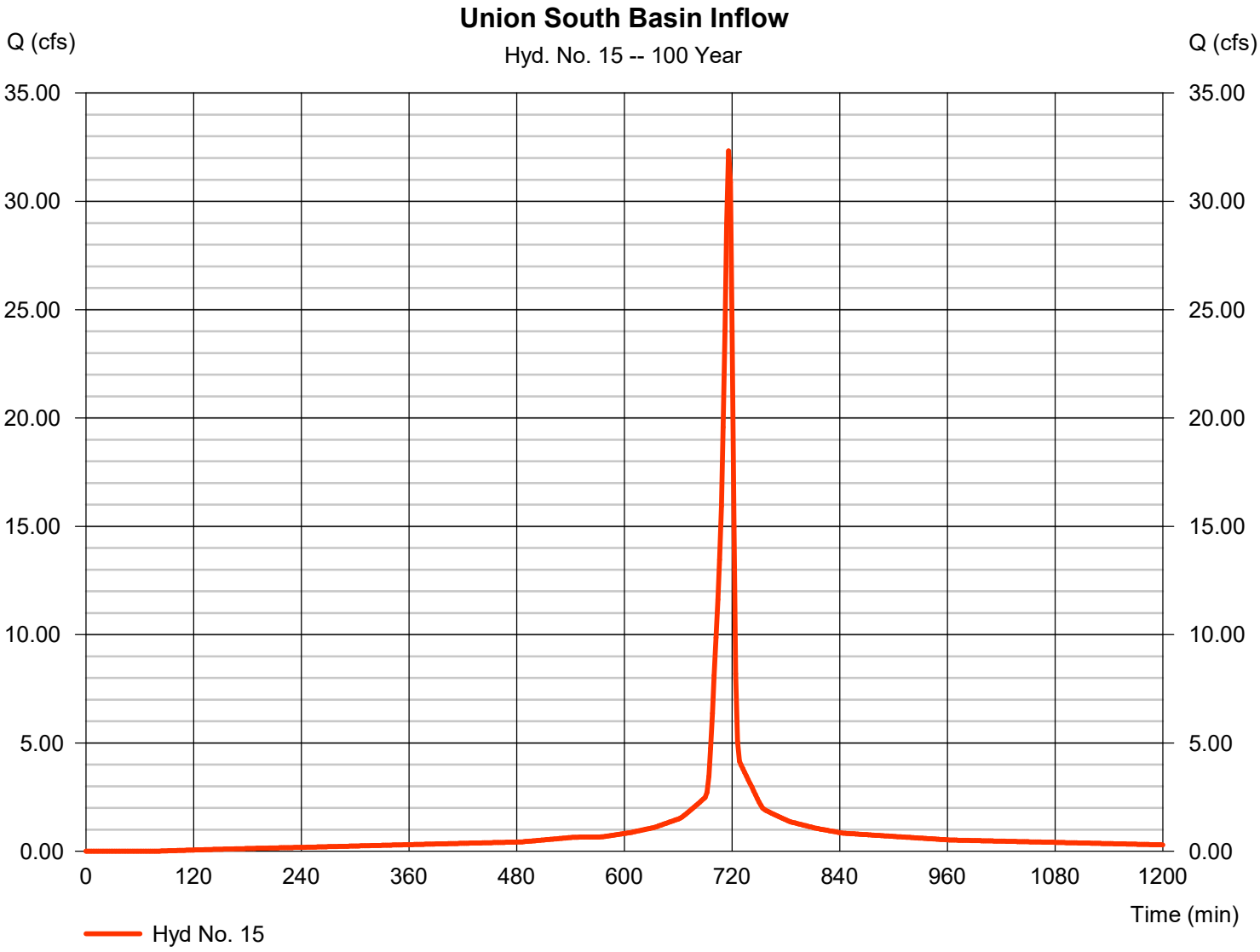
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 15

Union South Basin Inflow

Hydrograph type	= SCS Runoff	Peak discharge	= 32.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 75,523 cuft
Drainage area	= 3.720 ac	Curve number	= 96
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Pond Report

Pond No. 11 - Union South Underground Det.

Pond Data

UG Chambers -Invert elev. = 2052.00 ft, Rise x Span = 4.00 x 4.00 ft, Barrel Len = 140.00 ft, No. Barrels = 4, Slope = 0.50%, Headers = Yes
Encasement -Invert elev. = 2051.50 ft, Width = 6.50 ft, Height = 5.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2051.50	n/a	0	0
0.62	2052.12	n/a	462	462
1.24	2052.74	n/a	1,212	1,674
1.86	2053.36	n/a	1,655	3,329
2.48	2053.98	n/a	1,832	5,161
3.10	2054.60	n/a	1,888	7,049
3.72	2055.22	n/a	1,850	8,899
4.34	2055.84	n/a	1,703	10,602
4.96	2056.46	n/a	1,328	11,930
5.58	2057.08	n/a	1,009	12,939
6.20	2057.70	n/a	987	13,925

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	8.50	4.88	0.00
Span (in)	= 24.00	7.00	72.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 2051.50	2051.50	2054.55	0.00
Length (ft)	= 25.00	0.50	0.50	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 18.85	0.73	0.00	0.00
Crest El. (ft)	= 2058.71	2056.10	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2051.50	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.06	46	2051.56	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.018
0.12	92	2051.62	0.06 ic	0.06 ic	0.00	---	0.00	0.00	---	---	---	---	0.059
0.19	139	2051.69	0.12 ic	0.12 ic	0.00	---	0.00	0.00	---	---	---	---	0.119
0.25	185	2051.75	0.20 ic	0.19 ic	0.00	---	0.00	0.00	---	---	---	---	0.191
0.31	231	2051.81	0.29 ic	0.28 ic	0.00	---	0.00	0.00	---	---	---	---	0.276
0.37	277	2051.87	0.38 ic	0.38 ic	0.00	---	0.00	0.00	---	---	---	---	0.378
0.43	324	2051.93	0.48 ic	0.48 ic	0.00	---	0.00	0.00	---	---	---	---	0.483
0.50	370	2052.00	0.60 ic	0.60 ic	0.00	---	0.00	0.00	---	---	---	---	0.602
0.56	416	2052.06	0.73 ic	0.73 ic	0.00	---	0.00	0.00	---	---	---	---	0.734
0.62	462	2052.12	0.89 ic	0.86 ic	0.00	---	0.00	0.00	---	---	---	---	0.863
0.68	584	2052.18	1.01 ic	1.01 ic	0.00	---	0.00	0.00	---	---	---	---	1.010
0.74	705	2052.24	1.13 ic	1.12 ic	0.00	---	0.00	0.00	---	---	---	---	1.124
0.81	826	2052.31	1.20 ic	1.20 ic	0.00	---	0.00	0.00	---	---	---	---	1.201
0.87	947	2052.37	1.27 ic	1.27 ic	0.00	---	0.00	0.00	---	---	---	---	1.274
0.93	1,068	2052.43	1.35 ic	1.35 ic	0.00	---	0.00	0.00	---	---	---	---	1.346
0.99	1,189	2052.49	1.42 ic	1.42 ic	0.00	---	0.00	0.00	---	---	---	---	1.418
1.05	1,311	2052.55	1.49 ic	1.49 ic	0.00	---	0.00	0.00	---	---	---	---	1.489
1.12	1,432	2052.62	1.56 ic	1.56 ic	0.00	---	0.00	0.00	---	---	---	---	1.556
1.18	1,553	2052.68	1.64 ic	1.62 ic	0.00	---	0.00	0.00	---	---	---	---	1.616
1.24	1,674	2052.74	1.73 ic	1.67 ic	0.00	---	0.00	0.00	---	---	---	---	1.674
1.30	1,840	2052.80	1.74 ic	1.74 ic	0.00	---	0.00	0.00	---	---	---	---	1.738
1.36	2,005	2052.86	1.81 ic	1.80 ic	0.00	---	0.00	0.00	---	---	---	---	1.799
1.43	2,171	2052.93	1.90 ic	1.85 ic	0.00	---	0.00	0.00	---	---	---	---	1.851
1.49	2,336	2052.99	1.91 ic	1.91 ic	0.00	---	0.00	0.00	---	---	---	---	1.910
1.55	2,502	2053.05	1.99 ic	1.97 ic	0.00	---	0.00	0.00	---	---	---	---	1.965
1.61	2,667	2053.11	2.01 ic	2.01 ic	0.00	---	0.00	0.00	---	---	---	---	2.014
1.67	2,833	2053.17	2.08 ic	2.07 ic	0.00	---	0.00	0.00	---	---	---	---	2.073
1.74	2,998	2053.24	2.18 ic	2.12 ic	0.00	---	0.00	0.00	---	---	---	---	2.118
1.80	3,164	2053.30	2.18 ic	2.18 ic	0.00	---	0.00	0.00	---	---	---	---	2.175
1.86	3,329	2053.36	2.28 ic	2.22 ic	0.00	---	0.00	0.00	---	---	---	---	2.218
1.92	3,513	2053.42	2.28 ic	2.27 ic	0.00	---	0.00	0.00	---	---	---	---	2.273

Continues on next page...

Union South Underground Det.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.98	3,696	2053.48	2.38 ic	2.31 ic	0.00	---	0.00	0.00	---	---	---	---	2.313
2.05	3,879	2053.55	2.38 ic	2.37 ic	0.00	---	0.00	0.00	---	---	---	---	2.366
2.11	4,062	2053.61	2.41 ic	2.41 ic	0.00	---	0.00	0.00	---	---	---	---	2.405
2.17	4,245	2053.67	2.48 ic	2.46 ic	0.00	---	0.00	0.00	---	---	---	---	2.456
2.23	4,428	2053.73	2.50 ic	2.50 ic	0.00	---	0.00	0.00	---	---	---	---	2.498
2.29	4,612	2053.79	2.59 ic	2.54 ic	0.00	---	0.00	0.00	---	---	---	---	2.542
2.36	4,795	2053.86	2.59 ic	2.59 ic	0.00	---	0.00	0.00	---	---	---	---	2.589
2.42	4,978	2053.92	2.70 ic	2.63 ic	0.00	---	0.00	0.00	---	---	---	---	2.626
2.48	5,161	2053.98	2.70 ic	2.67 ic	0.00	---	0.00	0.00	---	---	---	---	2.672
2.54	5,350	2054.04	2.71 ic	2.71 ic	0.00	---	0.00	0.00	---	---	---	---	2.712
2.60	5,539	2054.10	2.81 ic	2.75 ic	0.00	---	0.00	0.00	---	---	---	---	2.752
2.67	5,728	2054.17	2.81 ic	2.80 ic	0.00	---	0.00	0.00	---	---	---	---	2.796
2.73	5,916	2054.23	2.83 ic	2.83 ic	0.00	---	0.00	0.00	---	---	---	---	2.831
2.79	6,105	2054.29	2.92 ic	2.87 ic	0.00	---	0.00	0.00	---	---	---	---	2.872
2.85	6,294	2054.35	2.92 ic	2.91 ic	0.00	---	0.00	0.00	---	---	---	---	2.915
2.91	6,483	2054.41	2.95 ic	2.95 ic	0.00	---	0.00	0.00	---	---	---	---	2.947
2.98	6,672	2054.48	3.03 ic	2.99 ic	0.00	---	0.00	0.00	---	---	---	---	2.988
3.04	6,860	2054.54	3.03 ic	3.03 ic	0.00	---	0.00	0.00	---	---	---	---	3.028
3.10	7,049	2054.60	3.32 oc	3.04 ic	0.23 ic	---	0.00	0.00	---	---	---	---	3.268
3.16	7,234	2054.66	3.80 oc	3.03 ic	0.77 ic	---	0.00	0.00	---	---	---	---	3.796
3.22	7,419	2054.72	4.49 oc	3.00 ic	1.48 ic	---	0.00	0.00	---	---	---	---	4.482
3.29	7,604	2054.79	5.38 oc	2.95 ic	2.34 ic	---	0.00	0.00	---	---	---	---	5.289
3.35	7,789	2054.85	6.24 oc	2.89 ic	3.32 ic	---	0.00	0.00	---	---	---	---	6.218
3.41	7,974	2054.91	7.28 oc	2.81 ic	4.41 ic	---	0.00	0.00	---	---	---	---	7.227
3.47	8,159	2054.97	8.26 oc	2.72 ic	5.50 ic	---	0.00	0.00	---	---	---	---	8.217
3.53	8,344	2055.03	8.91 oc	2.66 ic	6.23 ic	---	0.00	0.00	---	---	---	---	8.883
3.60	8,529	2055.10	9.42 oc	2.54 ic	6.88 ic	---	0.00	0.00	---	---	---	---	9.423
3.66	8,714	2055.16	10.01 oc	2.53 ic	7.48 ic	---	0.00	0.00	---	---	---	---	10.01
3.72	8,899	2055.22	10.58 oc	2.56 ic	8.03 ic	---	0.00	0.00	---	---	---	---	10.58
3.78	9,069	2055.28	11.12 oc	2.58 ic	8.54 ic	---	0.00	0.00	---	---	---	---	11.12
3.84	9,240	2055.34	11.63 oc	2.60 ic	9.03 ic	---	0.00	0.00	---	---	---	---	11.63
3.91	9,410	2055.41	12.11 oc	2.62 ic	9.49 ic	---	0.00	0.00	---	---	---	---	12.11
3.97	9,580	2055.47	12.58 oc	2.65 ic	9.93 ic	---	0.00	0.00	---	---	---	---	12.58
4.03	9,751	2055.53	13.02 oc	2.67 ic	10.35 ic	---	0.00	0.00	---	---	---	---	13.02
4.09	9,921	2055.59	13.45 oc	2.69 ic	10.76 ic	---	0.00	0.00	---	---	---	---	13.45
4.15	10,091	2055.65	13.86 oc	2.71 ic	11.15 ic	---	0.00	0.00	---	---	---	---	13.86
4.22	10,262	2055.72	14.26 oc	2.73 ic	11.53 ic	---	0.00	0.00	---	---	---	---	14.26
4.28	10,432	2055.78	14.65 oc	2.75 ic	11.89 ic	---	0.00	0.00	---	---	---	---	14.65
4.34	10,602	2055.84	15.03 oc	2.78 ic	12.25 ic	---	0.00	0.00	---	---	---	---	15.02
4.40	10,735	2055.90	15.39 oc	2.80 ic	12.59 ic	---	0.00	0.00	---	---	---	---	15.39
4.46	10,868	2055.96	15.75 oc	2.82 ic	12.93 ic	---	0.00	0.00	---	---	---	---	15.75
4.53	11,001	2056.03	16.10 oc	2.84 ic	13.25 ic	---	0.00	0.00	---	---	---	---	16.10
4.59	11,133	2056.09	16.44 oc	2.86 ic	13.57 ic	---	0.00	0.00	---	---	---	---	16.44
4.65	11,266	2056.15	16.79 oc	2.88 ic	13.88 ic	---	0.00	0.03	---	---	---	---	16.79
4.71	11,399	2056.21	17.18 oc	2.90 ic	14.19 ic	---	0.00	0.09	---	---	---	---	17.18
4.77	11,532	2056.27	17.58 oc	2.91 ic	14.49 ic	---	0.00	0.18	---	---	---	---	17.58
4.84	11,664	2056.34	17.99 oc	2.93 ic	14.78 ic	---	0.00	0.28	---	---	---	---	17.99
4.90	11,797	2056.40	18.40 oc	2.94 ic	15.07 ic	---	0.00	0.40	---	---	---	---	18.40
4.96	11,930	2056.46	18.82 oc	2.95 ic	15.35 ic	---	0.00	0.52	---	---	---	---	18.82
5.02	12,031	2056.52	19.25 oc	2.96 ic	15.62 ic	---	0.00	0.67	---	---	---	---	19.25
5.08	12,132	2056.58	19.69 oc	2.97 ic	15.90 ic	---	0.00	0.82	---	---	---	---	19.69
5.15	12,233	2056.65	20.12 oc	2.98 ic	16.16 ic	---	0.00	0.98	---	---	---	---	20.12
5.21	12,333	2056.71	20.57 oc	2.99 ic	16.43 ic	---	0.00	1.15	---	---	---	---	20.56
5.27	12,434	2056.77	21.01 oc	2.99 ic	16.68 ic	---	0.00	1.33	---	---	---	---	21.01
5.33	12,535	2056.83	21.46 oc	3.00 ic	16.94 ic	---	0.00	1.52	---	---	---	---	21.46
5.39	12,636	2056.89	21.91 oc	3.00 ic	17.19 ic	---	0.00	1.72	---	---	---	---	21.91
5.46	12,737	2056.96	22.36 ic	3.00 ic	17.44 ic	---	0.00	1.93	---	---	---	---	22.36
5.52	12,838	2057.02	22.76 ic	2.99 ic	17.64 ic	---	0.00	2.14	---	---	---	---	22.76
5.58	12,939	2057.08	23.02 ic	2.99 ic	17.67 ic	---	0.00	2.36	---	---	---	---	23.02
5.64	13,037	2057.14	23.29 ic	3.00 ic	17.71 ic	---	0.00	2.59	---	---	---	---	23.29
5.70	13,136	2057.20	23.56 ic	3.00 ic	17.73 ic	---	0.00	2.82	---	---	---	---	23.56
5.77	13,235	2057.27	23.83 ic	3.01 ic	17.76 ic	---	0.00	3.06	---	---	---	---	23.83
5.83	13,333	2057.33	24.10 ic	3.01 ic	17.78 ic	---	0.00	3.31	---	---	---	---	24.10
5.89	13,432	2057.39	24.37 ic	3.01 ic	17.79 ic	---	0.00	3.56	---	---	---	---	24.37
5.95	13,531	2057.45	24.64 ic	3.02 ic	17.81 ic	---	0.00	3.82	---	---	---	---	24.64
6.01	13,629	2057.51	24.92 ic	3.02 ic	17.82 ic	---	0.00	4.09	---	---	---	---	24.92
6.08	13,728	2057.58	25.20 ic	3.02 ic	17.82 ic	---	0.00	4.36	---	---	---	---	25.20
6.14	13,827	2057.64	25.48 ic	3.02 ic	17.82 ic	---	0.00	4.64	---	---	---	---	25.48
6.20	13,925	2057.70	25.76 ic	3.02 ic	17.82 ic	---	0.00	4.92	---	---	---	---	25.75

...End

Hydrograph Report

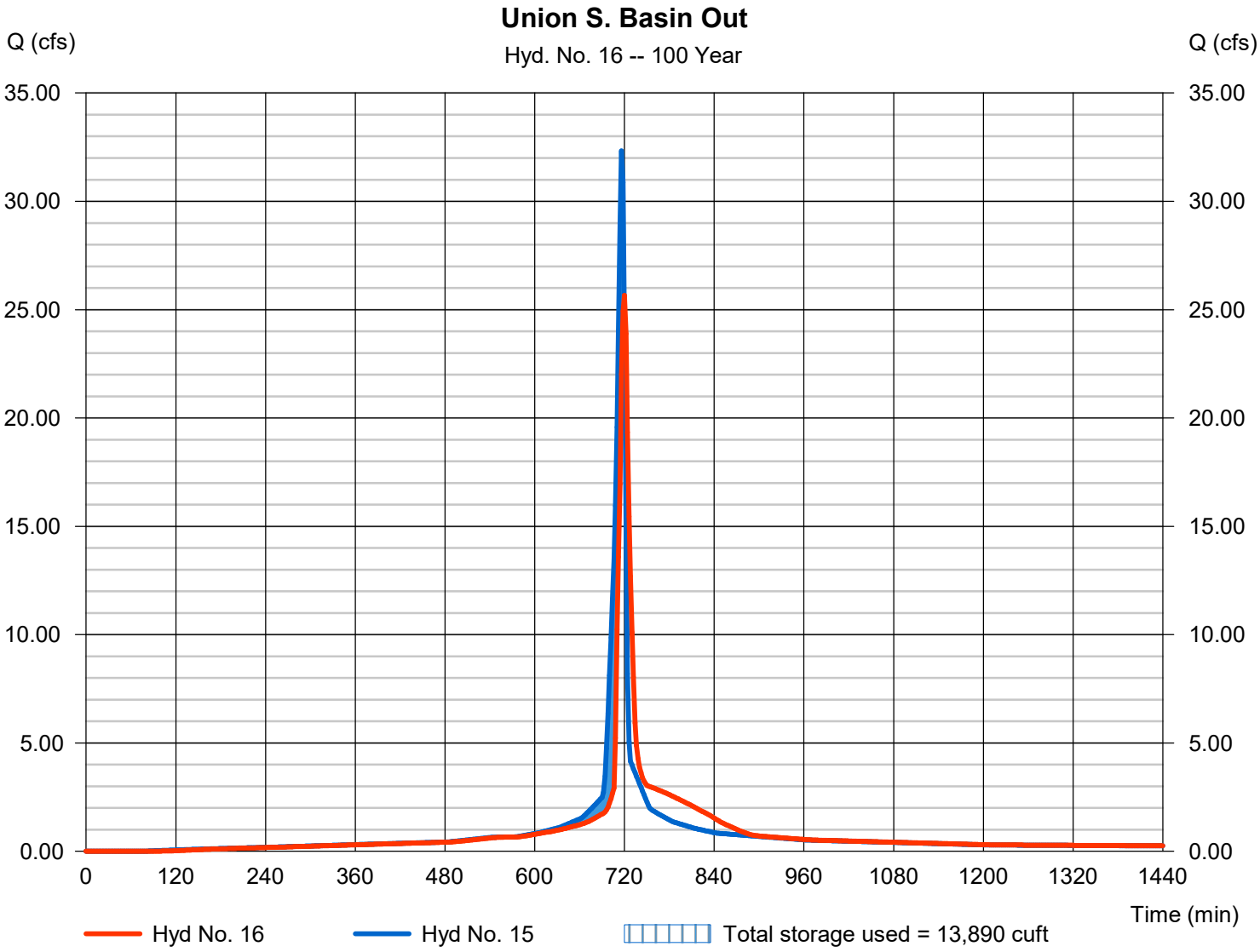
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 16

Union S. Basin Out

Hydrograph type	=	Reservoir	Peak discharge	=	25.66 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	75,520 cuft
Inflow hyd. No.	=	15 - Union South Basin Inflow	Max. Elevation	=	2057.68 ft
Reservoir name	=	Union South Underground Det	Max. Storage	=	13,890 cuft

Storage Indication method used.

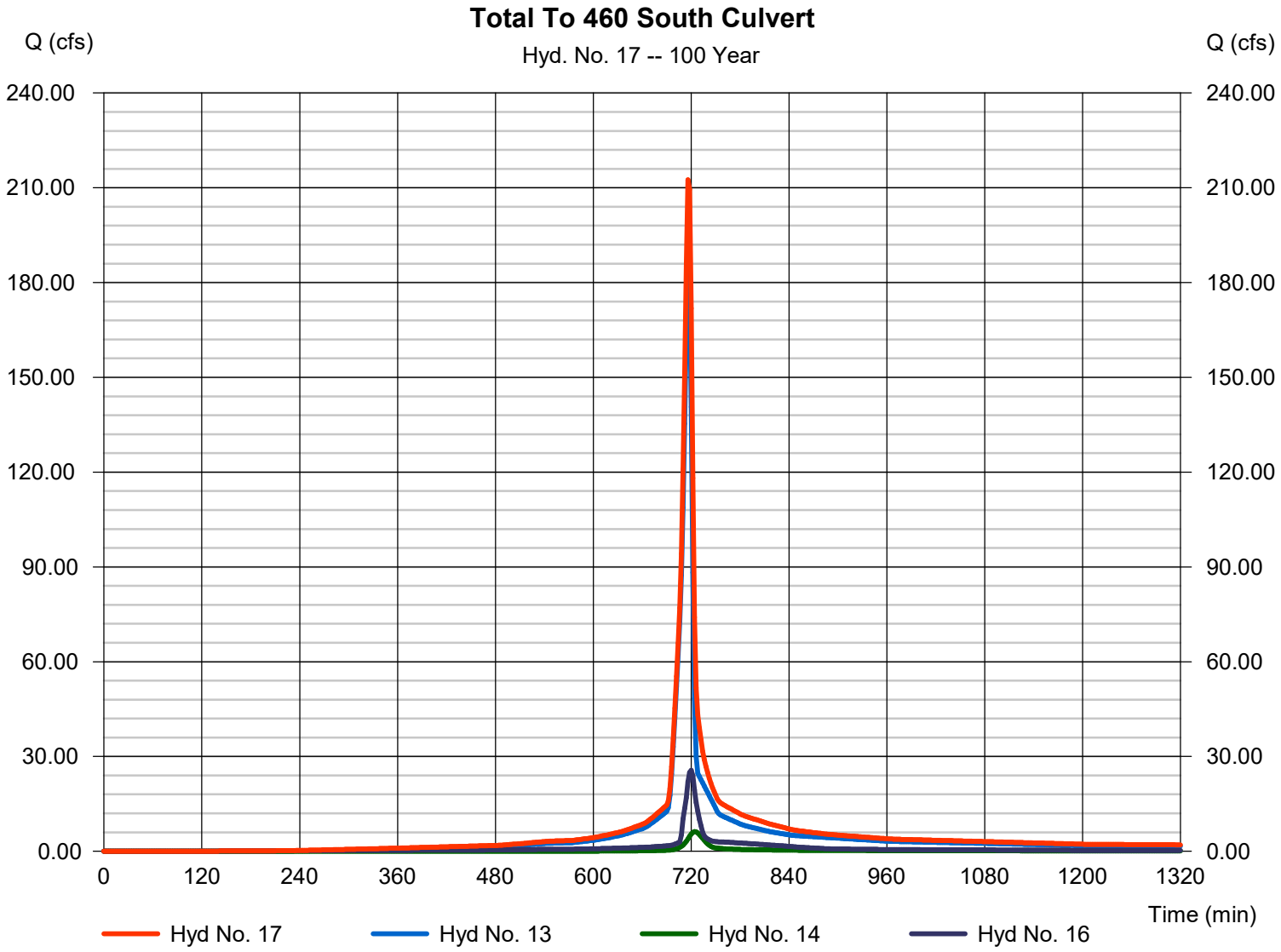


Hydrograph Report

Hyd. No. 17

Total To 460 South Culvert

Hydrograph type	= Combine	Peak discharge	= 212.55 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 496,876 cuft
Inflow hyds.	= 13, 14, 16	Contrib. drain. area	= 25.030 ac



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 04 / 29 / 2022

Pond No. 9 - 460 South Culvert HW Storage

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 2038.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2038.00	00	0	0
2.00	2040.00	4,884	4,884	4,884
4.00	2042.00	7,175	12,059	16,943
6.00	2044.00	9,534	16,709	33,652
8.00	2046.00	12,012	21,546	55,198
10.00	2048.00	14,742	26,754	81,952
12.00	2050.00	17,943	32,685	114,637

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	0.00	0.00	0.00
Span (in)	= 36.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 2038.00	0.00	0.00	0.00
Length (ft)	= 203.10	0.00	0.00	0.00
Slope (%)	= 2.92	0.00	0.00	n/a
N-Value	= .024	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2038.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.20	488	2038.20	0.31 ic	---	---	---	---	---	---	---	---	---	0.309
0.40	977	2038.40	1.21 ic	---	---	---	---	---	---	---	---	---	1.207
0.60	1,465	2038.60	2.66 ic	---	---	---	---	---	---	---	---	---	2.662
0.80	1,954	2038.80	4.61 ic	---	---	---	---	---	---	---	---	---	4.610
1.00	2,442	2039.00	7.03 ic	---	---	---	---	---	---	---	---	---	7.030
1.20	2,930	2039.20	9.85 ic	---	---	---	---	---	---	---	---	---	9.852
1.40	3,419	2039.40	13.04 ic	---	---	---	---	---	---	---	---	---	13.04
1.60	3,907	2039.60	16.53 ic	---	---	---	---	---	---	---	---	---	16.53
1.80	4,396	2039.80	20.25 ic	---	---	---	---	---	---	---	---	---	20.25
2.00	4,884	2040.00	24.12 ic	---	---	---	---	---	---	---	---	---	24.12
2.20	6,090	2040.20	28.08 ic	---	---	---	---	---	---	---	---	---	28.08
2.40	7,296	2040.40	31.98 ic	---	---	---	---	---	---	---	---	---	31.98
2.60	8,502	2040.60	35.75 ic	---	---	---	---	---	---	---	---	---	35.75
2.80	9,708	2040.80	39.12 ic	---	---	---	---	---	---	---	---	---	39.12
3.00	10,914	2041.00	41.68 ic	---	---	---	---	---	---	---	---	---	41.68
3.20	12,119	2041.20	44.37 ic	---	---	---	---	---	---	---	---	---	44.37
3.40	13,325	2041.40	46.91 ic	---	---	---	---	---	---	---	---	---	46.91
3.60	14,531	2041.60	49.32 ic	---	---	---	---	---	---	---	---	---	49.32
3.80	15,737	2041.80	51.61 ic	---	---	---	---	---	---	---	---	---	51.61
4.00	16,943	2042.00	53.81 ic	---	---	---	---	---	---	---	---	---	53.81
4.20	18,614	2042.20	55.92 ic	---	---	---	---	---	---	---	---	---	55.92
4.40	20,285	2042.40	57.95 ic	---	---	---	---	---	---	---	---	---	57.95
4.60	21,956	2042.60	59.92 ic	---	---	---	---	---	---	---	---	---	59.92
4.80	23,627	2042.80	61.82 ic	---	---	---	---	---	---	---	---	---	61.82
5.00	25,298	2043.00	62.77 oc	---	---	---	---	---	---	---	---	---	62.77
5.20	26,968	2043.20	63.56 oc	---	---	---	---	---	---	---	---	---	63.56
5.40	28,639	2043.40	64.33 oc	---	---	---	---	---	---	---	---	---	64.33
5.60	30,310	2043.60	65.10 oc	---	---	---	---	---	---	---	---	---	65.10
5.80	31,981	2043.80	65.86 oc	---	---	---	---	---	---	---	---	---	65.86
6.00	33,652	2044.00	66.61 oc	---	---	---	---	---	---	---	---	---	66.61
6.20	35,807	2044.20	67.35 oc	---	---	---	---	---	---	---	---	---	67.35
6.40	37,961	2044.40	68.09 oc	---	---	---	---	---	---	---	---	---	68.09
6.60	40,116	2044.60	68.81 oc	---	---	---	---	---	---	---	---	---	68.81
6.80	42,270	2044.80	69.53 oc	---	---	---	---	---	---	---	---	---	69.53
7.00	44,425	2045.00	70.24 oc	---	---	---	---	---	---	---	---	---	70.24

Continues on next page...

460 South Culvert HW Storage

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
7.20	46,580	2045.20	70.95 oc	---	---	---	---	---	---	---	---	---	70.95
7.40	48,734	2045.40	71.64 oc	---	---	---	---	---	---	---	---	---	71.64
7.60	50,889	2045.60	72.33 oc	---	---	---	---	---	---	---	---	---	72.33
7.80	53,043	2045.80	73.02 oc	---	---	---	---	---	---	---	---	---	73.02
8.00	55,198	2046.00	73.69 oc	---	---	---	---	---	---	---	---	---	73.69
8.20	57,873	2046.20	74.36 oc	---	---	---	---	---	---	---	---	---	74.36
8.40	60,549	2046.40	75.03 oc	---	---	---	---	---	---	---	---	---	75.03
8.60	63,224	2046.60	75.69 oc	---	---	---	---	---	---	---	---	---	75.69
8.80	65,900	2046.80	76.34 oc	---	---	---	---	---	---	---	---	---	76.34
9.00	68,575	2047.00	76.99 oc	---	---	---	---	---	---	---	---	---	76.99
9.20	71,250	2047.20	77.63 oc	---	---	---	---	---	---	---	---	---	77.63
9.40	73,926	2047.40	78.27 oc	---	---	---	---	---	---	---	---	---	78.27
9.60	76,601	2047.60	78.90 oc	---	---	---	---	---	---	---	---	---	78.90
9.80	79,277	2047.80	79.53 oc	---	---	---	---	---	---	---	---	---	79.53
10.00	81,952	2048.00	80.15 oc	---	---	---	---	---	---	---	---	---	80.15
10.20	85,221	2048.20	80.77 oc	---	---	---	---	---	---	---	---	---	80.77
10.40	88,489	2048.40	81.38 oc	---	---	---	---	---	---	---	---	---	81.38
10.60	91,758	2048.60	81.99 oc	---	---	---	---	---	---	---	---	---	81.99
10.80	95,026	2048.80	82.60 oc	---	---	---	---	---	---	---	---	---	82.60
11.00	98,295	2049.00	83.19 oc	---	---	---	---	---	---	---	---	---	83.19
11.20	101,563	2049.20	83.79 oc	---	---	---	---	---	---	---	---	---	83.79
11.40	104,832	2049.40	84.38 oc	---	---	---	---	---	---	---	---	---	84.38
11.60	108,100	2049.60	84.97 oc	---	---	---	---	---	---	---	---	---	84.97
11.80	111,369	2049.80	85.55 oc	---	---	---	---	---	---	---	---	---	85.55
12.00	114,637	2050.00	86.13 oc	---	---	---	---	---	---	---	---	---	86.13

...End

Hydrograph Report

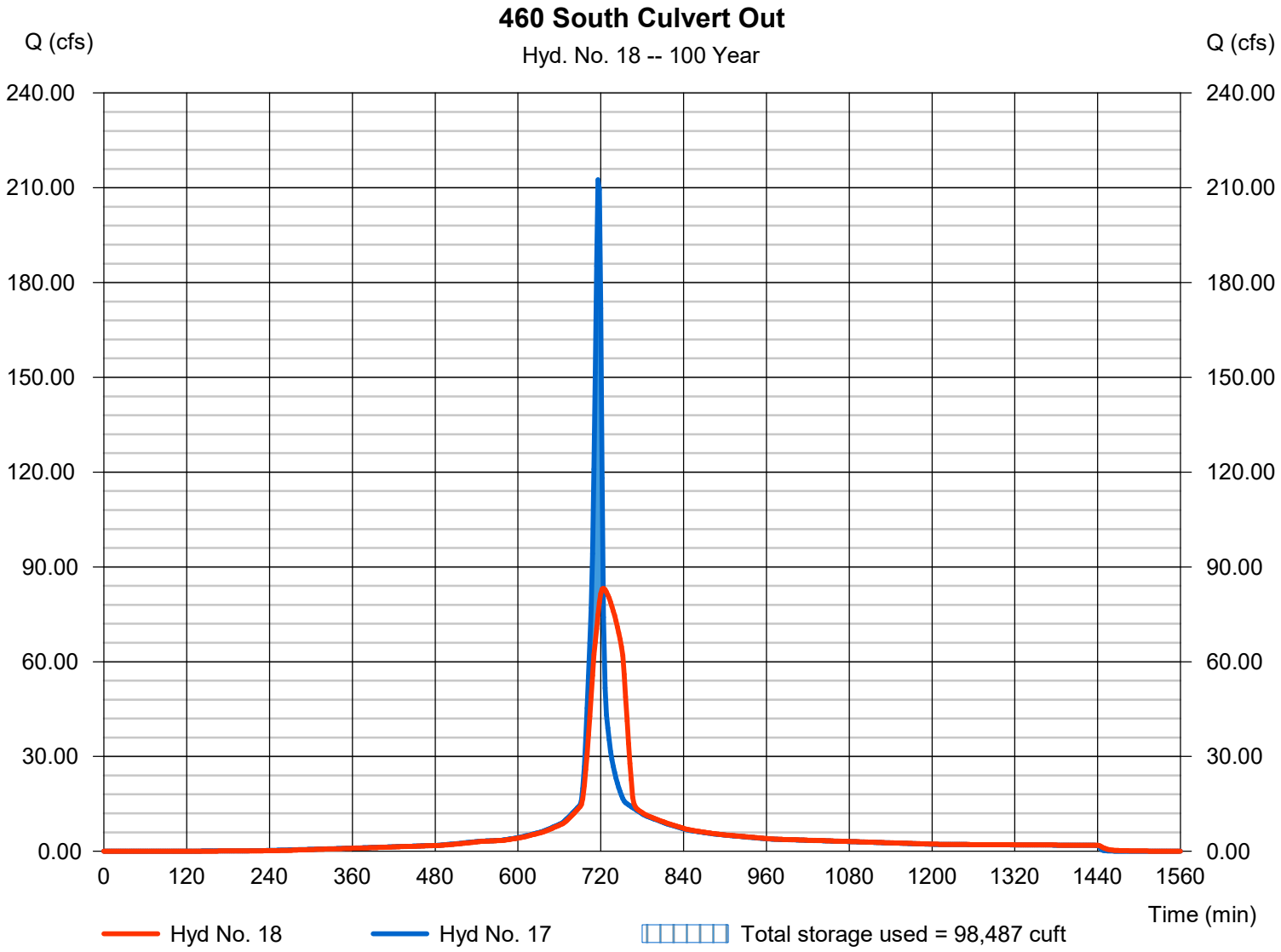
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 18

460 South Culvert Out

Hydrograph type	= Reservoir	Peak discharge	= 83.23 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 496,875 cuft
Inflow hyd. No.	= 17 - Total To 460 South Culvert	Max. Elevation	= 2049.01 ft
Reservoir name	= 460 South Culvert HW Storage	Max. Storage	= 98,487 cuft

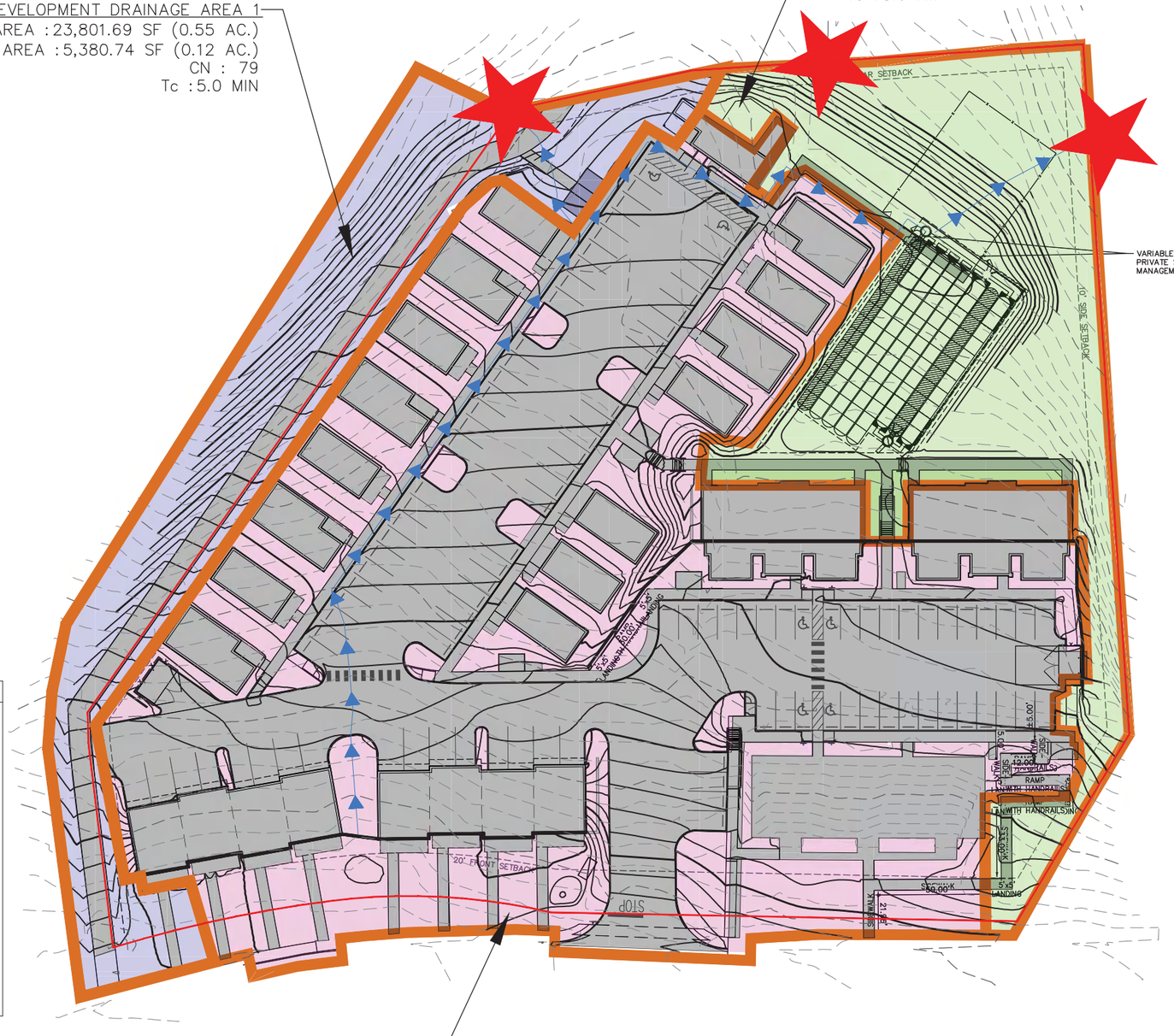
Storage Indication method used.



POST–DEVELOPMENT DRAINAGE AREA 1
TOTAL AREA : 23,801.69 SF (0.55 AC.)
IMPERVIOUS AREA : 5,380.74 SF (0.12 AC.)
CN : 79
Tc : 5.0 MIN

POST–DEVELOPMENT DRAINAGE AREA 3
TOTAL AREA : 33,629.01 SF (0.77 AC.)
IMPERVIOUS AREA : 2,101.43 SF (0.05 AC.)
CN : 75
Tc : 8.6 MIN

Note: DA 1 and 3 (which do not contribute to the underground detention) have been combined for the purpose of this document. See hydrograph 21, "The Farm Undetained Total". DA 2 is equal to hydrograph 19, "The Farm Basin Inflow".



LEGEND

- DRAINAGE AREA 1
- DRAINAGE AREA 2
- DRAINAGE AREA 3
- IMPERVIOUS AREA
- DRAINAGE AREA BOUNDARY
- SOILS MAP BOUNDARY
- TIME OF CONCENTRATION
- ANALYSIS POINT
- EXISTING PROPERTY LINE

POST–DEVELOPMENT DRAINAGE AREA 2
TOTAL AREA : 116,460.25 SF (2.67 AC.)
IMPERVIOUS AREA : 81,654.01 SF (1.87 AC.)
CN : 91
Tc : 5.8 MIN

Source: "The Farm" SWM calcs rev. 3/11/21

30 0 30 60
GRAPHIC SCALE FEET
CONTOUR INTERVAL = 1 FT.

GAY AND NEEL, INC.
CIVIL ENGINEERING ◆ LAND PLANNING ◆ SURVEYING
1260 Radford Street
Christiansburg, Virginia 24073
Phone: (540) 381-6011
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Web: www.gayandneel.com

POST-DEVELOPMENT DA MAP

THE FARM

TOWN OF BLACKSBURG, VIRGINIA

REVISIONS

NO.	COMMENTS	DATE

PROJECT TEAM

PIC	TREVOR M. KIMZEY, PE
PM	MATT P. TOMLINSON, PE
DESIGN	STC, ADS, MBL

ISSUE DATE: 02/01/2021

GNI JOB NO.: 1108.7

SHEET TITLE: POST-DEVELOPMENT DA MAP

SHEET NUMBER: 1 OF 1

Drainage Area Runoff and Time of Concentration

Precipitation Data	
Return Frequency	P (in.)
1 Yr.	2.26
2 Yr.	2.73
10 Yr.	4.06
100 Yr.	6.44

Drainage Area: **"The Farm" Drainage Areas**

Undetained areas total

Composite Curve Number (CN)

	CN	Area (Ac.)	CN*A
CN_1	79	0.55	43.45
CN_2	75	0.77	57.75
CN_3			0.00
CN_4			0.00
CN_5			0.00
Total	-	**1.32**	**101.20**
		Composite CN =	**77**

Time of Concentration, T_c

Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1						
2						
3						
4						
5						
6	Other Tt					8.6
					Total Time of Concentration, T_c (min.)	**8.6**

Runoff

	1 Yr.	10 Yr.	100 Yr.
Composite CN	77	77	77
Storage (in.) S=1000/CN-10	2.99	2.99	2.99
Initial abstraction (in.), I_a=0.2S	0.60	0.60	0.60
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.59	1.86	3.87
Runoff volume (ac-ft), RV = Q/12*A	0.07	0.20	0.43
Flow rate (cfs), q_{peak} from hydrograph	1.20	3.89	

Hydrograph No.: Contributes to 21

Notes: See "The Farm" calcs by others. CN1=DA1 post weighted CN, CN2=DA3 post weighted CN

Area to "The Farm" detention

Composite Curve Number (CN)

	CN	Area (Ac.)	CN*A
CN_1	91	2.67	242.97
CN_2			0.00
CN_3			0.00
CN_4			0.00
CN_5			0.00
Total	-	**2.67**	**242.97**
		Composite CN =	**91**

Time of Concentration, T_c

Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1						
2						
3						
4						
5						
6	Other Tt					5.8
					Total Time of Concentration, T_c (min.)	**5.8**

Runoff

	1 Yr.	10 Yr.	100 Yr.
VRRM CN*	91	91	91
Storage (in.) S=1000/CN-10	0.99	0.99	0.99
Initial abstraction (in.), I_a=0.2S	0.20	0.20	0.20
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	1.39	3.07	5.39
Runoff volume (ac-ft), RV = Q/12*A	0.31	0.68	1.20
Flow rate (cfs), q_{peak} from hydrograph	6.19	13.12	

*If different from Composite CN, runoff reduction BMPs are utilized

Hydrograph No.: 19

Notes: See "The Farm" calcs by others. CN1=DA3 post weighted CN

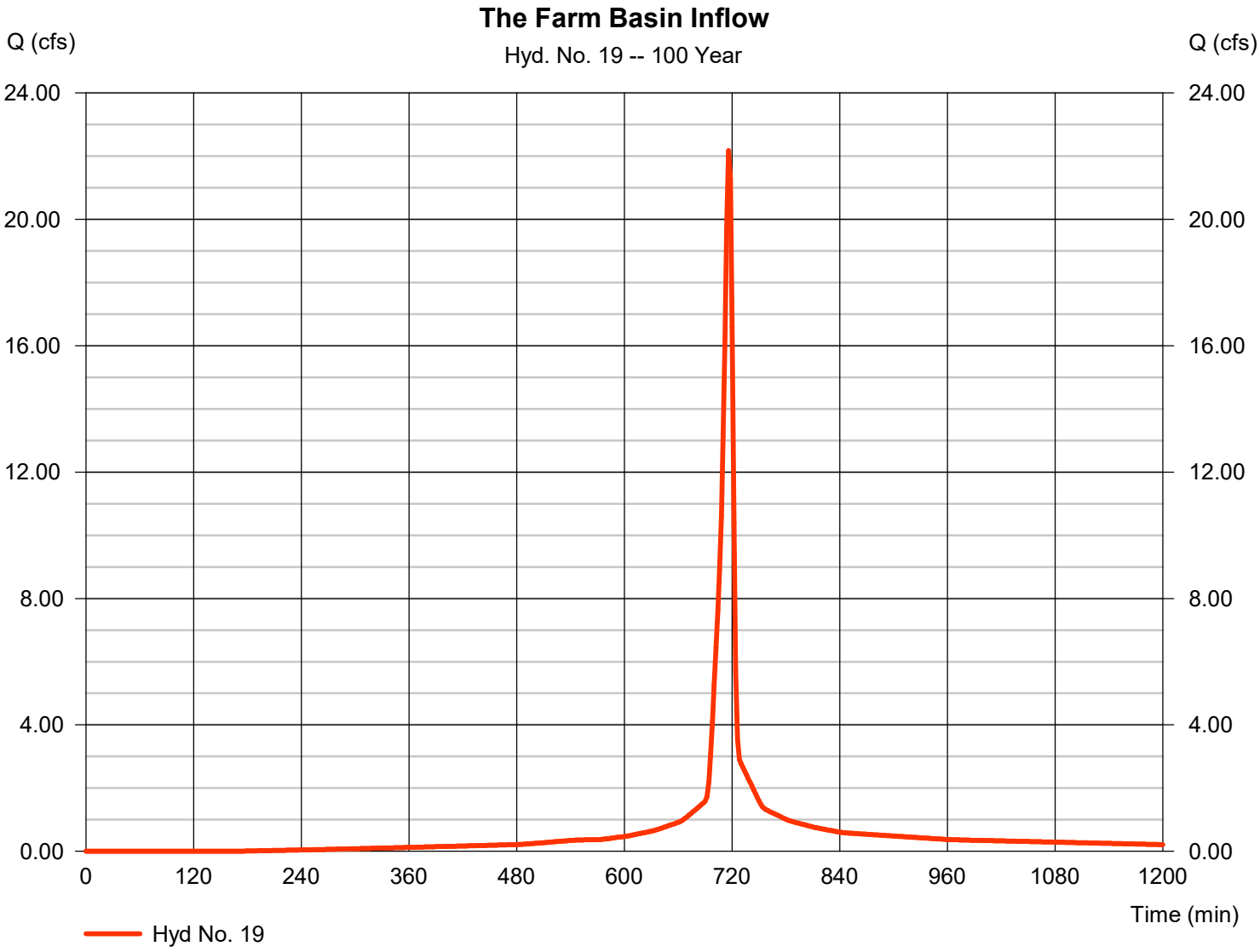
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 19

The Farm Basin Inflow

Hydrograph type	= SCS Runoff	Peak discharge	= 22.17 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 48,961 cuft
Drainage area	= 2.670 ac	Curve number	= 91
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.80 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Pond Report

Pond No. 12 - The Farm Underground Det

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2080.85	n/a	0	0
0.05	2080.90	n/a	126	126
0.24	2081.09	n/a	428	554
0.41	2081.26	n/a	406	960
0.69	2081.54	n/a	632	1,592
0.96	2081.81	n/a	1,180	2,772
1.53	2082.38	n/a	2,806	5,578
2.21	2083.06	n/a	3,199	8,777
2.63	2083.48	n/a	1,937	10,714
2.82	2083.67	n/a	835	11,549
3.40	2084.25	n/a	2,383	13,932
3.97	2084.82	n/a	2,068	16,000
4.40	2085.25	n/a	2,390	18,390
5.50	2086.35	n/a	1,362	19,752

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	1.00	5.00	0.00
Span (in)	= 15.00	1.00	5.00	0.00
No. Barrels	= 1	1	2	0
Invert El. (ft)	= 2080.85	2080.85	2083.85	0.00
Length (ft)	= 120.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.70	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.93	30.00	0.00	0.00
Crest El. (ft)	= 2085.25	2086.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2080.85	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.00	13	2080.85	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.000
0.01	25	2080.86	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.000
0.01	38	2080.86	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.000
0.02	50	2080.87	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.001
0.03	63	2080.88	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.001
0.03	76	2080.88	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.001
0.04	88	2080.88	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.001
0.04	101	2080.89	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.002
0.04	113	2080.89	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.002
0.05	126	2080.90	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.003
0.07	169	2080.92	0.00 ic	0.00 ic	0.00	---	0.00	0.00	---	---	---	---	0.004
0.09	212	2080.94	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.006
0.11	254	2080.96	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.007
0.13	297	2080.98	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.008
0.14	340	2081.00	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.008
0.16	383	2081.01	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.009
0.18	426	2081.03	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.010
0.20	468	2081.05	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.011
0.22	511	2081.07	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.011
0.24	554	2081.09	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.012
0.26	595	2081.11	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.012
0.27	635	2081.12	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.013
0.29	676	2081.14	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.013
0.31	716	2081.16	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.013
0.32	757	2081.18	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.014
0.34	798	2081.19	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.014
0.36	838	2081.21	0.01 ic	0.01 ic	0.00	---	0.00	0.00	---	---	---	---	0.015
0.38	879	2081.23	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.015
0.39	919	2081.24	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.015

Continues on next page...

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.41	960	2081.26	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.016
0.44	1,023	2081.29	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.016
0.47	1,086	2081.32	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.017
0.49	1,150	2081.34	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.017
0.52	1,213	2081.37	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.018
0.55	1,276	2081.40	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.018
0.58	1,339	2081.43	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.019
0.61	1,402	2081.46	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.020
0.63	1,466	2081.49	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.020
0.66	1,529	2081.51	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.020
0.69	1,592	2081.54	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.021
0.72	1,710	2081.57	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.021
0.74	1,828	2081.59	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.022
0.77	1,946	2081.62	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.022
0.80	2,064	2081.65	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.023
0.82	2,182	2081.68	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.023
0.85	2,300	2081.70	0.02 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.023
0.88	2,418	2081.73	0.03 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.024
0.91	2,536	2081.76	0.03 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.024
0.93	2,654	2081.78	0.03 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.024
0.96	2,772	2081.81	0.03 ic	0.02 ic	0.00	---	0.00	0.00	---	---	---	---	0.025
1.02	3,053	2081.87	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.026
1.07	3,333	2081.92	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.026
1.13	3,614	2081.98	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.027
1.19	3,894	2082.04	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.028
1.25	4,175	2082.09	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.028
1.30	4,456	2082.15	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.029
1.36	4,736	2082.21	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.030
1.42	5,017	2082.26	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.030
1.47	5,297	2082.32	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.031
1.53	5,578	2082.38	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.032
1.60	5,898	2082.45	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.032
1.67	6,218	2082.52	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.033
1.73	6,538	2082.58	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.034
1.80	6,858	2082.65	0.03 ic	0.03 ic	0.00	---	0.00	0.00	---	---	---	---	0.035
1.87	7,178	2082.72	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.035
1.94	7,497	2082.79	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.036
2.01	7,817	2082.86	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.036
2.07	8,137	2082.93	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.037
2.14	8,457	2082.99	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.038
2.21	8,777	2083.06	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.038
2.25	8,971	2083.10	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.039
2.29	9,164	2083.14	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.039
2.34	9,358	2083.19	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.039
2.38	9,552	2083.23	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.040
2.42	9,746	2083.27	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.040
2.46	9,939	2083.31	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.041
2.50	10,133	2083.35	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.041
2.55	10,327	2083.40	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.041
2.59	10,520	2083.44	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.042
2.63	10,714	2083.48	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.042
2.65	10,798	2083.50	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.042
2.67	10,881	2083.52	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.042
2.69	10,965	2083.54	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.042
2.71	11,048	2083.56	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.043
2.72	11,132	2083.57	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.043
2.74	11,215	2083.59	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.043
2.76	11,299	2083.61	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.043
2.78	11,382	2083.63	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.043
2.80	11,466	2083.65	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.043
2.82	11,549	2083.67	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.043
2.88	11,787	2083.73	0.04 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.044
2.94	12,026	2083.79	0.05 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.044
2.99	12,264	2083.84	0.05 ic	0.04 ic	0.00	---	0.00	0.00	---	---	---	---	0.045
3.05	12,502	2083.90	0.07 ic	0.05 ic	0.02 ic	---	0.00	0.00	---	---	---	---	0.061
3.11	12,741	2083.96	0.12 ic	0.05 ic	0.07 ic	---	0.00	0.00	---	---	---	---	0.111
3.17	12,979	2084.02	0.20 ic	0.05 ic	0.15 ic	---	0.00	0.00	---	---	---	---	0.191
3.23	13,217	2084.08	0.30 ic	0.05 ic	0.25 ic	---	0.00	0.00	---	---	---	---	0.293
3.28	13,455	2084.14	0.41 ic	0.05 ic	0.36 ic	---	0.00	0.00	---	---	---	---	0.407
3.34	13,694	2084.19	0.53 ic	0.05 ic	0.48 ic	---	0.00	0.00	---	---	---	---	0.525
3.40	13,932	2084.25	0.63 ic	0.05 ic	0.58 ic	---	0.00	0.00	---	---	---	---	0.626
3.46	14,139	2084.31	0.72 ic	0.05 ic	0.65 ic	---	0.00	0.00	---	---	---	---	0.701

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The Farm Underground Det

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.51	14,346	2084.36	0.79 ic	0.05 ic	0.73 ic	---	0.00	0.00	---	---	---	---	0.772
3.57	14,552	2084.42	0.86 ic	0.05 ic	0.79 ic	---	0.00	0.00	---	---	---	---	0.837
3.63	14,759	2084.48	0.90 ic	0.05 ic	0.85 ic	---	0.00	0.00	---	---	---	---	0.898
3.68	14,966	2084.53	0.97 ic	0.05 ic	0.91 ic	---	0.00	0.00	---	---	---	---	0.953
3.74	15,173	2084.59	1.01 ic	0.05 ic	0.96 ic	---	0.00	0.00	---	---	---	---	1.006
3.80	15,380	2084.65	1.06 ic	0.05 ic	1.01 ic	---	0.00	0.00	---	---	---	---	1.056
3.86	15,586	2084.71	1.10 ic	0.05 ic	1.06 ic	---	0.00	0.00	---	---	---	---	1.104
3.91	15,793	2084.76	1.18 ic	0.05 ic	1.10 ic	---	0.00	0.00	---	---	---	---	1.150
3.97	16,000	2084.82	1.22 ic	0.05 ic	1.15 ic	---	0.00	0.00	---	---	---	---	1.195
4.01	16,239	2084.86	1.23 ic	0.05 ic	1.18 ic	---	0.00	0.00	---	---	---	---	1.227
4.06	16,478	2084.91	1.27 ic	0.05 ic	1.21 ic	---	0.00	0.00	---	---	---	---	1.258
4.10	16,717	2084.95	1.31 ic	0.05 ic	1.24 ic	---	0.00	0.00	---	---	---	---	1.289
4.14	16,956	2084.99	1.32 ic	0.05 ic	1.27 ic	---	0.00	0.00	---	---	---	---	1.319
4.19	17,195	2085.03	1.36 ic	0.05 ic	1.30 ic	---	0.00	0.00	---	---	---	---	1.348
4.23	17,434	2085.08	1.41 ic	0.05 ic	1.33 ic	---	0.00	0.00	---	---	---	---	1.376
4.27	17,673	2085.12	1.41 ic	0.05 ic	1.35 ic	---	0.00	0.00	---	---	---	---	1.404
4.31	17,912	2085.16	1.45 ic	0.05 ic	1.38 ic	---	0.00	0.00	---	---	---	---	1.432
4.36	18,151	2085.21	1.46 ic	0.05 ic	1.41 ic	---	0.00	0.00	---	---	---	---	1.458
4.40	18,390	2085.25	1.50 ic	0.05 ic	1.43 ic	---	0.00	0.00	---	---	---	---	1.485
4.51	18,526	2085.36	2.03 ic	0.05 ic	1.50 ic	---	0.48	0.00	---	---	---	---	2.028
4.62	18,662	2085.47	2.98 ic	0.05 ic	1.56 ic	---	1.35	0.00	---	---	---	---	2.961
4.73	18,799	2085.58	4.17 ic	0.05 ic	1.62 ic	---	2.48	0.00	---	---	---	---	4.152
4.84	18,935	2085.69	5.54 oc	0.04 ic	1.68 ic	---	3.82	0.00	---	---	---	---	5.535
4.95	19,071	2085.80	5.63 oc	0.04 ic	1.73 ic	---	3.85 ic	0.00	---	---	---	---	5.626
5.06	19,207	2085.91	6.05 oc	0.04 ic	1.79 ic	---	4.22 ic	0.00	---	---	---	---	6.045
5.17	19,343	2086.02	6.43 oc	0.04 ic	1.84 ic	---	4.56 ic	0.30	---	---	---	---	6.739
5.28	19,480	2086.13	6.77 oc	0.04 ic	1.86 ic	---	4.87 ic	4.74	---	---	---	---	11.51
5.39	19,616	2086.24	7.04 oc	0.04 ic	1.84 ic	---	5.17 ic	11.82	---	---	---	---	18.86
5.50	19,752	2086.35	7.29 oc	0.04 ic	1.81 ic	---	5.44 ic	20.69	---	---	---	---	27.99

...End

Hydrograph Report

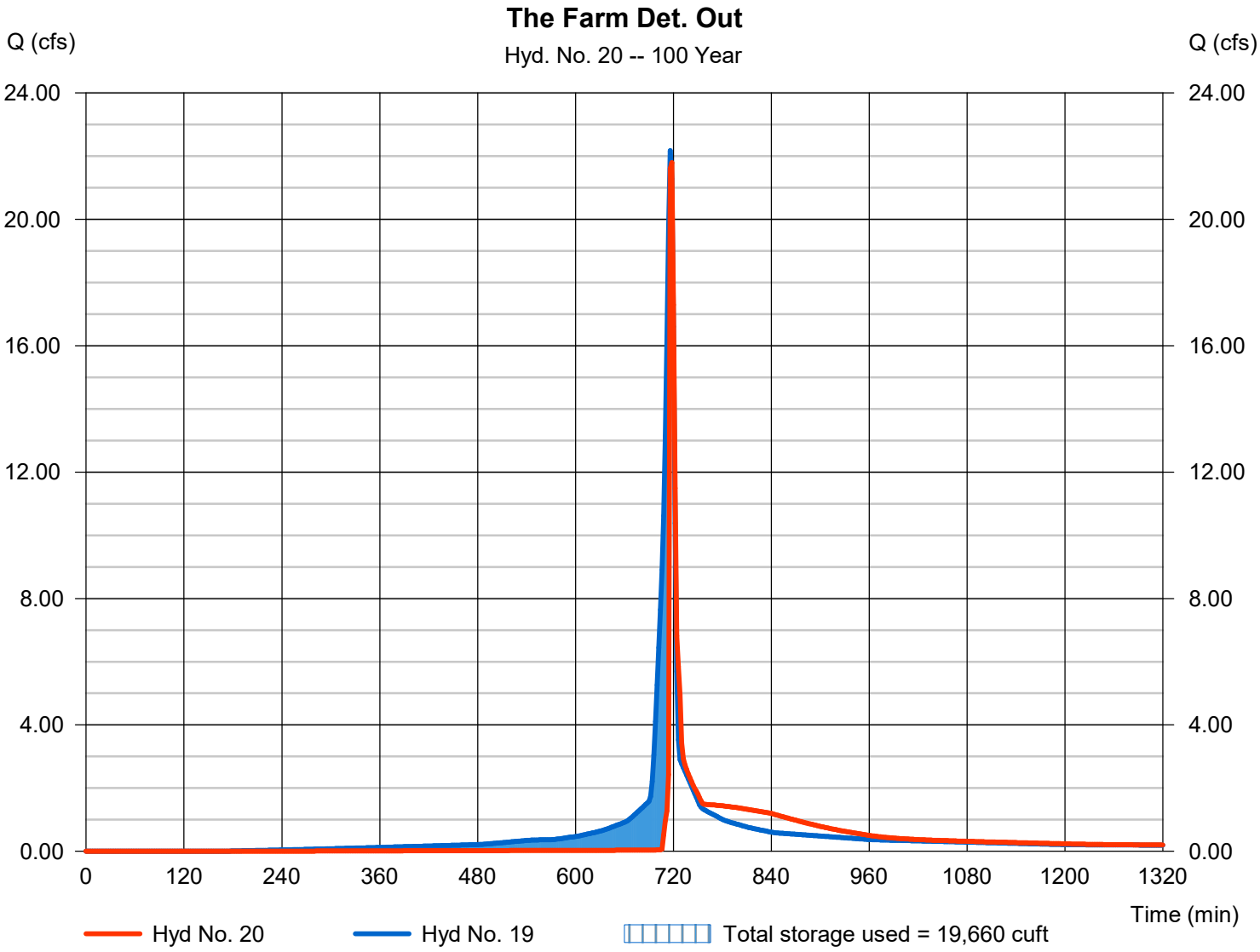
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 20

The Farm Det. Out

Hydrograph type	=	Reservoir	Peak discharge	=	21.80 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	45,560 cuft
Inflow hyd. No.	=	19 - The Farm Basin Inflow	Max. Elevation	=	2086.28 ft
Reservoir name	=	The Farm Underground Det	Max. Storage	=	19,660 cuft

Storage Indication method used.



Drainage Area Runoff and Time of Concentration

Precipitation Data	
Return Frequency	P (in.)
1 Yr.	2.26
2 Yr.	2.73
10 Yr.	4.06
100 Yr.	6.44

Drainage Area: **"The Farm" Drainage Areas**

Undetained areas total

Composite Curve Number (CN)

	CN	Area (Ac.)	CN*A
CN_1	79	0.55	43.45
CN_2	75	0.77	57.75
CN_3			0.00
CN_4			0.00
CN_5			0.00
Total	-	**1.32**	**101.20**
		Composite CN =	**77**

Time of Concentration, T_c

Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1						
2						
3						
4						
5						
6	Other Tt					8.6
					Total Time of Concentration, T_c (min.)	**8.6**

Runoff

	1 Yr.	10 Yr.	100 Yr.
Composite CN	77	77	77
Storage (in.) S=1000/CN-10	2.99	2.99	2.99
Initial abstraction (in.), I_a=0.2S	0.60	0.60	0.60
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.59	1.86	3.87
Runoff volume (ac-ft), RV = Q/12*A	0.07	0.20	0.43
Flow rate (cfs), q_{peak} from hydrograph	1.20	3.89	

Hydrograph No.: Contributes to 21

Notes: See "The Farm" calcs by others. CN1=DA1 post weighted CN, CN2=DA3 post weighted CN

Area to "The Farm" detention

Composite Curve Number (CN)

	CN	Area (Ac.)	CN*A
CN_1	91	2.67	242.97
CN_2			0.00
CN_3			0.00
CN_4			0.00
CN_5			0.00
Total	-	**2.67**	**242.97**
		Composite CN =	**91**

Time of Concentration, T_c

Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1						
2						
3						
4						
5						
6	Other Tt					5.8
					Total Time of Concentration, T_c (min.)	**5.8**

Runoff

	1 Yr.	10 Yr.	100 Yr.
VRRM CN*	91	91	91
Storage (in.) S=1000/CN-10	0.99	0.99	0.99
Initial abstraction (in.), I_a=0.2S	0.20	0.20	0.20
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	1.39	3.07	5.39
Runoff volume (ac-ft), RV = Q/12*A	0.31	0.68	1.20
Flow rate (cfs), q_{peak} from hydrograph	6.19	13.12	

*If different from Composite CN, runoff reduction BMPs are utilized

Hydrograph No.: 19

Notes: See "The Farm" calcs by others. CN1=DA3 post weighted CN

Drainage Area Runoff and Time of Concentration

Drainage Area: **Undetained Farm and other contrib. offsite flows**

PRE & POST

Composite Curve Number (CN)						**Notes:**
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	N/A	"Farm" DA1 post CN	79	0.55	43.45	-CN1 and CN2 are pulled from "The Farm" SWM plan. "The Farm" DA1 and DA3 are undetained by the development. DA2 is accounted for elsewhere and routed through "The Farm's" SWM improvements. -Remaining CNs are measured areas from offsite areas, incl. 460 and its median.
CN_2	N/A	"Farm" DA3 post CN	75	0.77	57.75	
CN_3	D	Imperv.	98	1.25	122.30	
CN_4	D	Open space	80	0.72	57.59	
CN_5	D	Brush (good)	73	1.53	111.33	
CN_6	C	Imperv.	98	0.28	27.15	
CN_7					0.00	
CN_8					0.00	
CN_9					0.00	
CN_{10}					0.00	
				Total	**5.09**	**419.57**	
				Composite CN =		**82**	

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Other Tt	Farm Tc				8.6
2						
3						
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**8.6**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	82	82	82
Storage (in.) S=1000/CN-10	2.20	2.20	2.20
Initial abstraction (in.), I_a=0.2S	0.44	0.44	0.44
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.83	2.25	4.39
Runoff volume (ac-ft), RV = Q/12*A	0.35	0.96	1.86
Flow rate (cfs), q_{peak} from hydrograph	6.64	18.18	34.74

Hydrograph Number: 21

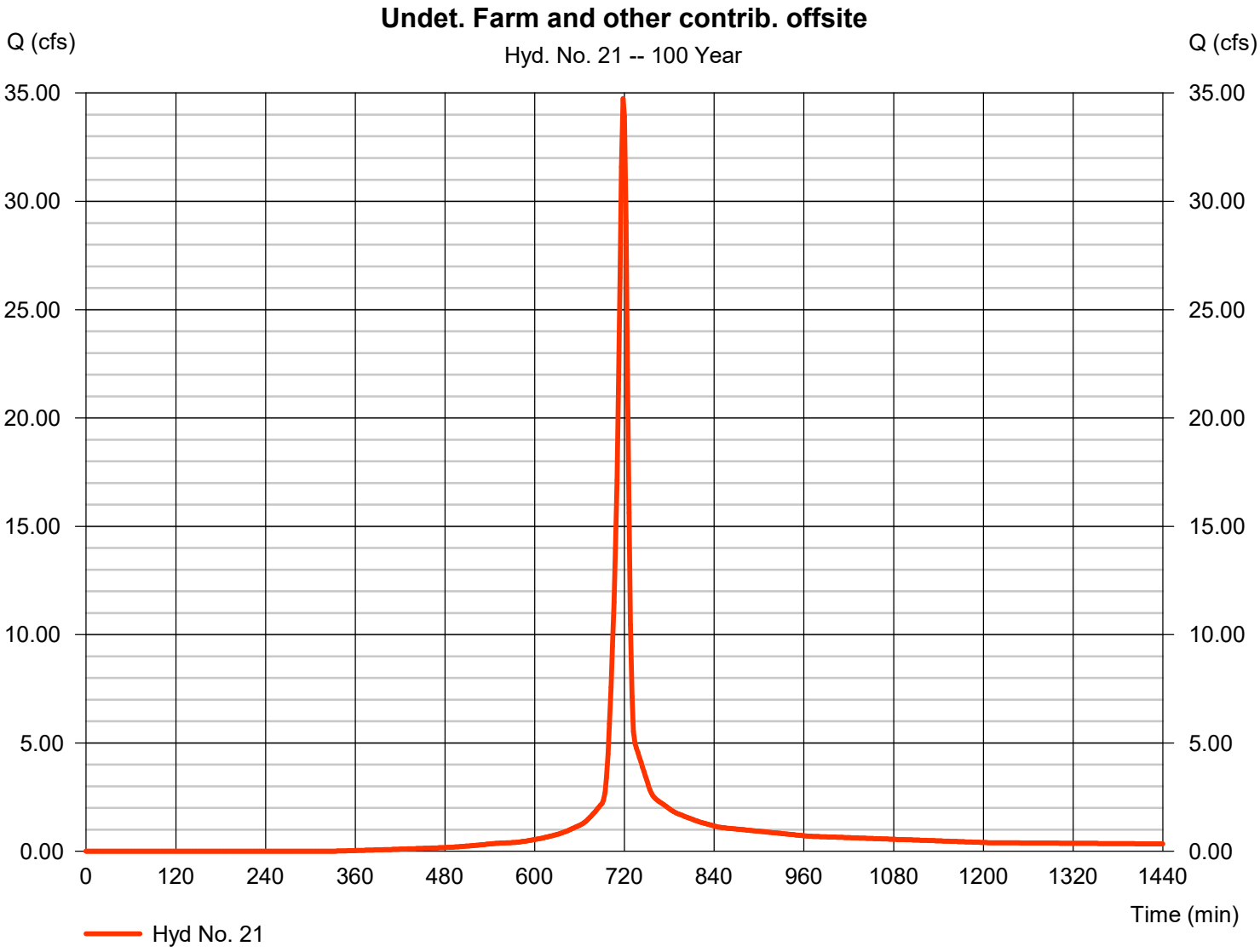
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 21

Undet. Farm and other contrib. offsite

Hydrograph type	= SCS Runoff	Peak discharge	= 34.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 81,182 cuft
Drainage area	= 5.090 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.60 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



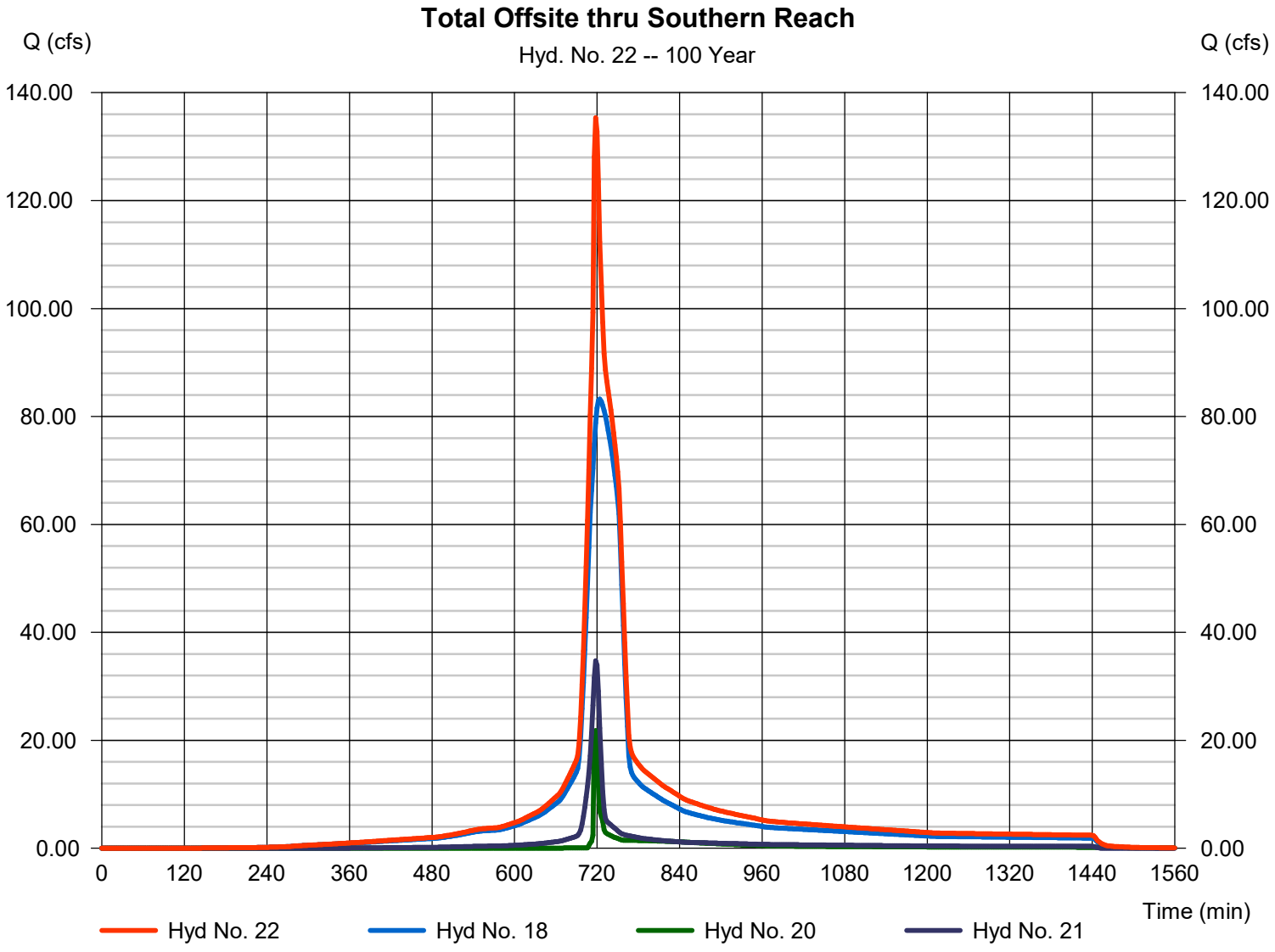
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

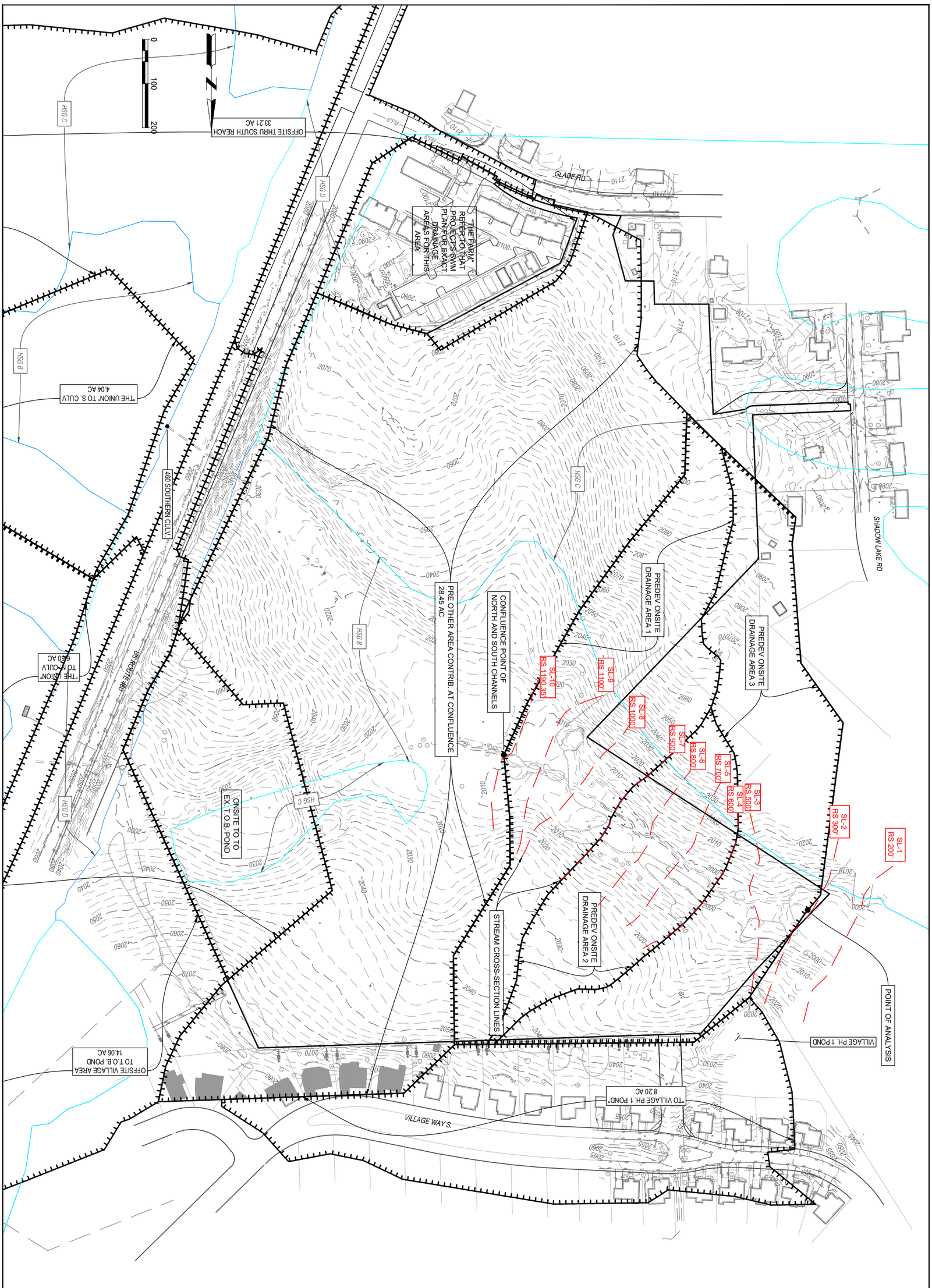
Hyd. No. 22

Total Offsite thru Southern Reach

Hydrograph type	= Combine	Peak discharge	= 135.34 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 623,617 cuft
Inflow hyds.	= 18, 20, 21	Contrib. drain. area	= 5.090 ac



C:\DROPBOX\E&A\CARY HOPPER\GLADE SPRING\CAD\REZONING CAD\FLOOD-MAP-PREDEV.DWG
11/15/2022 10:05:06 AM



Sheet No. 1 of 1	Checked By: ---	Drawn By: MSF	PROPOSED DEVELOPMENT OF
D2	Date: 04/28/2023	Scale: AS SHOWN	GLADE SPRING CROSSING

PROPERTY OF GLADE HGTS, LLC - TAX PARCELS
225-(A)-3, 225-(A)-4, & 224-(A)-57; 45.0976 AC.

TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

PREDEVELOPMENT ONSITE DRAINAGE AREAS

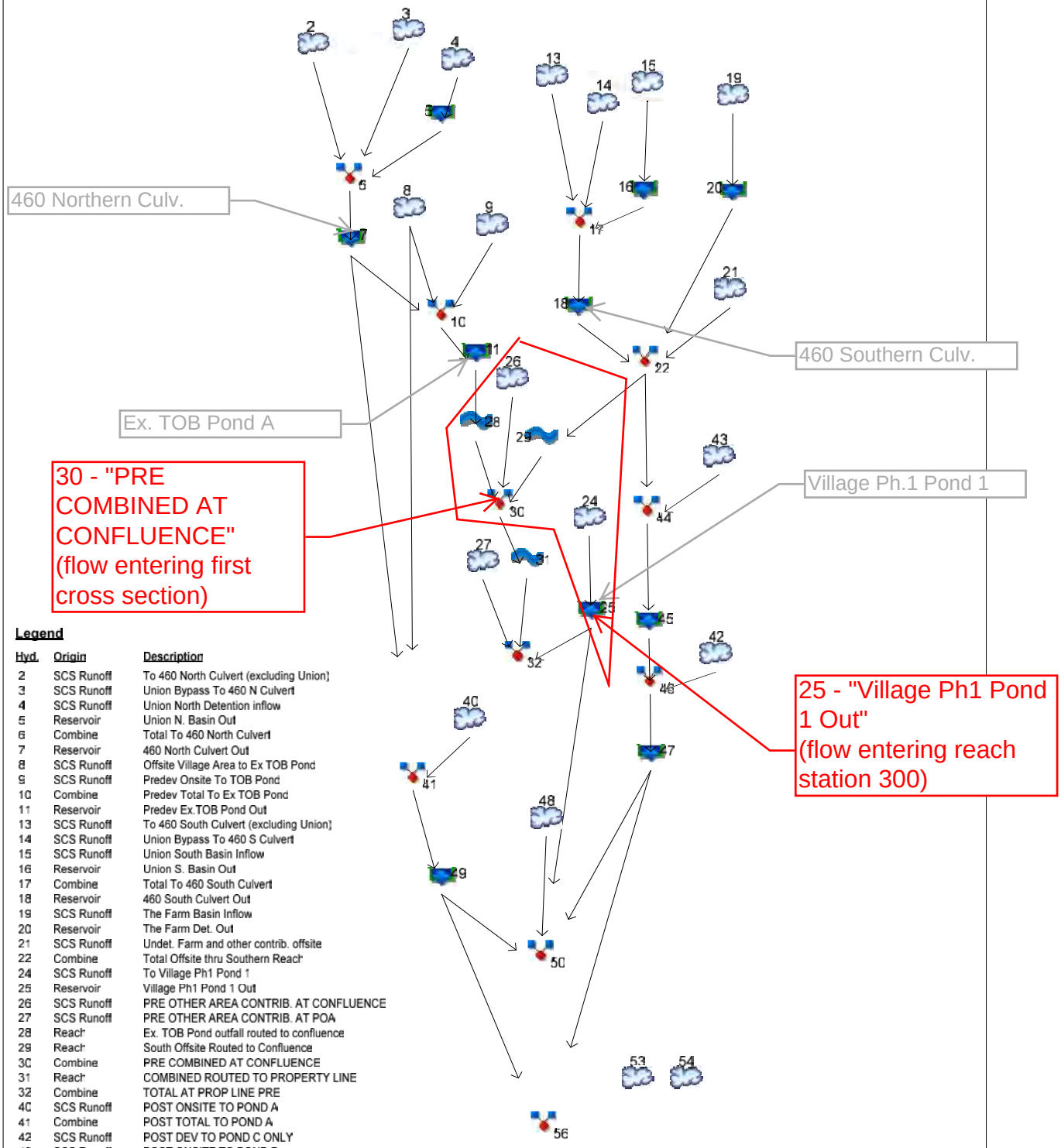
COMMONWEALTH OF VIRGINIA
PAUL BROWN
Lic. No. 036148
04/28/2023
PROFESSIONAL ENGINEER

No.	Revision Issue	Date

EDEN & ASSOCIATES
engineering • planning • development
1700 KRAFT DRIVE, SUITE 2350
BLACKSBURG, VIRGINIA 24060
VOICE 276-632-6231
FAX. 276-632-3648

Watershed Model Schematic

is this pre, post, or both?



Legend

Hyd.	Origin	Description
2	SCS Runoff	To 460 North Culvert (excluding Union)
3	SCS Runoff	Union Bypass To 460 N Culvert
4	SCS Runoff	Union North Detention inflow
5	Reservoir	Union N. Basin Out
6	Combine	Total To 460 North Culvert
7	Reservoir	460 North Culvert Out
8	SCS Runoff	Offsite Village Area to Ex TOB Pond
9	SCS Runoff	Predev Onsite To TOB Pond
10	Combine	Predev Total To Ex TOB Pond
11	Reservoir	Predev Ex.TOB Pond Out
13	SCS Runoff	To 460 South Culvert (excluding Union)
14	SCS Runoff	Union Bypass To 460 S Culvert
15	SCS Runoff	Union South Basin Inflow
16	Reservoir	Union S. Basin Out
17	Combine	Total To 460 South Culvert
18	Reservoir	460 South Culvert Out
19	SCS Runoff	The Farm Basin Inflow
20	Reservoir	The Farm Det. Out
21	SCS Runoff	Undet. Farm and other contrib. offsite
22	Combine	Total Offsite thru Southern Reach
24	SCS Runoff	To Village Ph1 Pond 1
25	Reservoir	Village Ph1 Pond 1 Out
26	SCS Runoff	PRE OTHER AREA CONTRIB. AT CONFLUENCE
27	SCS Runoff	PRE OTHER AREA CONTRIB. AT POA
28	Reach	Ex. TOB Pond outfall routed to confluence
29	Reach	South Offsite Routed to Confluence
30	Combine	PRE COMBINED AT CONFLUENCE
31	Reach	COMBINED ROUTED TO PROPERTY LINE
32	Combine	TOTAL AT PROP LINE PRE
40	SCS Runoff	POST ONSITE TO POND A
41	Combine	POST TOTAL TO POND A
42	SCS Runoff	POST DEV TO POND C ONLY
43	SCS Runoff	POST ONSITE TO POND B
44	Combine	TOTAL TO SOUTH DET POND B
45	Reservoir	S DET POND B ROUTE
46	Combine	TOTAL TO WET POND C
47	Reservoir	WET POND C ROUTED
48	SCS Runoff	POST UNDETAINED CONTRIB. AREA
49	Reservoir	UPGRADED POND A ROUTED
50	Combine	POST TOTAL ROUTED TO PROP LINE
53	SCS Runoff	Onsite Only Total Predev
54	SCS Runoff	Onsite Only Total Postdev
56	Combine	POST ROUTED POND TOTALS

Drainage Area Runoff and Time of Concentration

Drainage Area: **PRE OTHER AREA CONTRIB. AT CONFLUENCE**
PREDEVELOPMENT

Composite Curve Number (CN)						Notes:
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	16.39	999.91	"Other area" contributing at the confluence of the north and south channels. Comprises onsite and offsite areas downstream from detention measures.
CN_2	C	Open space	74	12.04	890.69	
CN_3	B	Imperv. (measured)	98	0.00	0.00	
CN_4	C	Imperv. (measured)	98	0.00	0.00	
CN_5	B	Woods (good)	55	0.00	0.00	
CN_6	C	Woods (good)	70	0.00	0.00	
CN_7					0.00	
CN_8					0.00	
CN_9					0.00	
CN_{10}					0.00	
				Total	**28.43**	**1890.59**
				Composite CN =		**67**

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Grass	100	0.24	0.05	10.7
2	Shallow Conc.	Grass	1100		0.091	3.8
3						
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**14.5**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	67	67	67
Storage (in.) S=1000/CN-10	4.93	4.93	4.93
Initial abstraction (in.), I_a=0.2S	0.99	0.99	0.99
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.26	1.18	2.87
Runoff volume (ac-ft), RV = Q/12*A	0.62	2.80	6.79
Flow rate (cfs), q_{peak} from hydrograph	5.61	39.92	102.14

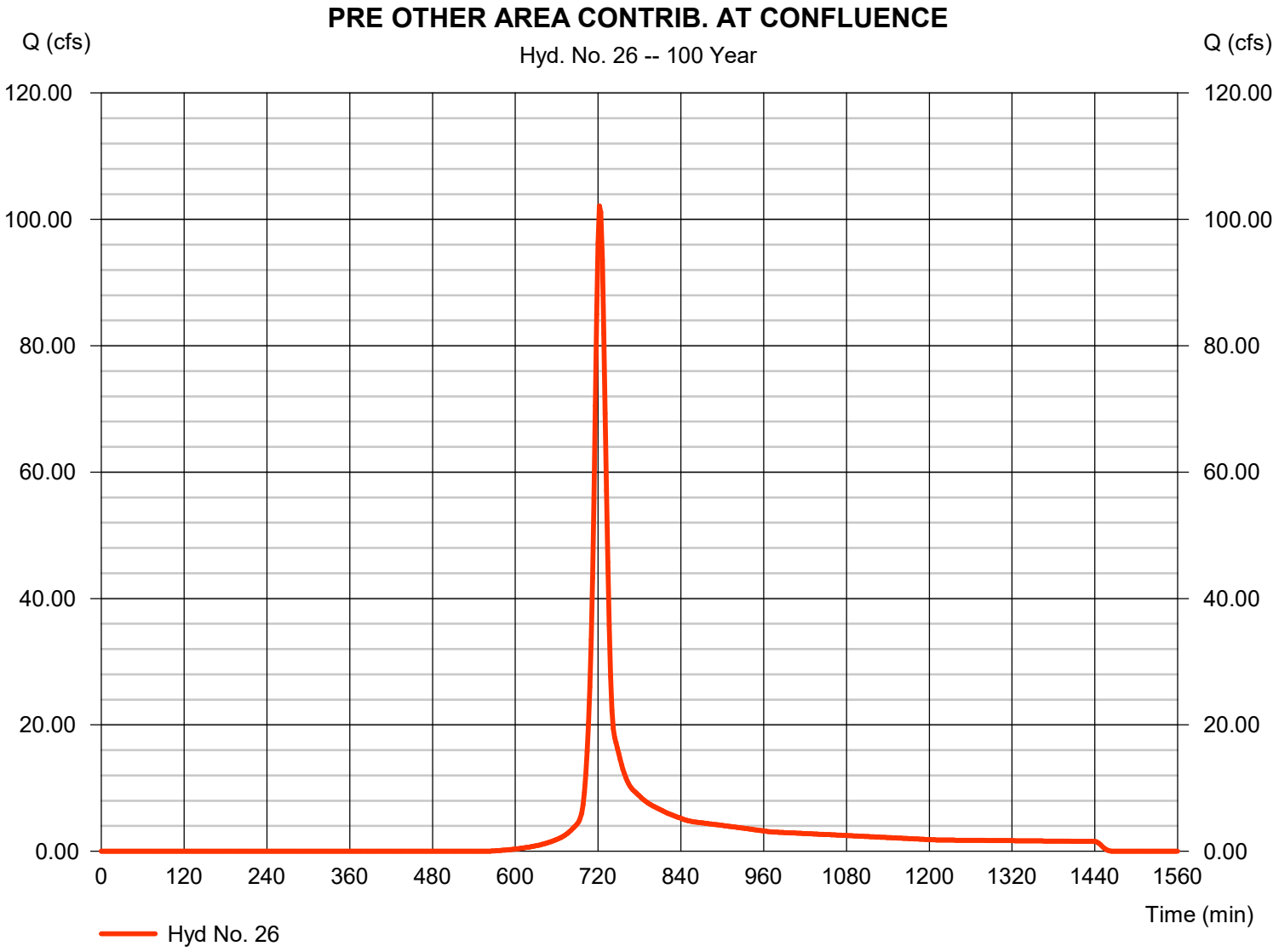
Hydrograph Number: 26

Hydrograph Report

Hyd. No. 26

PRE OTHER AREA CONTRIB. AT CONFLUENCE

Hydrograph type	= SCS Runoff	Peak discharge	= 102.14 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 288,440 cuft
Drainage area	= 28.430 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.50 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

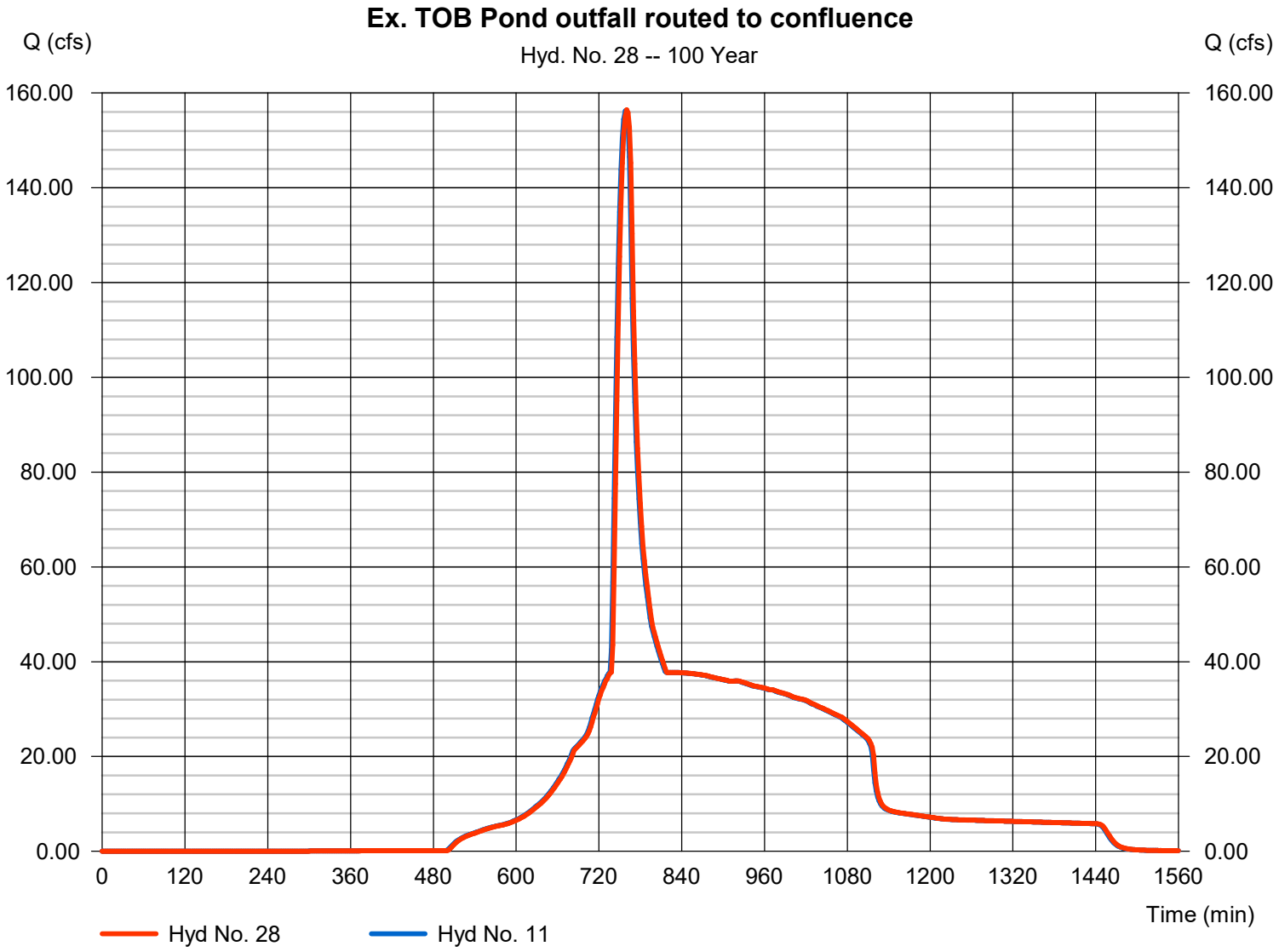
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 28

Ex. TOB Pond outfall routed to confluence

Hydrograph type	=	Reach	Peak discharge	=	156.49 cfs
Storm frequency	=	100 yrs	Time to peak	=	760 min
Time interval	=	2 min	Hyd. volume	=	1,325,139 cuft
Inflow hyd. No.	=	11 - Predev Ex.TOB Pond Out	Section type	=	Triangular
Reach length	=	436.0 ft	Channel slope	=	2.0 %
Manning's n	=	0.030	Bottom width	=	0.0 ft
Side slope	=	3.0:1	Max. depth	=	0.0 ft
Rating curve x	=	3.074	Rating curve m	=	1.333
Ave. velocity	=	0.00 ft/s	Routing coeff.	=	1.2019

Modified Att-Kin routing method used.



Hydrograph Report

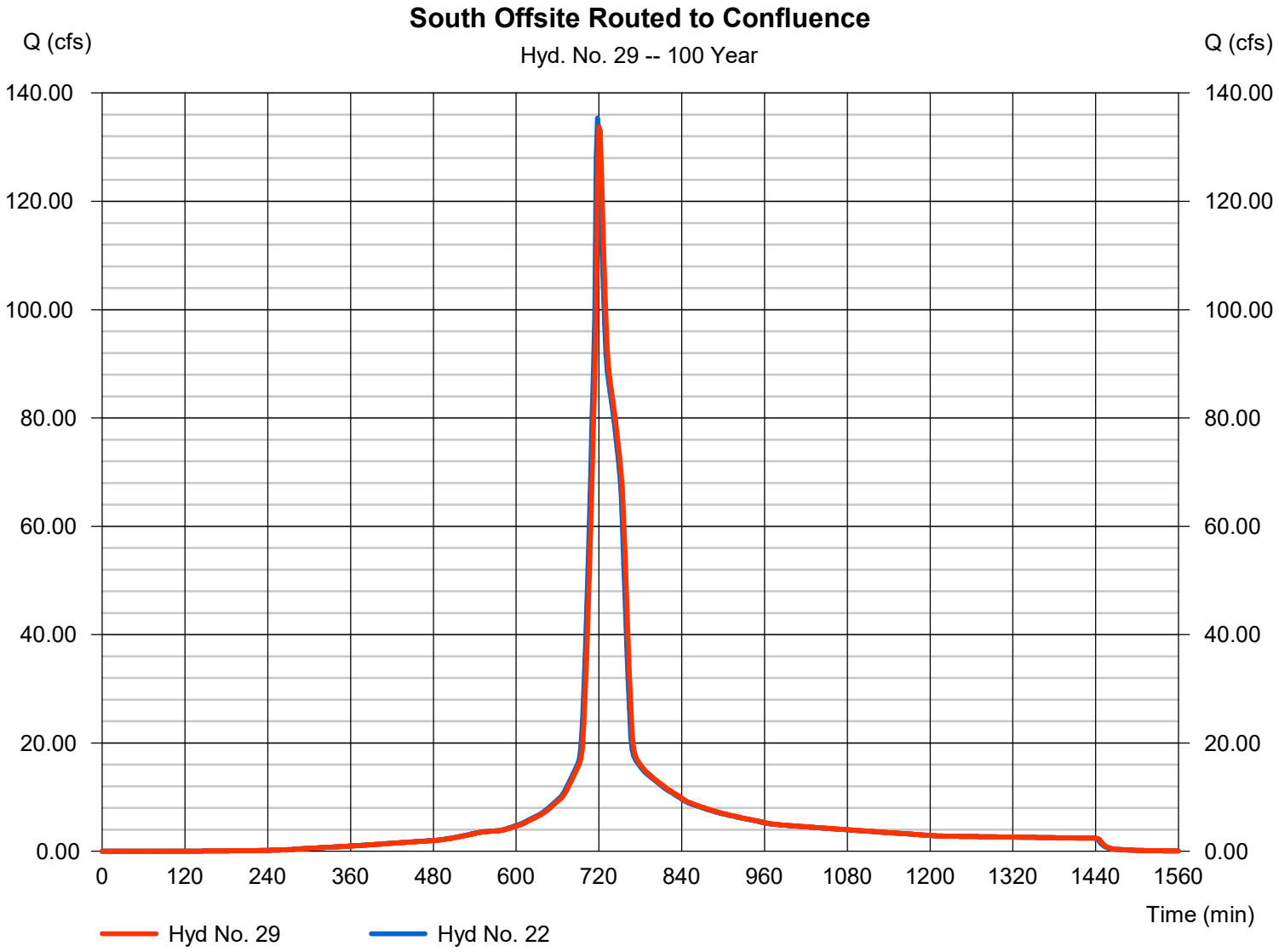
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 29

South Offsite Routed to Confluence

Hydrograph type	=	Reach	Peak discharge	=	133.79 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	623,614 cuft
Inflow hyd. No.	=	22 - Total Offsite thru Southern Reach	Section type	=	Triangular
Reach length	=	877.0 ft	Channel slope	=	2.3 %
Manning's n	=	0.030	Bottom width	=	0.0 ft
Side slope	=	3.0:1	Max. depth	=	0.0 ft
Rating curve x	=	3.296	Rating curve m	=	1.333
Ave. velocity	=	0.00 ft/s	Routing coeff.	=	0.8643

Modified Att-Kin routing method used.



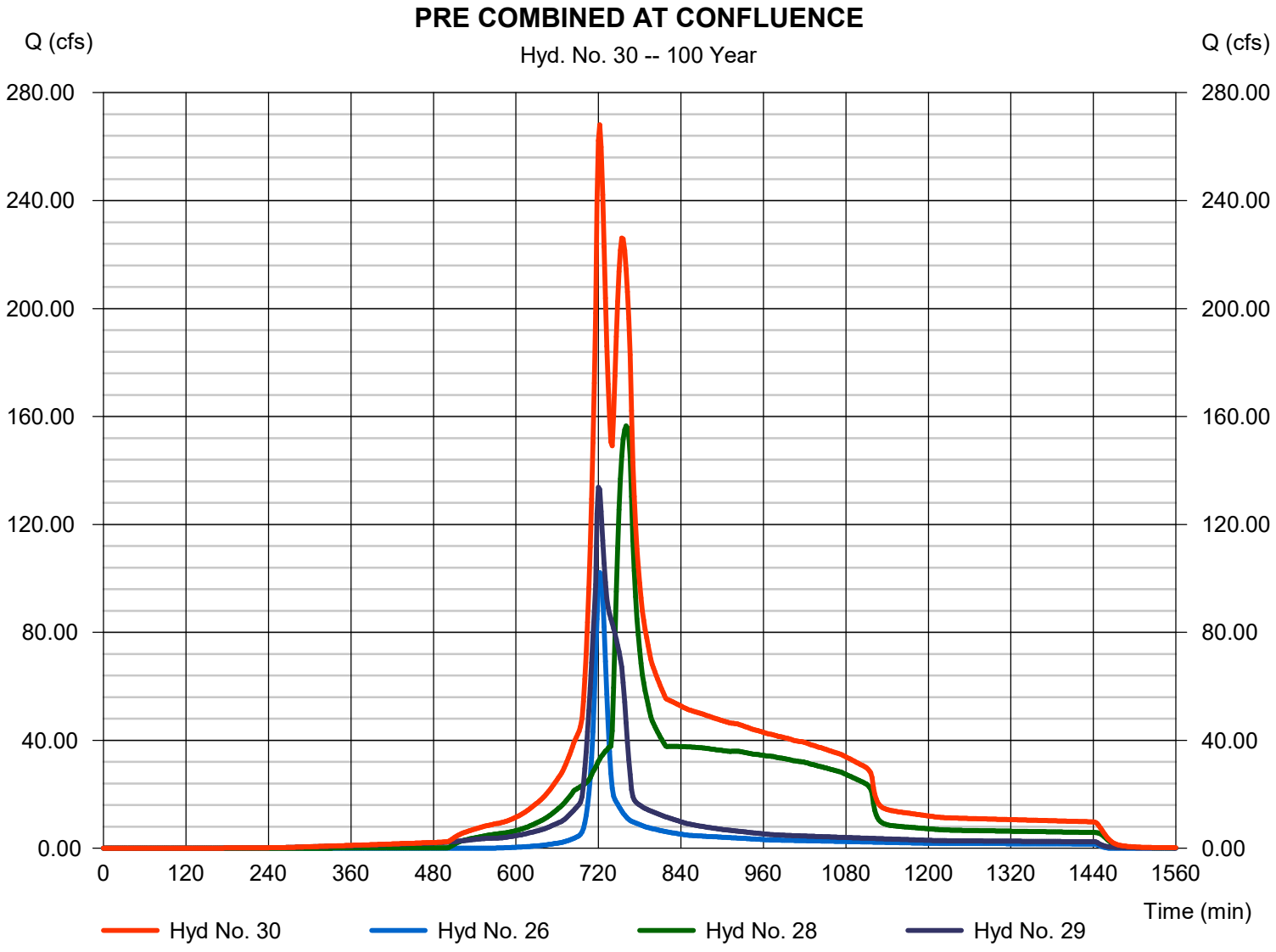
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 30

PRE COMBINED AT CONFLUENCE

Hydrograph type	= Combine	Peak discharge	= 268.04 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 2,237,189 cuft
Inflow hyds.	= 26, 28, 29	Contrib. drain. area	= 28.430 ac



Drainage Area Runoff and Time of Concentration

Drainage Area: 1

PREDEVELOPMENT

Composite Curve Number (CN)						Notes:
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	3.20	195.02	
CN_2	C	Open space	74	2.45	181.20	
CN_3	B	Imperv. (measured)	98		0.00	
CN_4	C	Imperv. (measured)	98		0.00	
CN_5	B	Imperv. (est. lots)	98		0.00	
CN_6	C	Imperv. (est. lots)	98		0.00	
CN_7	B	Imperv. (water surf.)	98		0.00	
CN_8	B	Woods	55	0.69	37.85	
CN_9	C	Woods	70	0.85	59.64	
CN_{10}					0.00	
			Total	**7.19**	**473.72**	
				Composite CN =	**66**	

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Open Space	100	0.13	0.018	9.9
2	Shallow Conc.	Unpaved	818		0.115	2.5
3	Channel	Natural Channel	200	0.03	0.025	0.9
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**13.3**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	66	66	66
Storage (in.) S=1000/CN-10	5.15	5.15	5.15
Initial abstraction (in.), I_a=0.2S	1.03	1.03	1.03
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.24	1.12	2.77
Runoff volume (ac-ft), RV = Q/12*A	0.14	0.67	1.66
Flow rate (cfs), q_{peak} from hydrograph			28.51

Hydrograph Number: 60

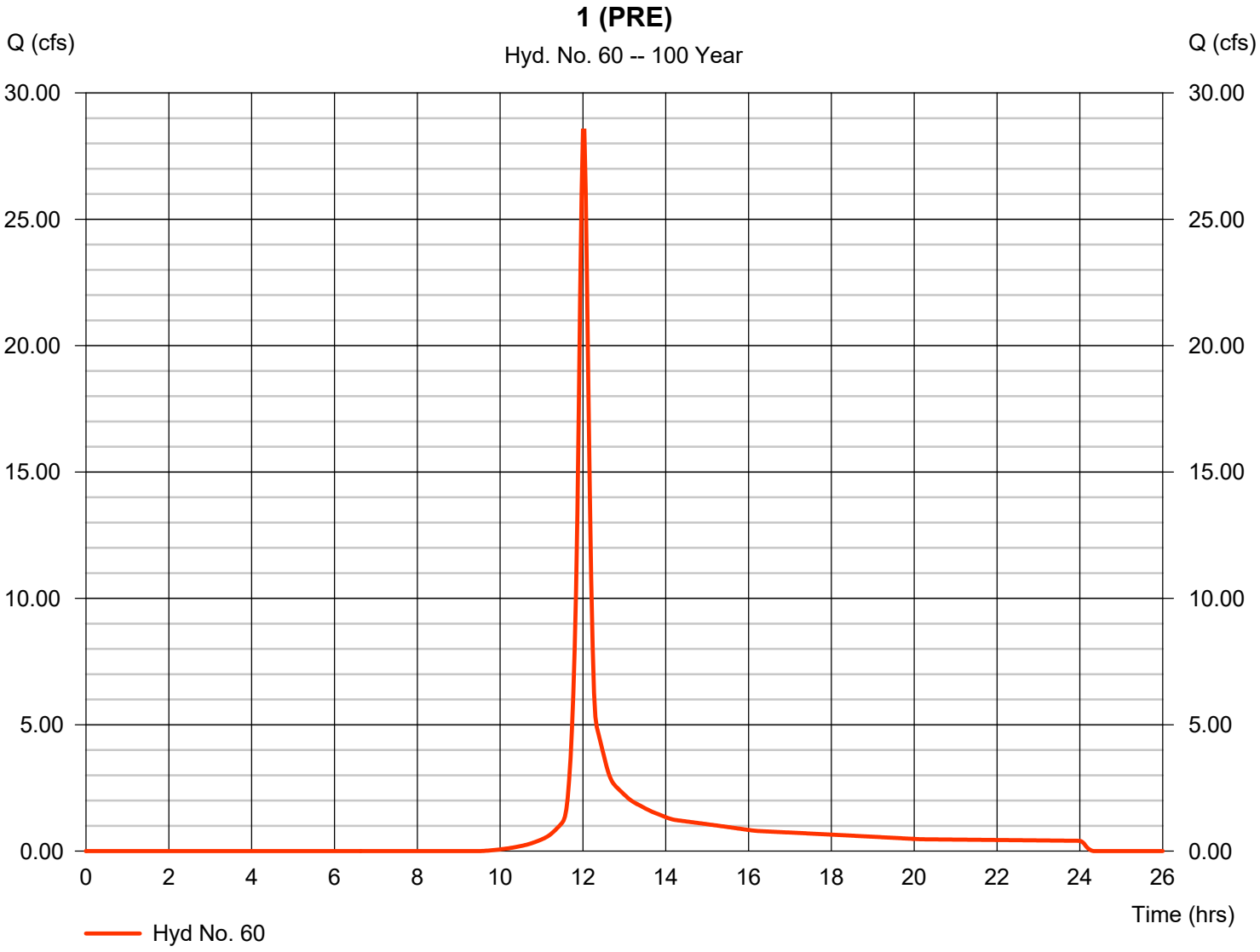
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 60

1 (PRE)

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.51 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	74,582 cuft
Drainage area	=	7.190 ac	Curve number	=	66
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.30 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Drainage Area Runoff and Time of Concentration

Drainage Area: **2**

PREDEVELOPMENT

Composite Curve Number (CN)						**Notes:**
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	2.49	151.85	
CN_2	C	Open space	74		0.00	
CN_3	B	Imperv. (measured)	98		0.00	
CN_4	C	Imperv. (measured)	98		0.00	
CN_5	B	Imperv. (est. lots)	98		0.00	
CN_6	C	Imperv. (est. lots)	98		0.00	
CN_7	B	Imperv. (water surf.)	98		0.00	
CN_8	B	Woods	55	0.90	49.66	
CN_9	C	Woods	70	0.49	34.25	
CN_{10}					0.00	
				Total	**3.88**	**235.75**
					Composite CN =	**61**

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Grass	100	0.13	0.09	5.2
2	Shallow Conc.	Unpaved	515		0.083	1.8
3	Channel	Natural Channel	95	0.03	0.01	0.7
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**7.7**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	61	61	61
Storage (in.) S=1000/CN-10	6.39	6.39	6.39
Initial abstraction (in.), I_a=0.2S	1.28	1.28	1.28
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.13	0.84	2.31
Runoff volume (ac-ft), RV = Q/12*A	0.04	0.27	0.75
Flow rate (cfs), q_{peak} from hydrograph			14.13

Hydrograph Number: 61

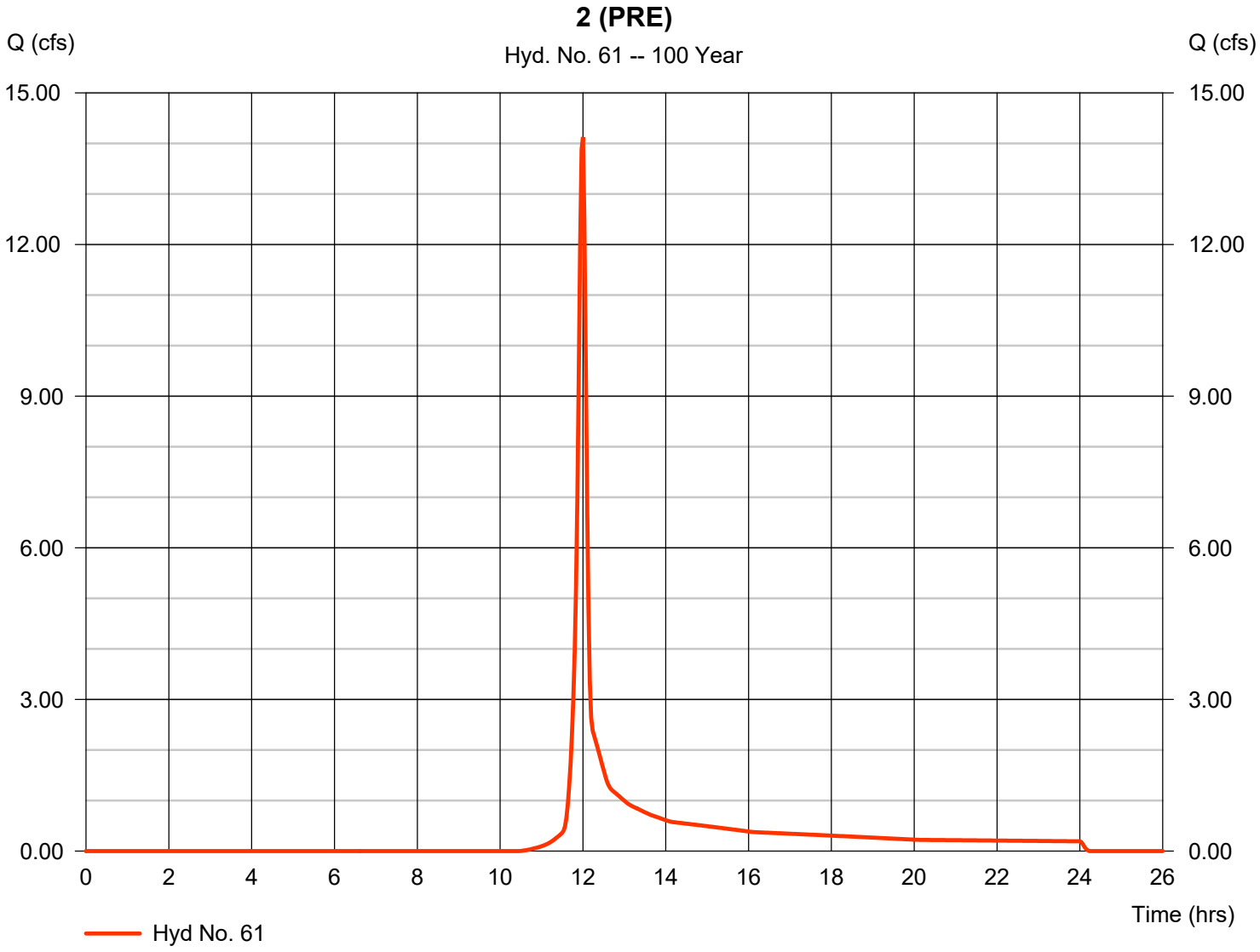
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 61

2 (PRE)

Hydrograph type	= SCS Runoff	Peak discharge	= 14.13 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 32,471 cuft
Drainage area	= 3.880 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.70 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Drainage Area Runoff and Time of Concentration

Drainage Area: **3**

PREDEVELOPMENT

Composite Curve Number (CN)						**Notes:**
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	2.39	145.88	
CN_2	C	Open space	74	0.39	28.93	
CN_3	B	Imperv. (measured)	98		0.00	
CN_4	C	Imperv. (measured)	98		0.00	
CN_5	B	Imperv. (est. lots)	98		0.00	
CN_6	C	Imperv. (est. lots)	98		0.00	
CN_7	B	Imperv. (water surf.)	98		0.00	
CN_8	B	Woods	55	0.74	40.97	
CN_9	C	Woods	70	3.55	248.36	
CN_{10}					0.00	
				Total	**7.08**	**464.13**
					Composite CN =	**66**

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Woods	100	0.4	0.051	16.0
2	Shallow Conc.	Unpaved	943		0.107	3.0
3	Channel	Natural Channel	218	0.03	0.01	1.6
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**20.6**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	66	66	66
Storage (in.) S=1000/CN-10	5.15	5.15	5.15
Initial abstraction (in.), I_a=0.2S	1.03	1.03	1.03
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.24	1.12	2.77
Runoff volume (ac-ft), RV = Q/12*A	0.14	0.66	1.63
Flow rate (cfs), q_{peak} from hydrograph			20.62

Hydrograph Number: 62

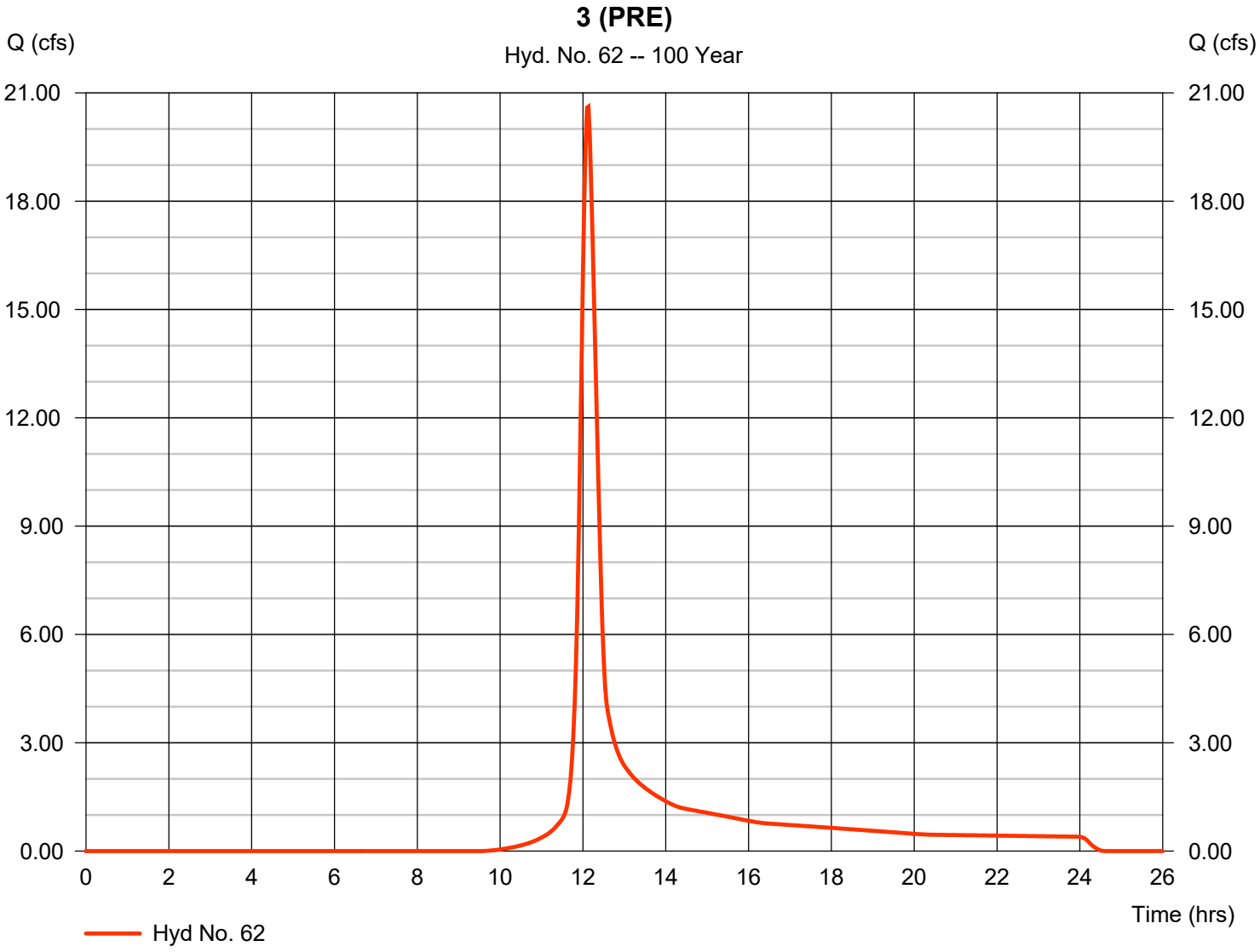
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 62

3 (PRE)

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.62 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	72,487 cuft
Drainage area	=	7.080 ac	Curve number	=	66
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	20.60 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Drainage Area Runoff and Time of Concentration

Precipitation Data	
Return Frequency	P (in.)
1 Yr.	2.26
2 Yr.	2.73
10 Yr.	4.06
100 Yr.	6.44

Drainage Area: **To Village Phase 1 Pond**

Predev.

Composite Curve Number (CN)

	CN	Area (Ac.)	CN*A
CN_1	75	8.20	615.26
CN_2			0.00
CN_3			0.00
CN_4			0.00
CN_5			0.00
Total	-	**8.20**	**615.26**
		Composite CN =	**75**

Time of Concentration, T_c

Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Grass	100	0.24	0.087	8.6
2	Shallow Conc.	Unpaved	120		0.16	0.3
3	Channel	Grass	478	0.03	0.042	1.7
4						
5						
6						
				Total Time of Concentration, T_c (min.)		**10.6**

Runoff

	1 Yr.	10 Yr.	100 Yr.
Composite CN	75	75	75
Storage (in.) S=1000/CN-10	3.33	3.33	3.33
Initial abstraction (in.), I_a=0.2S	0.67	0.67	0.67
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.52	1.71	3.66
Runoff volume (ac-ft), RV = Q/12*A	0.35	1.17	2.50
Flow rate (cfs), q_{peak} from hydrograph	5.51	20.07	

Hydrograph No.: 24

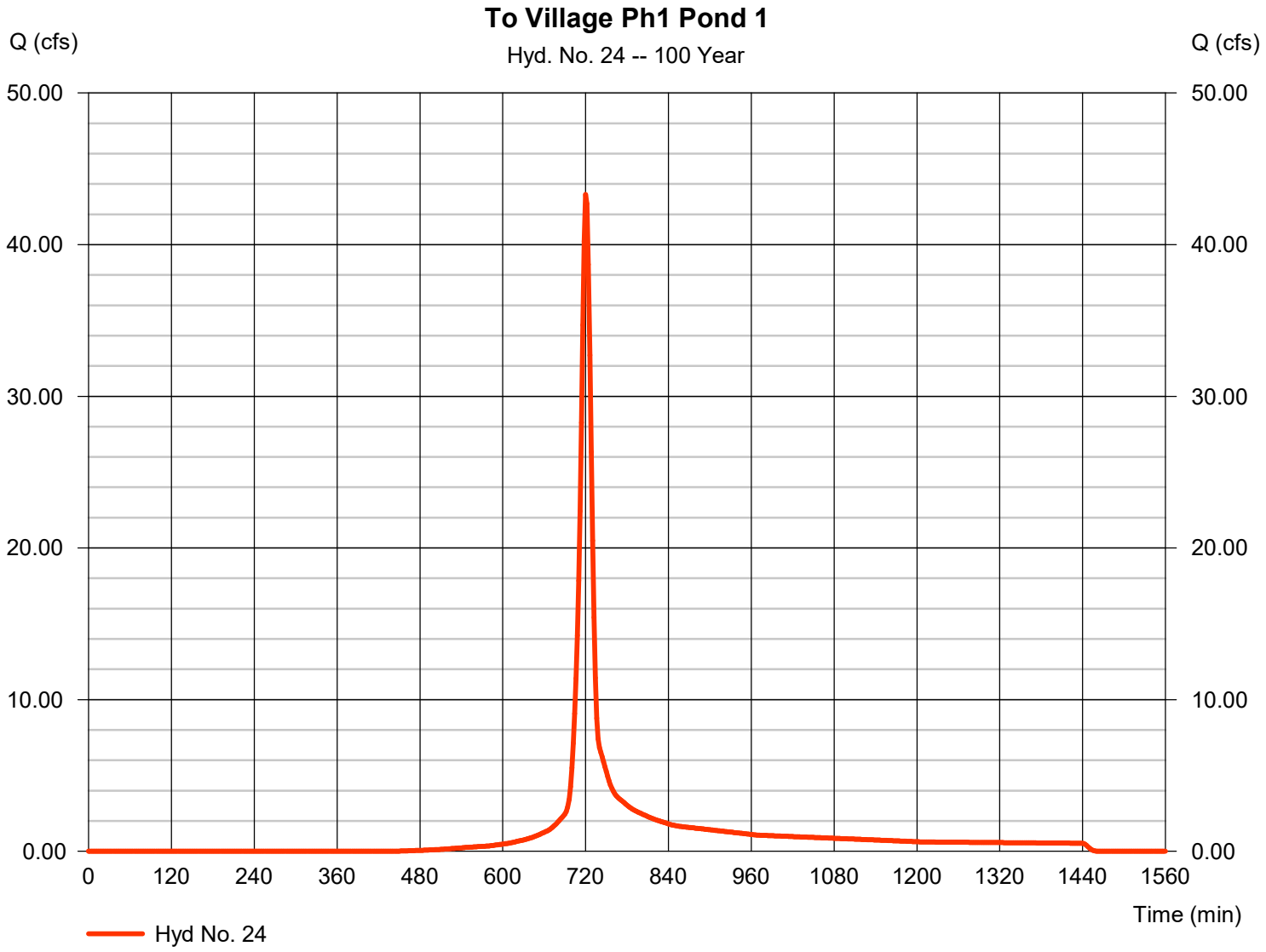
Notes: B soil, 1/4 ac lots CN: 75. Composite CN from Village Ph. 1 calcs: 74

Hydrograph Report

Hyd. No. 24

To Village Ph1 Pond 1

Hydrograph type	= SCS Runoff	Peak discharge	= 43.30 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 112,351 cuft
Drainage area	= 8.200 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.60 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 04 / 29 / 2022

Pond No. 7 - Ex. Village Ph.1 Pond 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2020.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2020.00	8,930	0	0
2.00	2022.00	11,435	20,311	20,311
4.00	2024.00	14,161	25,545	45,856
6.00	2026.00	17,119	31,230	77,086
6.40	2026.40	17,672	6,957	84,044

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	8.00	0.00	0.00
Span (in)	= 15.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 2020.00	2021.00	0.00	0.00
Length (ft)	= 60.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.55	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.50	20.00	0.00	0.00
Crest El. (ft)	= 2024.50	2025.50	0.00	0.00
Weir Coeff.	= 0.90	2.50	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2020.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.20	2,031	2020.20	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.40	4,062	2020.40	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.60	6,093	2020.60	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.80	8,125	2020.80	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	10,156	2021.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.20	12,187	2021.20	0.13 ic	0.12 ic	---	---	0.00	0.00	---	---	---	---	0.124
1.40	14,218	2021.40	0.43 ic	0.43 ic	---	---	0.00	0.00	---	---	---	---	0.433
1.60	16,249	2021.60	0.80 ic	0.80 ic	---	---	0.00	0.00	---	---	---	---	0.800
1.80	18,280	2021.80	1.05 ic	1.05 ic	---	---	0.00	0.00	---	---	---	---	1.052
2.00	20,311	2022.00	1.29 ic	1.26 ic	---	---	0.00	0.00	---	---	---	---	1.258
2.20	22,866	2022.20	1.46 ic	1.43 ic	---	---	0.00	0.00	---	---	---	---	1.434
2.40	25,420	2022.40	1.59 ic	1.59 ic	---	---	0.00	0.00	---	---	---	---	1.591
2.60	27,975	2022.60	1.73 ic	1.73 ic	---	---	0.00	0.00	---	---	---	---	1.734
2.80	30,529	2022.80	1.87 ic	1.87 ic	---	---	0.00	0.00	---	---	---	---	1.866
3.00	33,084	2023.00	2.02 ic	1.99 ic	---	---	0.00	0.00	---	---	---	---	1.989
3.20	35,638	2023.20	2.11 ic	2.10 ic	---	---	0.00	0.00	---	---	---	---	2.105
3.40	38,193	2023.40	2.21 ic	2.21 ic	---	---	0.00	0.00	---	---	---	---	2.214
3.60	40,747	2023.60	2.32 ic	2.32 ic	---	---	0.00	0.00	---	---	---	---	2.319
3.80	43,302	2023.80	2.42 ic	2.42 ic	---	---	0.00	0.00	---	---	---	---	2.419
4.00	45,856	2024.00	2.52 ic	2.52 ic	---	---	0.00	0.00	---	---	---	---	2.516
4.20	48,979	2024.20	2.61 ic	2.61 ic	---	---	0.00	0.00	---	---	---	---	2.608
4.40	52,102	2024.40	2.70 ic	2.70 ic	---	---	0.00	0.00	---	---	---	---	2.698
4.60	55,225	2024.60	2.90 ic	2.78 ic	---	---	0.10	0.00	---	---	---	---	2.884
4.80	58,348	2024.80	3.40 ic	2.87 ic	---	---	0.52	0.00	---	---	---	---	3.385
5.00	61,471	2025.00	4.07 ic	2.95 ic	---	---	1.11	0.00	---	---	---	---	4.063
5.20	64,594	2025.20	4.87 oc	3.03 ic	---	---	1.84	0.00	---	---	---	---	4.873
5.40	67,717	2025.40	5.71 ic	3.02 ic	---	---	2.69	0.00	---	---	---	---	5.707
5.60	70,840	2025.60	6.61 ic	2.97 ic	---	---	3.63	1.57	---	---	---	---	8.177
5.80	73,963	2025.80	7.56 ic	2.90 ic	---	---	4.67	8.20	---	---	---	---	15.76
6.00	77,086	2026.00	8.57 ic	2.79 ic	---	---	5.79	17.68	---	---	---	---	26.25
6.04	77,782	2026.04	8.78 ic	2.76 ic	---	---	6.02	19.84	---	---	---	---	28.62
6.08	78,478	2026.08	8.99 ic	2.73 ic	---	---	6.26	22.09	---	---	---	---	31.08
6.12	79,174	2026.12	9.20 ic	2.70 ic	---	---	6.50	24.42	---	---	---	---	33.61
6.16	79,869	2026.16	9.41 ic	2.67 ic	---	---	6.74	26.82	---	---	---	---	36.23
6.20	80,565	2026.20	9.38 ic	2.69 ic	---	---	5.37 ic	29.30	---	---	---	---	37.35
6.24	81,261	2026.24	9.36 ic	2.71 ic	---	---	5.43 ic	31.84	---	---	---	---	39.99
6.28	81,957	2026.28	9.34 ic	2.74 ic	---	---	5.49 ic	34.46	---	---	---	---	42.69

Continues on next page...

Ex. Village Ph.1 Pond 1

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
6.32	82,652	2026.32	9.32 ic	2.76 ic	---	---	5.55 ic	37.15	---	---	---	---	45.46
6.36	83,348	2026.36	9.30 ic	2.78 ic	---	---	5.61 ic	39.90	---	---	---	---	48.30
6.40	84,044	2026.40	9.28 ic	2.80 ic	---	---	5.67 ic	42.69	---	---	---	---	51.17

...End

Hydrograph Report

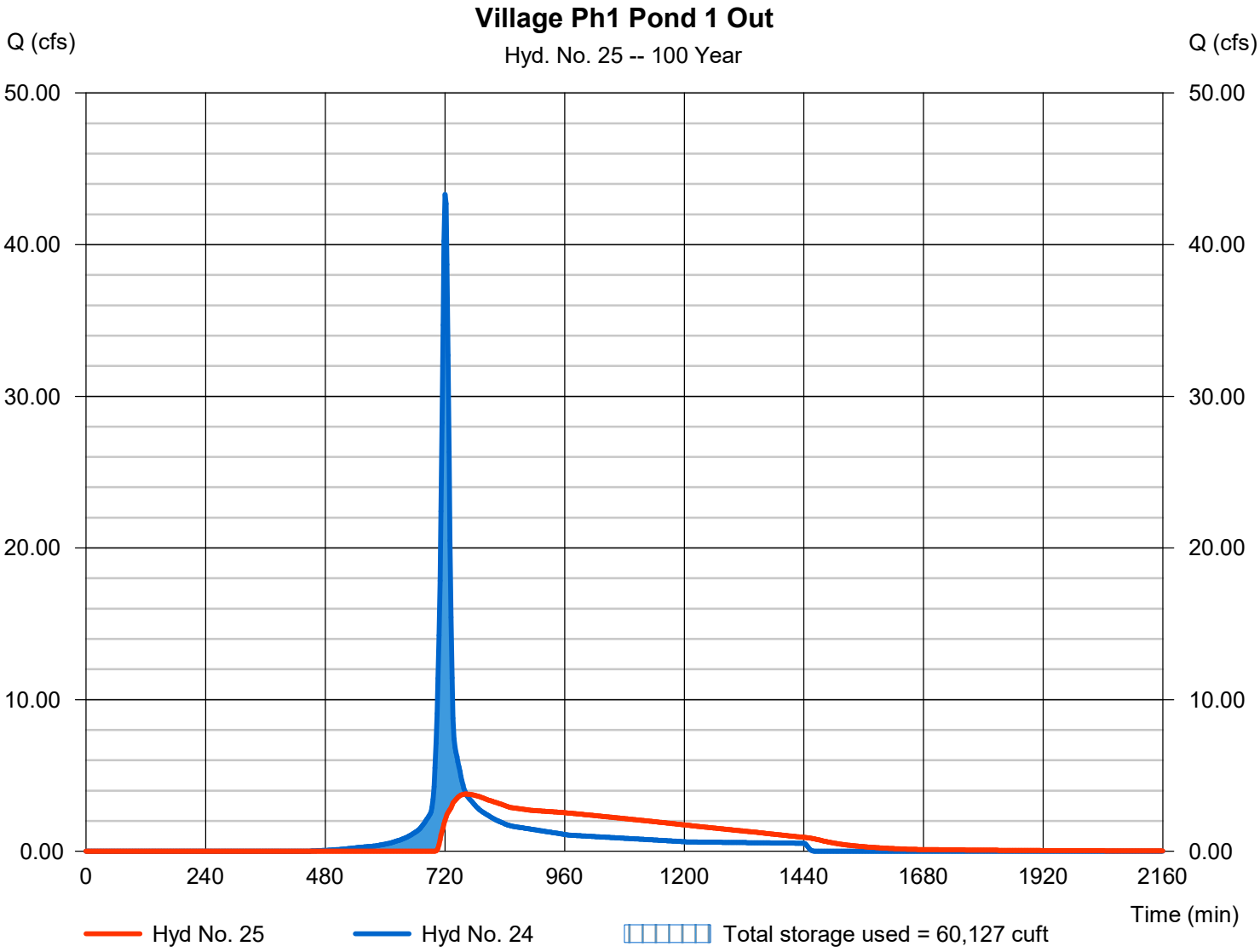
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 25

Village Ph1 Pond 1 Out

Hydrograph type	= Reservoir	Peak discharge	= 3.771 cfs
Storm frequency	= 100 yrs	Time to peak	= 762 min
Time interval	= 2 min	Hyd. volume	= 102,179 cuft
Inflow hyd. No.	= 24 - To Village Ph1 Pond 1	Max. Elevation	= 2024.91 ft
Reservoir name	= Ex. Village Ph.1 Pond 1	Max. Storage	= 60,127 cuft

Storage Indication method used.

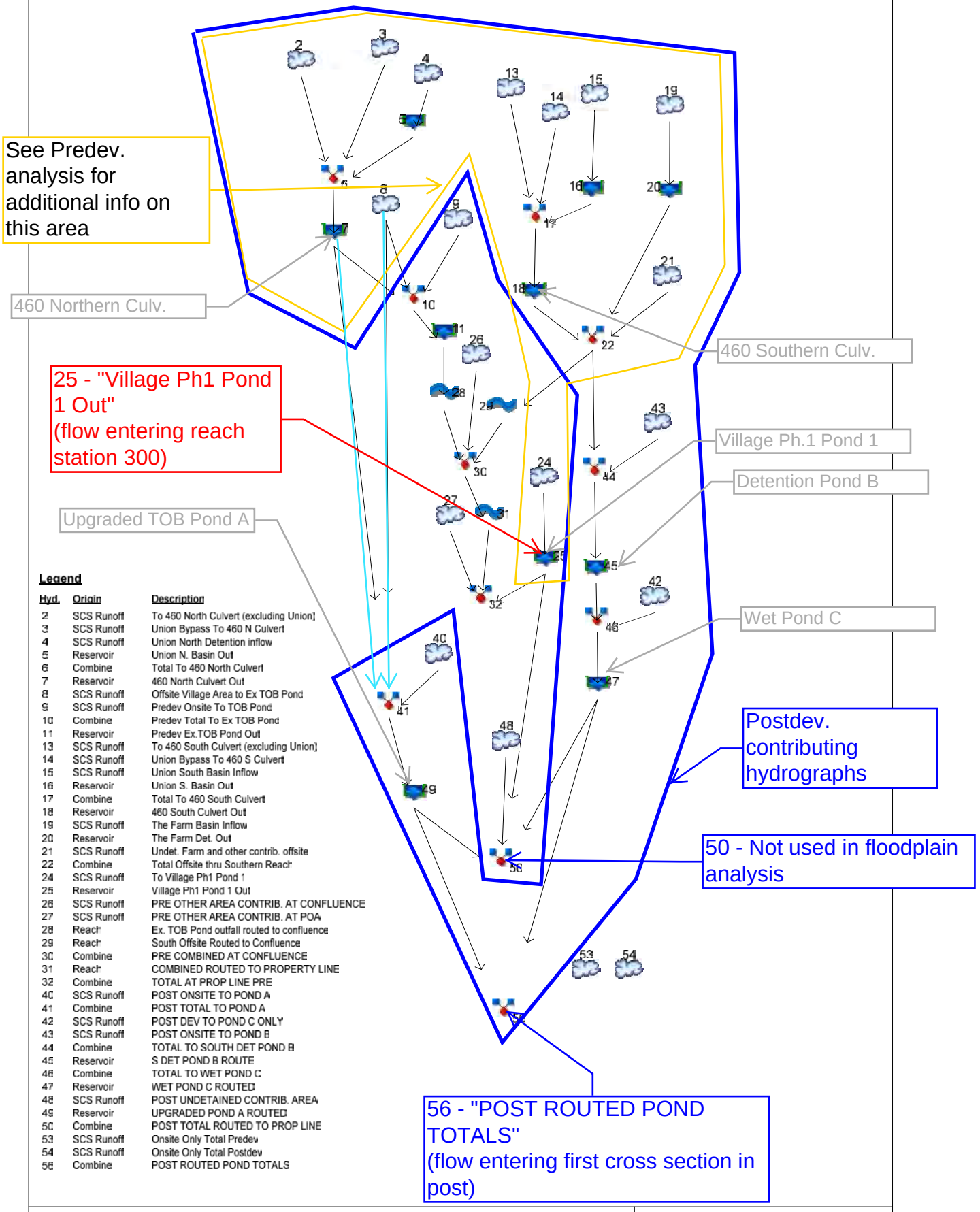


SECTION D:

Individual Drainage Area Computations

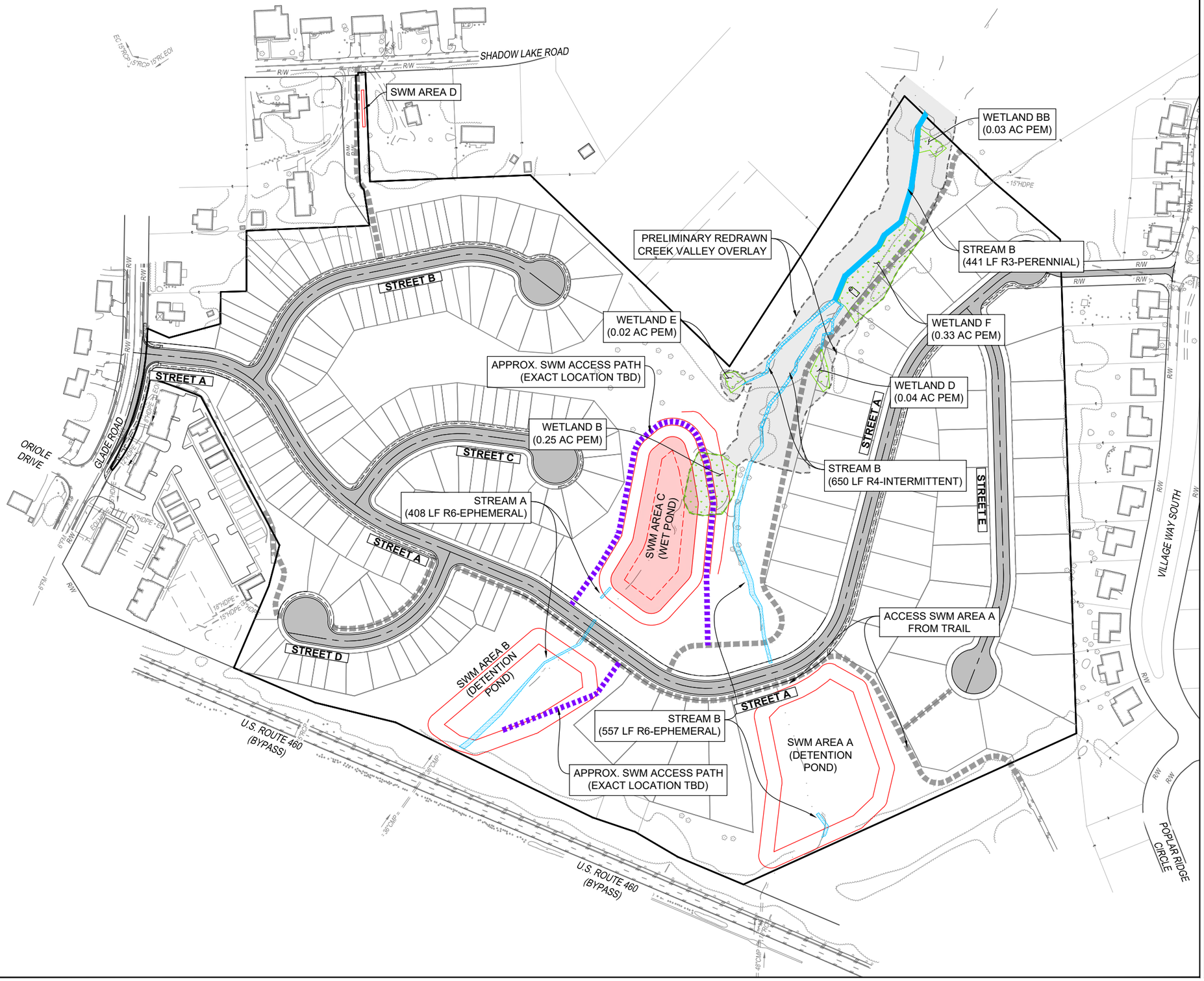
D2. Post-development

Watershed Model Schematic



Legend

Hyd.	Origin	Description
2	SCS Runoff	To 460 North Culvert (excluding Union)
3	SCS Runoff	Union Bypass To 460 N Culvert
4	SCS Runoff	Union North Detention inflow
5	Reservoir	Union N. Basin Out
6	Combine	Total To 460 North Culvert
7	Reservoir	460 North Culvert Out
8	SCS Runoff	Offsite Village Area to Ex TOB Pond
9	SCS Runoff	Predev Onsite To TOB Pond
10	Combine	Predev Total To Ex TOB Pond
11	Reservoir	Predev Ex.TOB Pond Out
13	SCS Runoff	To 460 South Culvert (excluding Union)
14	SCS Runoff	Union Bypass To 460 S Culvert
15	SCS Runoff	Union South Basin Inflow
16	Reservoir	Union S. Basin Out
17	Combine	Total To 460 South Culvert
18	Reservoir	460 South Culvert Out
19	SCS Runoff	The Farm Basin Inflow
20	Reservoir	The Farm Det. Out
21	SCS Runoff	Undet. Farm and other contrib. offsite
22	Combine	Total Offsite thru Southern Reach
24	SCS Runoff	To Village Ph1 Pond 1
25	Reservoir	Village Ph1 Pond 1 Out
26	SCS Runoff	PRE OTHER AREA CONTRIB. AT CONFLUENCE
27	SCS Runoff	PRE OTHER AREA CONTRIB. AT POA
28	Reach	Ex. TOB Pond outfall routed to confluence
29	Reach	South Offsite Routed to Confluence
30	Combine	PRE COMBINED AT CONFLUENCE
31	Reach	COMBINED ROUTED TO PROPERTY LINE
32	Combine	TOTAL AT PROP LINE PRE
40	SCS Runoff	POST ONSITE TO POND A
41	Combine	POST TOTAL TO POND A
42	SCS Runoff	POST DEV TO POND C ONLY
43	SCS Runoff	POST ONSITE TO POND B
44	Combine	TOTAL TO SOUTH DET POND B
45	Reservoir	S DET POND B ROUTE
46	Combine	TOTAL TO WET POND C
47	Reservoir	WET POND C ROUTED
48	SCS Runoff	POST UNDETAINED CONTRIB. AREA
49	Reservoir	UPGRADED POND A ROUTED
50	Combine	POST TOTAL ROUTED TO PROP LINE
53	SCS Runoff	Onsite Only Total Predev
54	SCS Runoff	Onsite Only Total Postdev
56	Combine	POST ROUTED POND TOTALS



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No.	Revision / Issue	Date

COMMONWEALTH OF VIRGINIA
Paul J. Brown
PAUL J. BROWN
Lic. No. 036148
04/28/2023
PROFESSIONAL ENGINEER

STORMWATER MANAGEMENT AREAS EXHIBIT

PROPOSED DEVELOPMENT OF

GLADE SPRING CROSSING

PROPERTY OF GLADE HGTS, LLC - TAX PARCELS 225-(A)-3, 225-(A)-4, & 224-(A)-57; 45.0976 AC.
TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

Drawn By:	Scale:
MSF	AS SHOWN
Checked By:	Date:
PJB	04/28/2023
Sheet No.	
1 of 1	SWM

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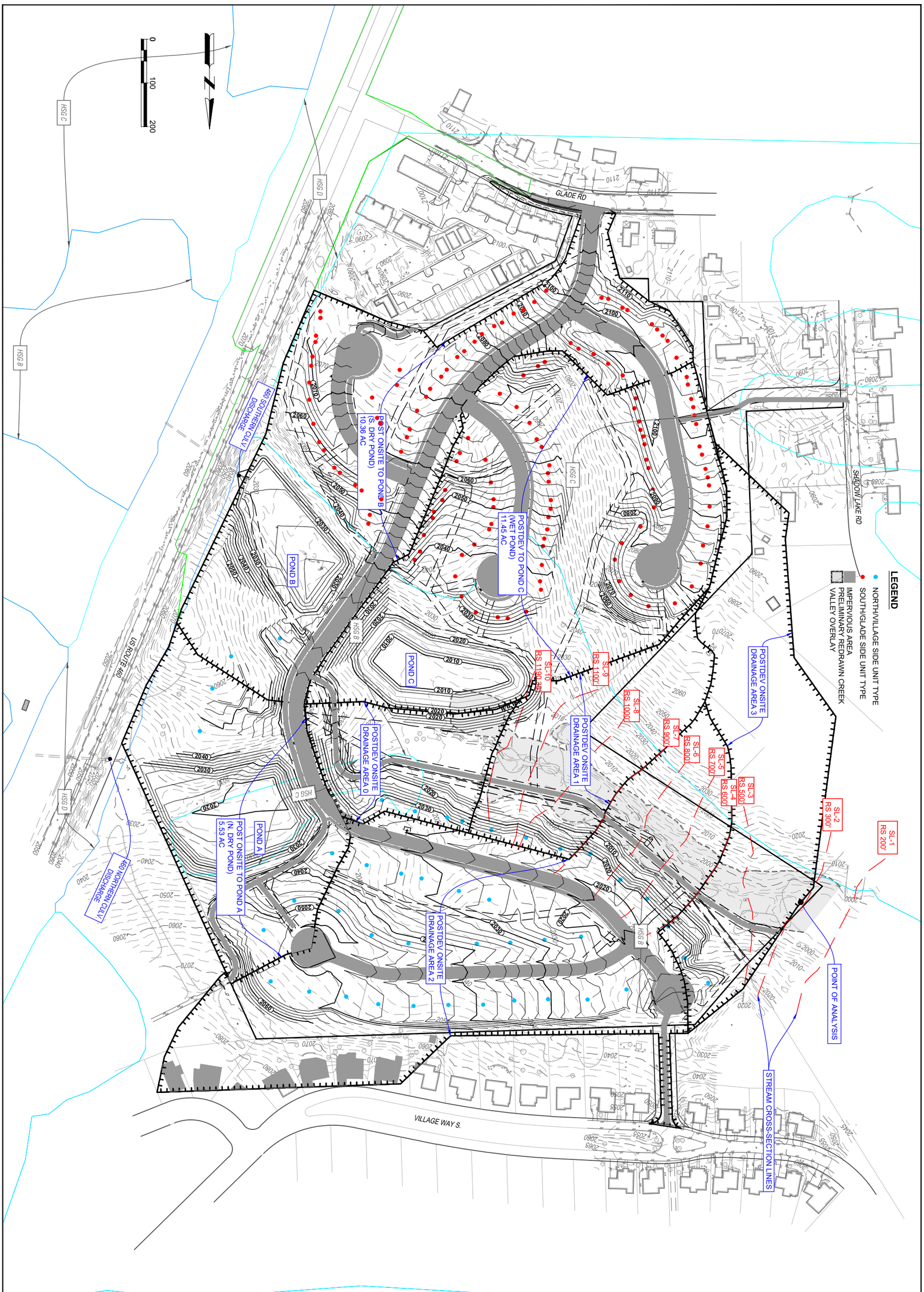
4/27/2023 11:30:17 AM

C:\DROPBOX\E&A\CARY HOPPER\GLADE SPRING\CAD\REZONING CAD\FLOOD-MAP-POSTDEV.DWG
4/27/2023 1:12:59 PM



Sheet No. 1 of 1	Checked By: ---	Drawn By: MSF	PROPOSED DEVELOPMENT OF
D3	Date: 04/28/2023	Scale: AS SHOWN	GLADE SPRING CROSSING

PROPERTY OF GLADE HGTS, LLC - TAX PARCELS 225-(A)-3, 225-(A)-4, & 224-(A)-57; 45.0976 AC.

TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

POSTDEVELOPMENT ONSITE DRAINAGE AREAS

COMMONWEALTH OF VIRGINIA
PAUL BROWN
Lic. No. 036148
04/28/2023
PROFESSIONAL ENGINEER

No.	Revision/ Issue	Date

EDEN & ASSOCIATES
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BLACKSBURG, VIRGINIA 24060
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South/Glade Side Units	
Typical Unit Impervious Footprint	Area (sf)
18'x35' (incl. 18'x5' porch)	630
28'x30' (incl. 28'x6' porch)	840
24'x34' (incl. 24'x6' porch)	816
Average	770
Typical 18'x34' Driveway (total to back of curb)	612
Total Typical Impervious Area per Unit (average+driveway)	**1382**

North/Village Side Units	
Typical Unit Impervious Footprint	Area (sf)
48'x48' (incl. variable porch)	2304
45'x63' (incl. variable porch)	2835
Average	2570
Typical 20'x37' Driveway (total to EP)	740
Typical 12'x12' Deck	144
Total Typical Impervious Area per Unit (average+driveway+deck)	**3454**

Typical Lot Impervious Area Estimates

South/Glade side dwelling unit assumed impervious area (sf):	1,382
North/Village side dwelling unit assumed impervious area (sf):	3,454

Hydrologic Soil Group B Dwelling Unit Impervious Estimate						
	South/Glade		North/Village		Total Impervious Area	
Drainage Area	No. units	Imperv. area (sf)	No. units	Imperv. area (sf)	(sf)	(ac.)
POST ONSITE TO POND B (S. DRY POND)	0	0	2	6,908	6,908	0.159
POSTDEV TO POND C (WETPOND)	8	11,056	0	0	11,056	0.254
POST ONSITE TO POND A (N. DRY POND)	0	0	5	17,270	17,270	0.396
Undetained	0	0	36	124,344	124,344	2.855

Hydrologic Soil Group C Dwelling Unit Impervious Estimate						
	South/Glade		North/Village		Total Impervious Area	
Drainage Area	No. units	Imperv. area (sf)	No. units	Imperv. area (sf)	(sf)	(ac.)
POST ONSITE TO POND B (S. DRY POND)	56	77,392	0	0	77,392	1.777
POSTDEV TO POND C (WETPOND)	69	95,358	0	0	95,358	2.189
POST ONSITE TO POND A (N. DRY POND)	0	0	0	0	0	0.000
Undetained	0	0	0	0	0	0.000

Drainage Area Runoff and Time of Concentration

Drainage Area: POST ONSITE TO POND A (N. DRY POND)
POSTDEVELOPMENT

Composite Curve Number (CN)						Notes:
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	3.56	217.30	Impervious lot area calculated on "Typical Lot Impervious Area Estimate" table elsewhere
CN_2	C	Open space	74	1.08	79.82	
CN_3	B	Imperv. (measured)	98	0.42	40.81	
CN_4	C	Imperv. (measured)	98	0.07	7.15	
CN_5	B	Imperv. (est. lots)	98	0.40	38.81	
CN_6	C	Imperv. (est. lots)	98	0.00	0.00	
CN_7					0.00	
CN_8					0.00	
CN_9					0.00	
CN_{10}					0.00	
			Total	**5.53**	**383.89**	
				Composite CN =	**69**	

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Other Tt	Estimate				10.0
2						
3						
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**10.0**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	69	69	69
Storage (in.) S=1000/CN-10	4.49	4.49	4.49
Initial abstraction (in.), I_a=0.2S	0.90	0.90	0.90
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.32	1.31	3.06
Runoff volume (ac-ft), RV = Q/12*A	0.15	0.60	1.41
Flow rate (cfs), q_{peak} from hydrograph	1.78	10.10	24.37

Hydrograph Number: 40

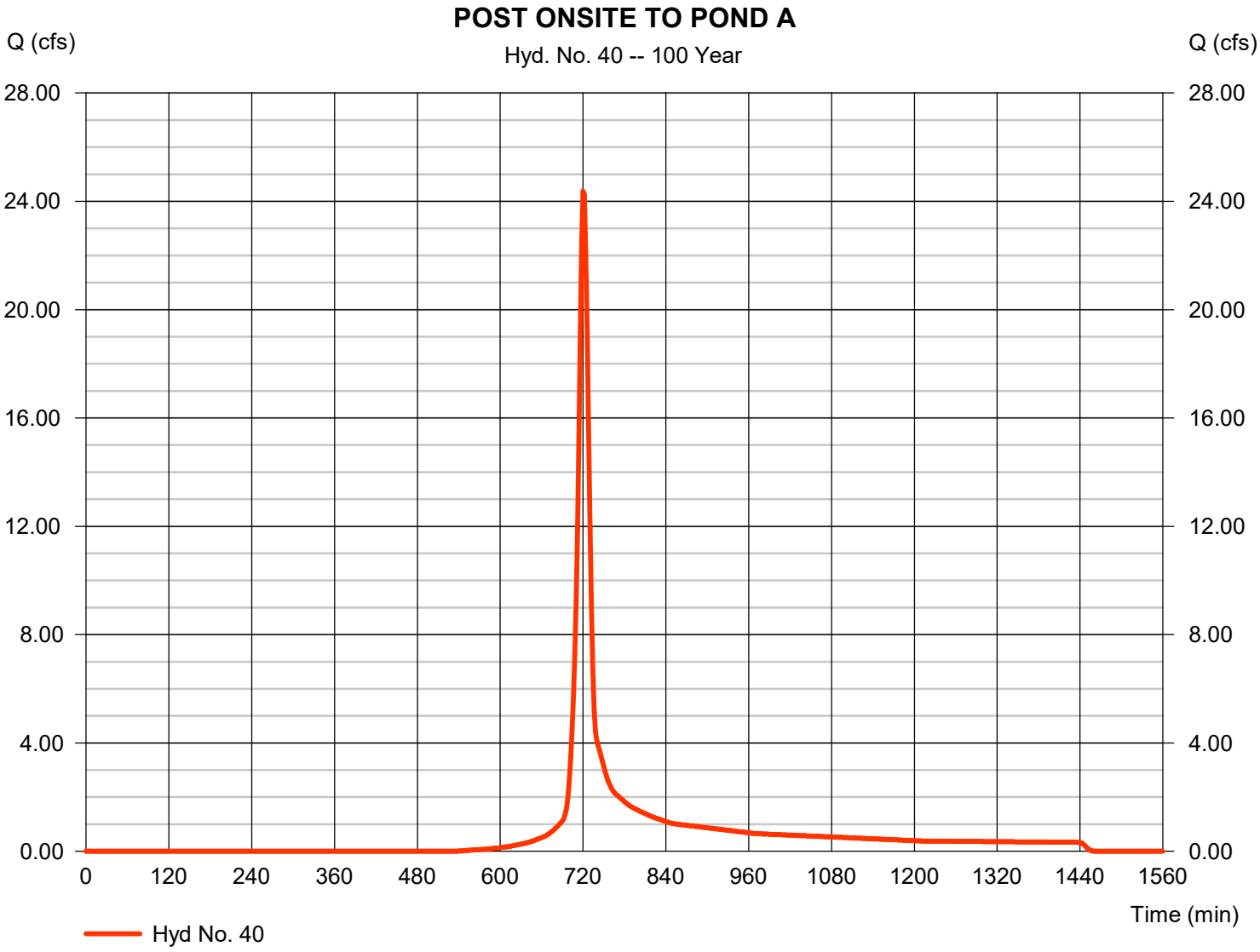
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 1 / 2022

Hyd. No. 40

POST ONSITE TO POND A

Hydrograph type	= SCS Runoff	Peak discharge	= 24.37 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 63,352 cuft
Drainage area	= 5.530 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

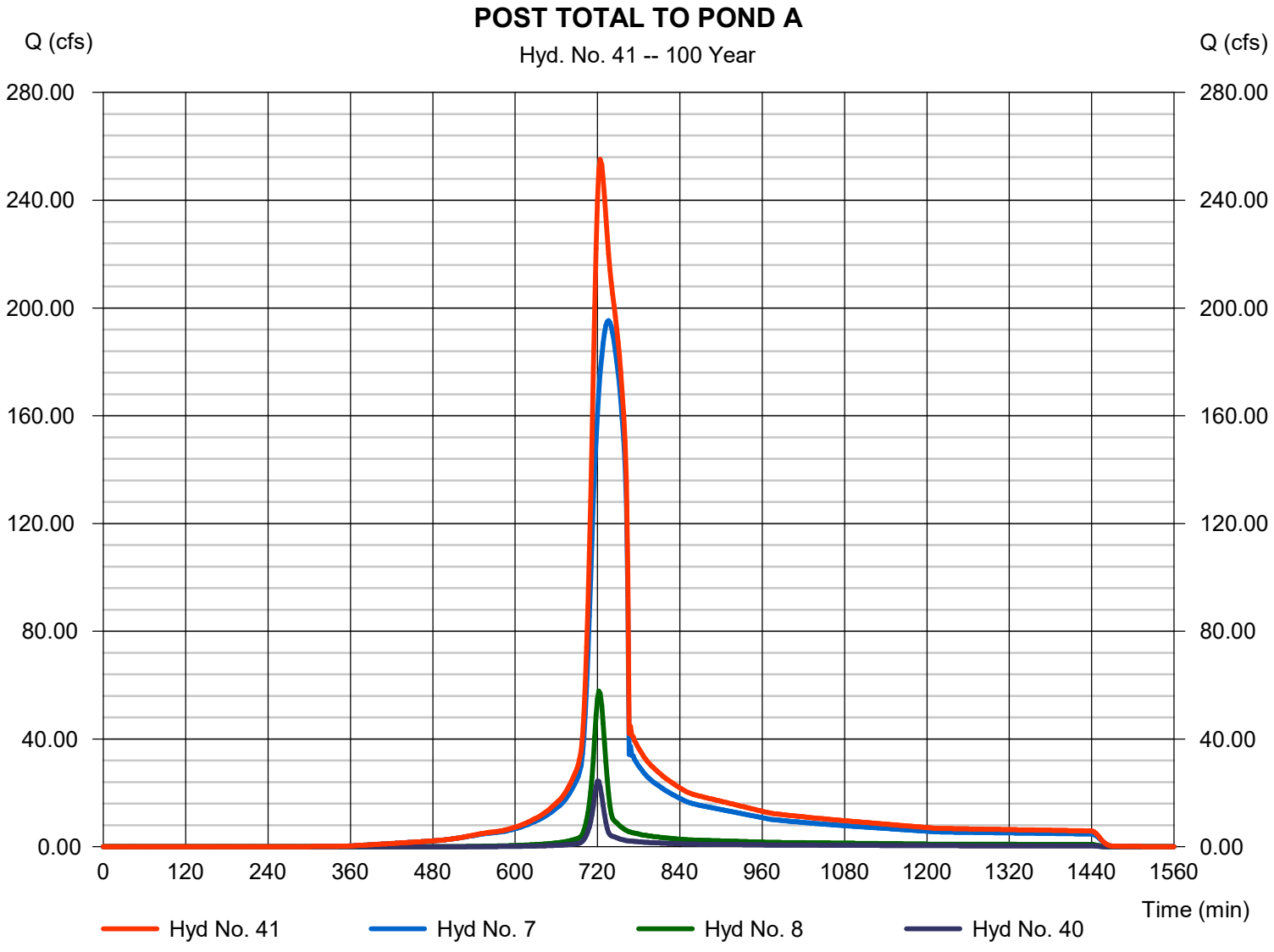


Hydrograph Report

Hyd. No. 41

POST TOTAL TO POND A

Hydrograph type	= Combine	Peak discharge	= 255.21 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,343,252 cuft
Inflow hyds.	= 7, 8, 40	Contrib. drain. area	= 19.590 ac



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 1 / 2022

Pond No. 4 - Pond A-Upgraded TOB Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2018.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2018.00	27	0	0
1.00	2019.00	2,927	1,078	1,078
2.00	2020.00	10,298	6,238	7,316
3.00	2021.00	19,913	14,842	22,158
4.00	2022.00	30,584	25,056	47,214
5.00	2023.00	43,395	36,800	84,014
6.00	2024.00	47,862	45,606	129,619
7.00	2025.00	52,118	49,970	179,589
8.00	2026.00	55,880	53,983	233,572
9.00	2027.00	59,237	57,545	291,117
10.00	2028.00	63,672	61,435	352,552
11.00	2029.00	68,439	66,035	418,586
12.00	2030.00	77,946	73,134	491,720
13.00	2031.00	91,064	84,412	576,131
14.00	2032.00	99,712	95,346	671,477
15.00	2033.00	107,355	103,500	774,977
16.00	2034.00	115,265	111,275	886,252
17.00	2035.00	122,400	118,803	1,005,055

Proposed Pond A improvements: Increased storage volume, new discharge culvert, new outlet structure and outlet structure configuration

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	30.00	12.00	Inactive	0.00
Span (in)	=	30.00	12.00	24.00	0.00
No. Barrels	=	1	1	2	0
Invert El. (ft)	=	2018.00	2018.01	2028.50	0.00
Length (ft)	=	200.00	0.50	100.00	0.00
Slope (%)	=	2.00	1.00	5.00	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)	=	13.20	Inactive	1.50	0.00
Crest El. (ft)	=	2027.50	2029.50	2024.00	0.00
Weir Coeff.	=	3.33	2.60	3.33	3.33
Weir Type	=	1	Broad	Rect	---
Multi-Stage	=	Yes	No	Yes	No
Exfil.(in/hr)	=	0.000 (by Wet area)			
TW Elev. (ft)	=	0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2018.00	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.10	108	2018.10	0.03 ic	0.03 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.032
0.20	216	2018.20	0.13 ic	0.13 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.131
0.30	323	2018.30	0.29 ic	0.29 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.292
0.40	431	2018.40	0.51 ic	0.51 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.508
0.50	539	2018.50	0.77 ic	0.77 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.774
0.60	647	2018.60	1.06 ic	1.06 ic	0.00	---	0.00	0.00	0.00	---	---	---	1.061
0.70	755	2018.70	1.39 ic	1.39 ic	0.00	---	0.00	0.00	0.00	---	---	---	1.389
0.80	863	2018.80	1.76 ic	1.76 ic	0.00	---	0.00	0.00	0.00	---	---	---	1.759
0.90	970	2018.90	2.10 ic	2.10 ic	0.00	---	0.00	0.00	0.00	---	---	---	2.097
1.00	1,078	2019.00	2.46 ic	2.40 ic	0.00	---	0.00	0.00	0.00	---	---	---	2.397
1.10	1,702	2019.10	2.61 ic	2.61 ic	0.00	---	0.00	0.00	0.00	---	---	---	2.612
1.20	2,326	2019.20	2.87 ic	2.81 ic	0.00	---	0.00	0.00	0.00	---	---	---	2.809
1.30	2,950	2019.30	3.02 ic	3.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	3.013
1.40	3,573	2019.40	3.18 ic	3.18 ic	0.00	---	0.00	0.00	0.00	---	---	---	3.184
1.50	4,197	2019.50	3.35 ic	3.35 ic	0.00	---	0.00	0.00	0.00	---	---	---	3.352
1.60	4,821	2019.60	3.52 ic	3.52 ic	0.00	---	0.00	0.00	0.00	---	---	---	3.518
1.70	5,445	2019.70	3.68 ic	3.68 ic	0.00	---	0.00	0.00	0.00	---	---	---	3.681
1.80	6,068	2019.80	3.84 ic	3.84 ic	0.00	---	0.00	0.00	0.00	---	---	---	3.842
1.90	6,692	2019.90	4.00 ic	4.00 ic	0.00	---	0.00	0.00	0.00	---	---	---	4.001
2.00	7,316	2020.00	4.16 ic	4.16 ic	0.00	---	0.00	0.00	0.00	---	---	---	4.158
2.10	8,800	2020.10	4.34 ic	4.30 ic	0.00	---	0.00	0.00	0.00	---	---	---	4.298
2.20	10,284	2020.20	4.52 ic	4.43 ic	0.00	---	0.00	0.00	0.00	---	---	---	4.431
2.30	11,769	2020.30	4.56 ic	4.56 ic	0.00	---	0.00	0.00	0.00	---	---	---	4.564
2.40	13,253	2020.40	4.71 ic	4.71 ic	0.00	---	0.00	0.00	0.00	---	---	---	4.713

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Pond A-Upgraded TOB Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.50	14,737	2020.50	4.90 ic	4.84 ic	0.00	---	0.00	0.00	0.00	---	---	---	4.837
2.60	16,221	2020.60	5.10 ic	4.96 ic	0.00	---	0.00	0.00	0.00	---	---	---	4.955
2.70	17,706	2020.70	5.10 ic	5.10 ic	0.00	---	0.00	0.00	0.00	---	---	---	5.097
2.80	19,190	2020.80	5.30 ic	5.21 ic	0.00	---	0.00	0.00	0.00	---	---	---	5.210
2.90	20,674	2020.90	5.33 ic	5.33 ic	0.00	---	0.00	0.00	0.00	---	---	---	5.331
3.00	22,158	2021.00	5.50 ic	5.45 ic	0.00	---	0.00	0.00	0.00	---	---	---	5.453
3.10	24,664	2021.10	5.56 ic	5.56 ic	0.00	---	0.00	0.00	0.00	---	---	---	5.559
3.20	27,169	2021.20	5.71 ic	5.69 ic	0.00	---	0.00	0.00	0.00	---	---	---	5.685
3.30	29,675	2021.30	5.93 ic	5.79 ic	0.00	---	0.00	0.00	0.00	---	---	---	5.786
3.40	32,181	2021.40	5.93 ic	5.91 ic	0.00	---	0.00	0.00	0.00	---	---	---	5.908
3.50	34,686	2021.50	6.14 ic	6.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.005
3.60	37,192	2021.60	6.14 ic	6.12 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.123
3.70	39,697	2021.70	6.36 ic	6.22 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.217
3.80	42,203	2021.80	6.36 ic	6.33 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.331
3.90	44,709	2021.90	6.42 ic	6.42 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.422
4.00	47,214	2022.00	6.59 ic	6.53 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.532
4.10	50,894	2022.10	6.63 ic	6.63 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.627
4.20	54,574	2022.20	6.82 ic	6.73 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.727
4.30	58,254	2022.30	6.83 ic	6.83 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.828
4.40	61,934	2022.40	7.05 ic	6.92 ic	0.00	---	0.00	0.00	0.00	---	---	---	6.916
4.50	65,614	2022.50	7.05 ic	7.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.019
4.60	69,294	2022.60	7.10 ic	7.10 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.103
4.70	72,974	2022.70	7.28 ic	7.20 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.200
4.80	76,654	2022.80	7.30 ic	7.29 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.295
4.90	80,334	2022.90	7.52 ic	7.38 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.377
5.00	84,014	2023.00	7.52 ic	7.47 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.474
5.10	88,574	2023.10	7.56 ic	7.56 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.558
5.20	93,135	2023.20	7.76 ic	7.64 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.644
5.30	97,695	2023.30	7.76 ic	7.74 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.737
5.40	102,256	2023.40	7.81 ic	7.81 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.815
5.50	106,817	2023.50	8.00 ic	7.90 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.902
5.60	111,377	2023.60	8.00 ic	7.99 ic	0.00	---	0.00	0.00	0.00	---	---	---	7.992
5.70	115,938	2023.70	8.07 ic	8.07 ic	0.00	---	0.00	0.00	0.00	---	---	---	8.066
5.80	120,498	2023.80	8.25 ic	8.15 ic	0.00	---	0.00	0.00	0.00	---	---	---	8.152
5.90	125,059	2023.90	8.25 ic	8.24 ic	0.00	---	0.00	0.00	0.00	---	---	---	8.239
6.00	129,619	2024.00	8.31 ic	8.31 ic	0.00	---	0.00	0.00	0.00	---	---	---	8.311
6.10	134,616	2024.10	8.54 ic	8.38 ic	0.00	---	0.00	0.00	0.16	---	---	---	8.543
6.20	139,613	2024.20	9.01 ic	8.45 ic	0.00	---	0.00	0.00	0.45	---	---	---	8.892
6.30	144,610	2024.30	9.32 ic	8.50 ic	0.00	---	0.00	0.00	0.82	---	---	---	9.322
6.40	149,607	2024.40	9.82 ic	8.56 ic	0.00	---	0.00	0.00	1.26	---	---	---	9.821
6.50	154,604	2024.50	10.37 ic	8.61 ic	0.00	---	0.00	0.00	1.77	---	---	---	10.37
6.60	159,601	2024.60	11.14 ic	8.65 ic	0.00	---	0.00	0.00	2.32	---	---	---	10.97
6.70	164,598	2024.70	11.68 ic	8.70 ic	0.00	---	0.00	0.00	2.92	---	---	---	11.62
6.80	169,595	2024.80	12.31 ic	8.74 ic	0.00	---	0.00	0.00	3.57	---	---	---	12.31
6.90	174,592	2024.90	13.07 ic	8.78 ic	0.00	---	0.00	0.00	4.26	---	---	---	13.05
7.00	179,589	2025.00	13.91 ic	8.82 ic	0.00	---	0.00	0.00	4.99	---	---	---	13.81
7.10	184,988	2025.10	14.74 ic	8.85 ic	0.00	---	0.00	0.00	5.76	---	---	---	14.62
7.20	190,386	2025.20	15.57 ic	8.89 ic	0.00	---	0.00	0.00	6.57	---	---	---	15.45
7.30	195,784	2025.30	16.39 ic	8.93 ic	0.00	---	0.00	0.00	7.40	---	---	---	16.33
7.40	201,182	2025.40	17.23 ic	8.96 ic	0.00	---	0.00	0.00	8.27	---	---	---	17.23
7.50	206,581	2025.50	18.24 ic	8.99 ic	0.00	---	0.00	0.00	9.18	---	---	---	18.16
7.60	211,979	2025.60	19.25 ic	9.01 ic	0.00	---	0.00	0.00	10.11	---	---	---	19.12
7.70	217,377	2025.70	20.20 ic	9.04 ic	0.00	---	0.00	0.00	11.07	---	---	---	20.11
7.80	222,775	2025.80	21.13 ic	9.06 ic	0.00	---	0.00	0.00	12.06	---	---	---	21.13
7.90	228,174	2025.90	22.16 ic	9.08 ic	0.00	---	0.00	0.00	13.08	---	---	---	22.16
8.00	233,572	2026.00	23.23 ic	9.10 ic	0.00	---	0.00	0.00	14.13	---	---	---	23.23
8.10	239,326	2026.10	24.31 ic	9.11 ic	0.00	---	0.00	0.00	15.20	---	---	---	24.31
8.20	245,081	2026.20	25.42 ic	9.12 ic	0.00	---	0.00	0.00	16.30	---	---	---	25.42
8.30	250,835	2026.30	26.52 ic	9.10 ic	0.00	---	0.00	0.00	17.42	---	---	---	26.52
8.40	256,590	2026.40	27.66 ic	9.09 ic	0.00	---	0.00	0.00	18.57	---	---	---	27.66
8.50	262,344	2026.50	28.82 ic	9.08 ic	0.00	---	0.00	0.00	19.74	---	---	---	28.82
8.60	268,099	2026.60	30.00 ic	9.06 ic	0.00	---	0.00	0.00	20.94	---	---	---	30.00
8.70	273,853	2026.70	31.19 ic	9.03 ic	0.00	---	0.00	0.00	22.16	---	---	---	31.19
8.80	279,608	2026.80	32.40 ic	9.00 ic	0.00	---	0.00	0.00	23.40	---	---	---	32.40
8.90	285,362	2026.90	33.63 ic	8.97 ic	0.00	---	0.00	0.00	24.67	---	---	---	33.63
9.00	291,117	2027.00	34.88 ic	8.93 ic	0.00	---	0.00	0.00	25.95	---	---	---	34.88
9.10	297,260	2027.10	36.14 ic	8.88 ic	0.00	---	0.00	0.00	27.26	---	---	---	36.14
9.20	303,404	2027.20	37.41 ic	8.82 ic	0.00	---	0.00	0.00	28.59	---	---	---	37.41
9.30	309,547	2027.30	38.70 ic	8.76 ic	0.00	---	0.00	0.00	29.94	---	---	---	38.70
9.40	315,691	2027.40	40.01 ic	8.69 ic	0.00	---	0.00	0.00	31.31	---	---	---	40.01
9.50	321,834	2027.50	41.32 ic	8.62 ic	0.00	---	0.00	0.00	32.71	---	---	---	41.32
9.60	327,978	2027.60	43.88 ic	8.37 ic	0.00	---	1.39	0.00	34.12	---	---	---	43.88

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Pond A-Upgraded TOB Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
9.70	334,121	2027.70	47.43 ic	7.95 ic	0.00	---	3.93	0.00	35.55	---	---	---	47.43
9.80	340,265	2027.80	51.57 ic	7.36 ic	0.00	---	7.22	0.00	37.00 s	---	---	---	51.57
9.90	346,408	2027.90	55.18 ic	6.76 ic	0.00	---	11.11	0.00	37.31 s	---	---	---	55.18
10.00	352,552	2028.00	58.40 ic	6.15 ic	0.00	---	15.54	0.00	36.71 s	---	---	---	58.40
10.10	359,155	2028.10	61.33 ic	5.50 ic	0.00	---	20.43	0.00	35.40 s	---	---	---	61.33
10.20	365,759	2028.20	63.97 ic	4.82 ic	0.00	---	25.74	0.00	33.41 s	---	---	---	63.97
10.30	372,362	2028.30	66.30 ic	4.11 ic	0.00	---	31.45	0.00	30.74 s	---	---	---	66.30
10.40	378,965	2028.40	68.21 ic	3.42 ic	0.00	---	37.13 s	0.00	27.67 s	---	---	---	68.21
10.50	385,569	2028.50	69.31 ic	3.05 ic	0.00	---	40.18 s	0.00	26.07 s	---	---	---	69.30
10.60	392,172	2028.60	70.16 ic	2.77 ic	0.00	---	42.51 s	0.00	24.88 s	---	---	---	70.16
10.70	398,776	2028.70	70.89 ic	2.54 ic	0.00	---	44.46 s	0.00	23.89 s	---	---	---	70.89
10.80	405,379	2028.80	71.55 ic	2.34 ic	0.00	---	46.16 s	0.00	23.04 s	---	---	---	71.54
10.90	411,983	2028.90	72.14 ic	2.18 ic	0.00	---	47.67 s	0.00	22.29 s	---	---	---	72.13
11.00	418,586	2029.00	72.69 ic	2.03 ic	0.00	---	49.03 s	0.00	21.63 s	---	---	---	72.69
11.10	425,900	2029.10	73.21 ic	1.90 ic	0.00	---	50.27 s	0.00	21.04 s	---	---	---	73.21
11.20	433,213	2029.20	73.71 ic	1.79 ic	0.00	---	51.41 s	0.00	20.51 s	---	---	---	73.70
11.30	440,526	2029.30	74.18 ic	1.68 ic	0.00	---	52.46 s	0.00	20.02 s	---	---	---	74.17
11.40	447,840	2029.40	74.63 ic	1.59 ic	0.00	---	53.45 s	0.00	19.58 s	---	---	---	74.62
11.50	455,153	2029.50	75.07 ic	1.51 ic	0.00	---	54.37 s	0.00	19.18 s	---	---	---	75.06
11.60	462,466	2029.60	75.50 ic	1.43 ic	0.00	---	55.25 s	0.00	18.82 s	---	---	---	75.50
11.70	469,780	2029.70	75.92 ic	1.36 ic	0.00	---	56.07 s	0.00	18.48 s	---	---	---	75.92
11.80	477,093	2029.80	76.33 ic	1.30 ic	0.00	---	56.85 s	0.00	18.17 s	---	---	---	76.32
11.90	484,407	2029.90	76.73 ic	1.24 ic	0.00	---	57.58 s	0.00	17.89 s	---	---	---	76.71
12.00	491,720	2030.00	77.13 ic	1.19 ic	0.00	---	58.30 s	0.00	17.62 s	---	---	---	77.11
12.10	500,161	2030.10	77.52 ic	1.14 ic	0.00	---	58.99 s	0.00	17.38 s	---	---	---	77.51
12.20	508,602	2030.20	77.90 ic	1.09 ic	0.00	---	59.63 s	0.00	17.15 s	---	---	---	77.88
12.30	517,043	2030.30	78.28 ic	1.05 ic	0.00	---	60.28 s	0.00	16.94 s	---	---	---	78.28
12.40	525,484	2030.40	78.66 ic	1.01 ic	0.00	---	60.89 s	0.00	16.75 s	---	---	---	78.65
12.50	533,926	2030.50	79.03 ic	0.98 ic	0.00	---	61.47 s	0.00	16.56 s	---	---	---	79.01
12.60	542,367	2030.60	79.40 ic	0.94 ic	0.00	---	62.04 s	0.00	16.39 s	---	---	---	79.37
12.70	550,808	2030.70	79.76 ic	0.91 ic	0.00	---	62.60 s	0.00	16.23 s	---	---	---	79.74
12.80	559,249	2030.80	80.13 ic	0.88 ic	0.00	---	63.14 s	0.00	16.08 s	---	---	---	80.10
12.90	567,690	2030.90	80.49 ic	0.85 ic	0.00	---	63.66 s	0.00	15.94 s	---	---	---	80.45
13.00	576,131	2031.00	80.84 ic	0.82 ic	0.00	---	64.18 s	0.00	15.81 s	---	---	---	80.81
13.10	585,666	2031.10	81.20 ic	0.80 ic	0.00	---	64.67 s	0.00	15.68 s	---	---	---	81.15
13.20	595,201	2031.20	81.55 ic	0.78 ic	0.00	---	65.19 s	0.00	15.57 s	---	---	---	81.54
13.30	604,735	2031.30	81.90 ic	0.75 ic	0.00	---	65.63 s	0.00	15.45 s	---	---	---	81.83
13.40	614,270	2031.40	82.25 ic	0.73 ic	0.00	---	66.13 s	0.00	15.35 s	---	---	---	82.21
13.50	623,804	2031.50	82.59 ic	0.71 ic	0.00	---	66.56 s	0.00	15.25 s	---	---	---	82.53
13.60	633,339	2031.60	82.94 ic	0.69 ic	0.00	---	67.03 s	0.00	15.16 s	---	---	---	82.88
13.70	642,873	2031.70	83.28 ic	0.67 ic	0.00	---	67.45 s	0.00	15.07 s	---	---	---	83.19
13.80	652,408	2031.80	83.62 ic	0.66 ic	0.00	---	67.90 s	0.00	14.99 s	---	---	---	83.56
13.90	661,942	2031.90	83.96 ic	0.64 ic	0.00	---	68.36 s	0.00	14.92 s	---	---	---	83.93
14.00	671,477	2032.00	84.29 ic	0.63 ic	0.00	---	68.76 s	0.00	14.85 s	---	---	---	84.23
14.10	681,827	2032.10	84.63 ic	0.61 ic	0.00	---	69.19 s	0.00	14.78 s	---	---	---	84.58
14.20	692,177	2032.20	84.96 ic	0.60 ic	0.00	---	69.62 s	0.00	14.72 s	---	---	---	84.94
14.30	702,527	2032.30	85.29 ic	0.58 ic	0.00	---	69.96 s	0.00	14.64 s	---	---	---	85.19
14.40	712,877	2032.40	85.62 ic	0.57 ic	0.00	---	70.44 s	0.00	14.60 s	---	---	---	85.62
14.50	723,227	2032.50	85.95 ic	0.56 ic	0.00	---	70.72 s	0.00	14.52 s	---	---	---	85.80
14.60	733,577	2032.60	86.28 ic	0.55 ic	0.00	---	71.16 s	0.00	14.48 s	---	---	---	86.19
14.70	743,927	2032.70	86.61 ic	0.53 ic	0.00	---	71.53 s	0.00	14.43 s	---	---	---	86.49
14.80	754,277	2032.80	86.93 ic	0.52 ic	0.00	---	71.96 s	0.00	14.39 s	---	---	---	86.87
14.90	764,627	2032.90	87.25 ic	0.51 ic	0.00	---	72.31 s	0.00	14.35 s	---	---	---	87.17
15.00	774,977	2033.00	87.58 ic	0.50 ic	0.00	---	72.67 s	0.00	14.30 s	---	---	---	87.47
15.10	786,104	2033.10	87.87 oc	0.49 ic	0.00	---	73.04 s	0.00	14.26 s	---	---	---	87.79
15.20	797,232	2033.20	88.14 oc	0.48 ic	0.00	---	73.30 s	0.00	14.21 s	---	---	---	87.98
15.30	808,359	2033.30	88.40 oc	0.47 ic	0.00	---	73.70 s	0.00	14.18 s	---	---	---	88.36
15.40	819,487	2033.40	88.67 oc	0.46 ic	0.00	---	74.00 s	0.00	14.14 s	---	---	---	88.60
15.50	830,615	2033.50	88.93 oc	0.46 ic	0.00	---	74.28 s	0.00	14.09 s	---	---	---	88.83
15.60	841,742	2033.60	89.20 oc	0.45 ic	0.00	---	74.50 s	0.00	14.04 s	---	---	---	88.98
15.70	852,870	2033.70	89.46 oc	0.44 ic	0.00	---	74.80 s	0.00	14.00 s	---	---	---	89.24
15.80	863,997	2033.80	89.72 oc	0.43 ic	0.00	---	75.10 s	0.00	13.97 s	---	---	---	89.50
15.90	875,125	2033.90	89.98 oc	0.42 ic	0.00	---	75.52 s	0.00	13.96 s	---	---	---	89.90
16.00	886,252	2034.00	90.24 oc	0.42 ic	0.00	---	75.81 s	0.00	13.93 s	---	---	---	90.15
16.10	898,132	2034.10	90.50 oc	0.41 ic	0.00	---	76.12 s	0.00	13.90 s	---	---	---	90.43
16.20	910,013	2034.20	90.75 oc	0.40 ic	0.00	---	76.44 s	0.00	13.88 s	---	---	---	90.73
16.30	921,893	2034.30	91.01 oc	0.40 ic	0.00	---	76.65 s	0.00	13.84 s	---	---	---	90.89
16.40	933,773	2034.40	91.27 oc	0.39 ic	0.00	---	76.81 s	0.00	13.79 s	---	---	---	90.99
16.50	945,653	2034.50	91.52 oc	0.38 ic	0.00	---	77.26 s	0.00	13.80 s	---	---	---	91.44
16.60	957,534	2034.60	91.78 oc	0.38 ic	0.00	---	77.60 s	0.00	13.79 s	---	---	---	91.76
16.70	969,414	2034.70	92.03 oc	0.37 ic	0.00	---	77.59 s	0.00	13.71 s	---	---	---	91.68
16.80	981,294	2034.80	92.29 oc	0.37 ic	0.00	---	77.91 s	0.00	13.70 s	---	---	---	91.98

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Pond A-Upgraded TOB Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
16.90	993,174	2034.90	92.54 oc	0.36 ic	0.00	---	78.45 s	0.00	13.73 s	---	---	---	92.54
17.00	1,005,055	2035.00	92.79 oc	0.35 ic	0.00	---	78.42 s	0.00	13.66 s	---	---	---	92.43

...End

Hydrograph Report

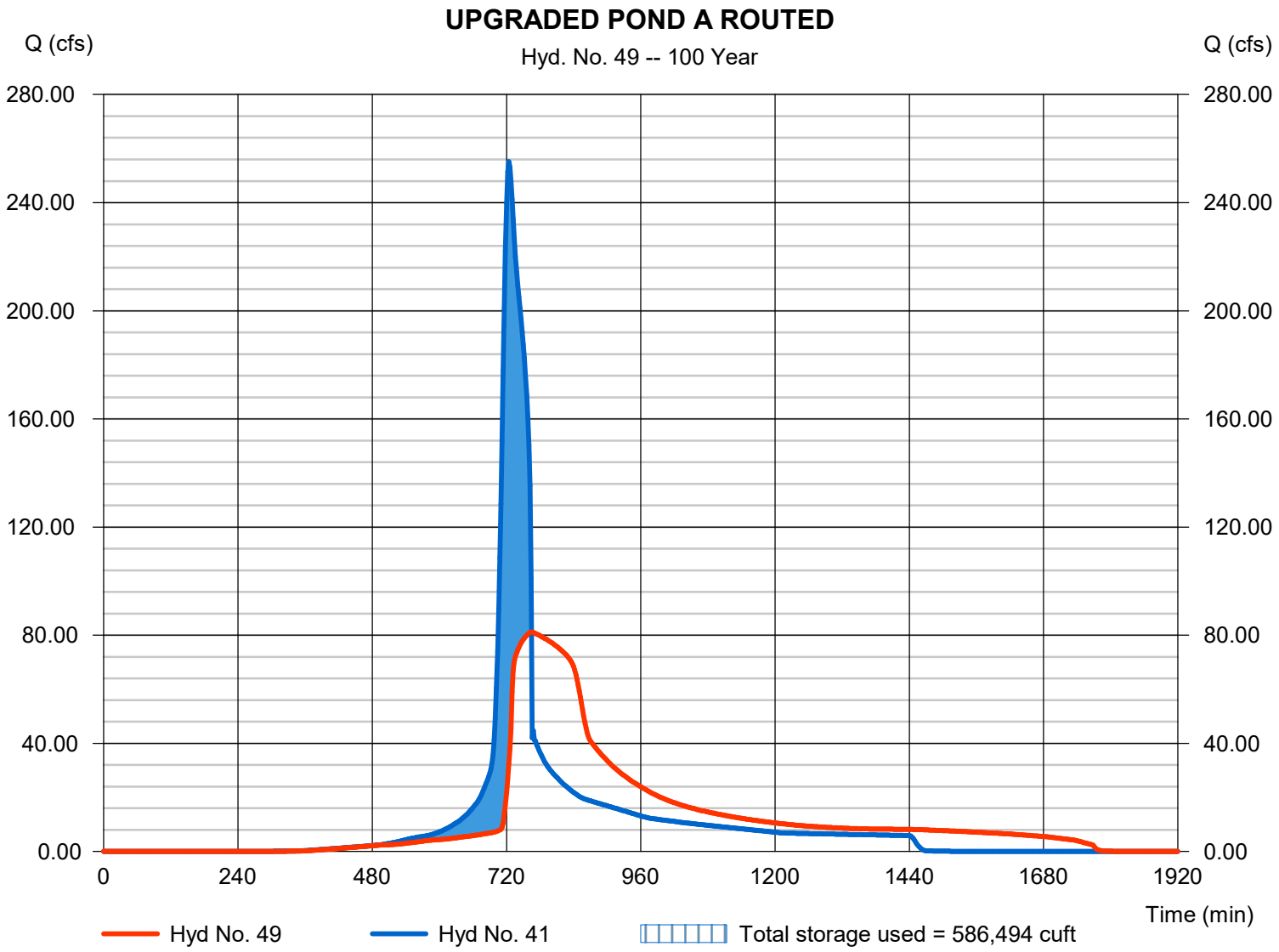
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 1 / 2022

Hyd. No. 49

UPGRADED POND A ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 81.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 764 min
Time interval	= 2 min	Hyd. volume	= 1,343,249 cuft
Inflow hyd. No.	= 41 - POST TOTAL TO POND A	Max. Elevation	= 2031.11 ft
Reservoir name	= Pond A-Upgraded TOB Pond	Max. Storage	= 586,494 cuft

Storage Indication method used.



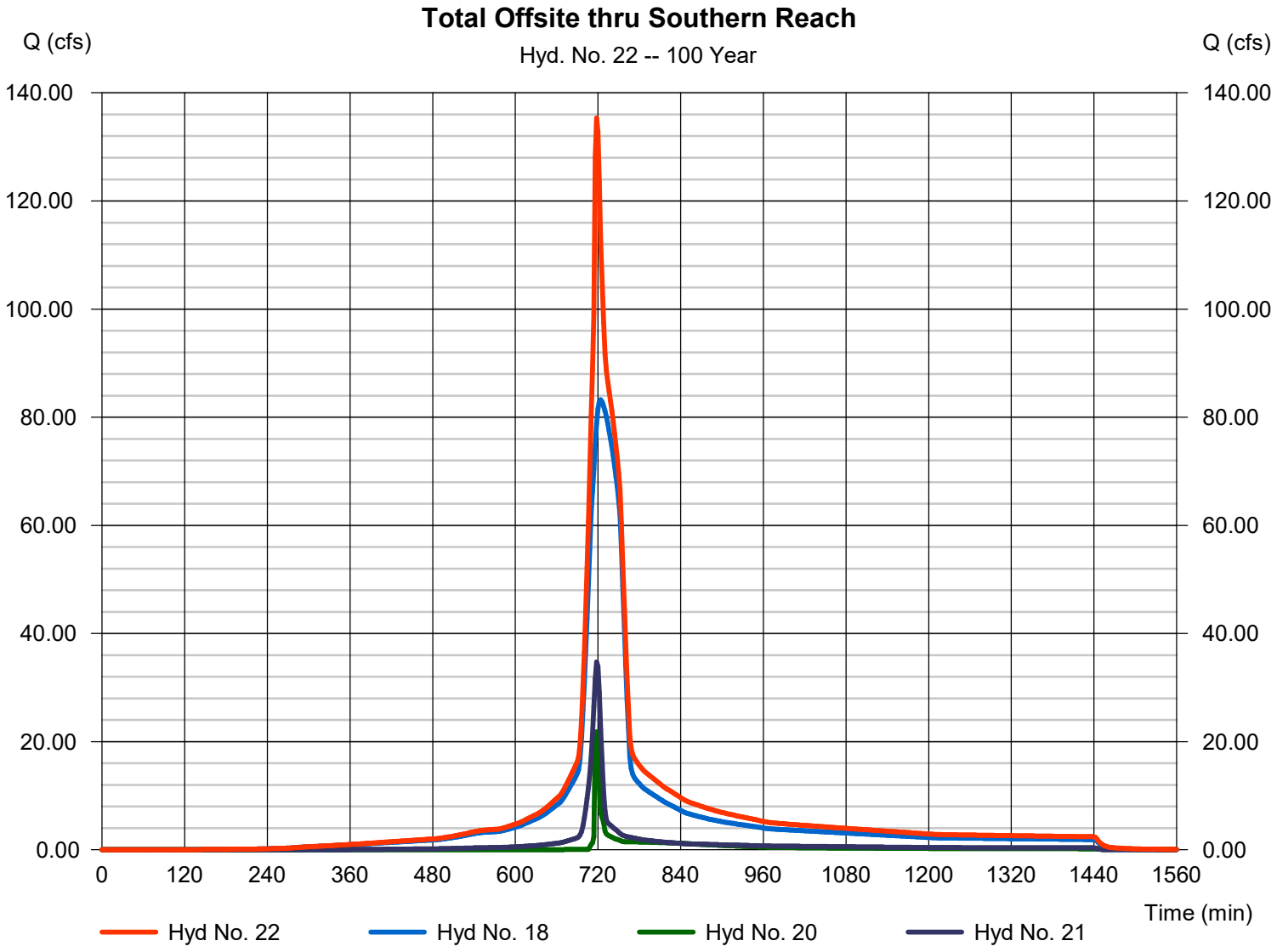
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 22

Total Offsite thru Southern Reach

Hydrograph type	= Combine	Peak discharge	= 135.34 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 623,617 cuft
Inflow hyds.	= 18, 20, 21	Contrib. drain. area	= 5.090 ac



Drainage Area Runoff and Time of Concentration

Drainage Area: POST ONSITE TO POND B (S. DRY POND)
POSTDEVELOPMENT

Composite Curve Number (CN)						Notes:
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	3.15	192.37	Impervious lot area calculated on "Typical Lot Impervious Area Estimate" table elsewhere
CN_2	C	Open space	74	3.27	242.32	
CN_3	B	Imperv. (measured)	98	0.38	36.97	
CN_4	C	Imperv. (measured)	98	1.62	158.58	
CN_5	B	Imperv. (est. lots)	98	0.16	15.58	
CN_6	C	Imperv. (est. lots)	98	1.78	174.15	
CN_7					0.00	
CN_8					0.00	
CN_9					0.00	
CN_{10}					0.00	
				Total	**10.36**	**819.97**
					Composite CN =	**79**

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Other Tt	Estimate				5.0
2						
3						
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**5.0**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	79	79	79
Storage (in.) S=1000/CN-10	2.66	2.66	2.66
Initial abstraction (in.), I_a=0.2S	0.53	0.53	0.53
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.68	2.01	4.07
Runoff volume (ac-ft), RV = Q/12*A	0.59	1.74	3.52
Flow rate (cfs), q_{peak} from hydrograph	11.94	35.13	69.96

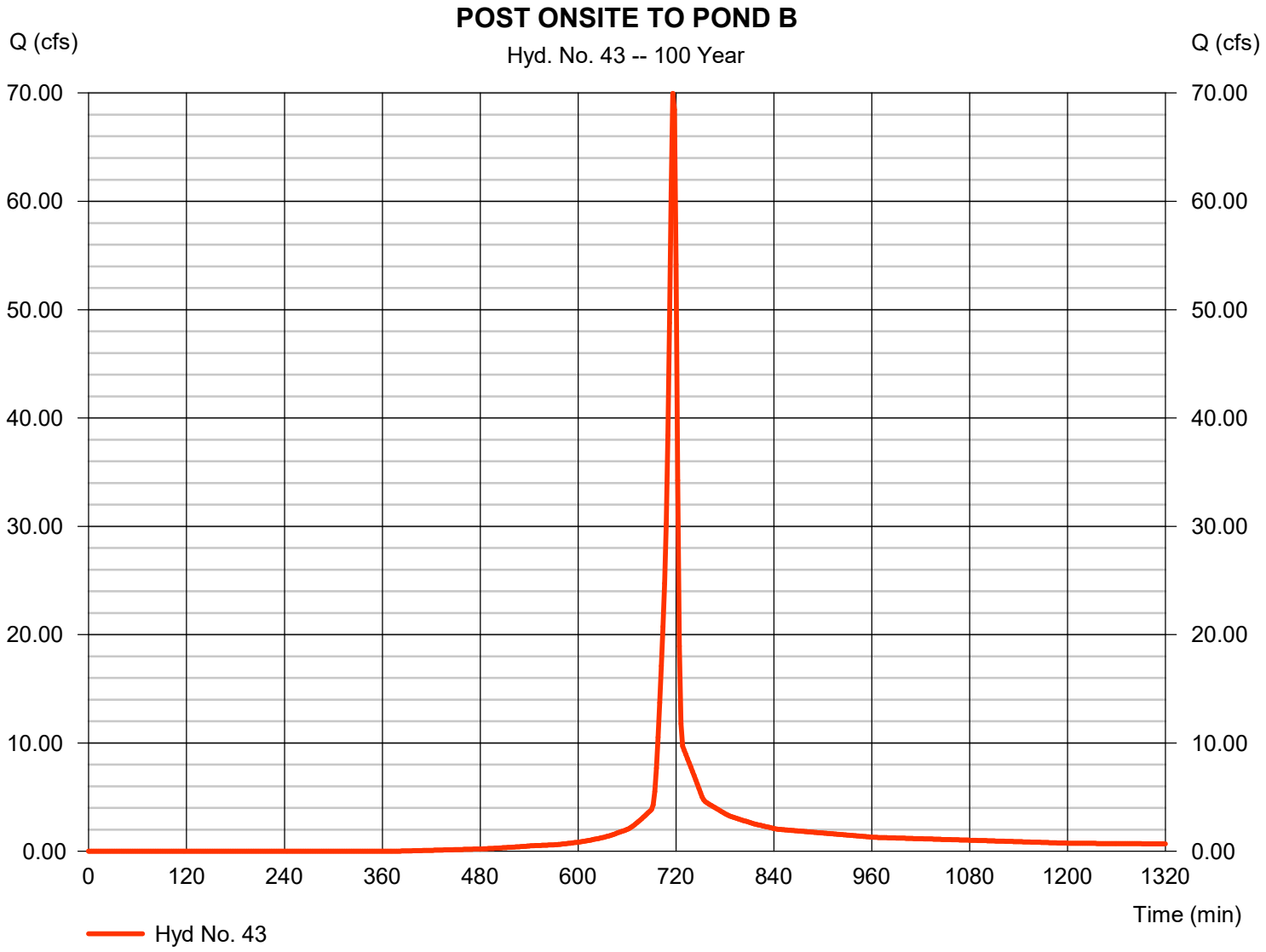
Hydrograph Number: 43

Hydrograph Report

Hyd. No. 43

POST ONSITE TO POND B

Hydrograph type	=	SCS Runoff	Peak discharge	=	69.96 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	143,669 cuft
Drainage area	=	10.360 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

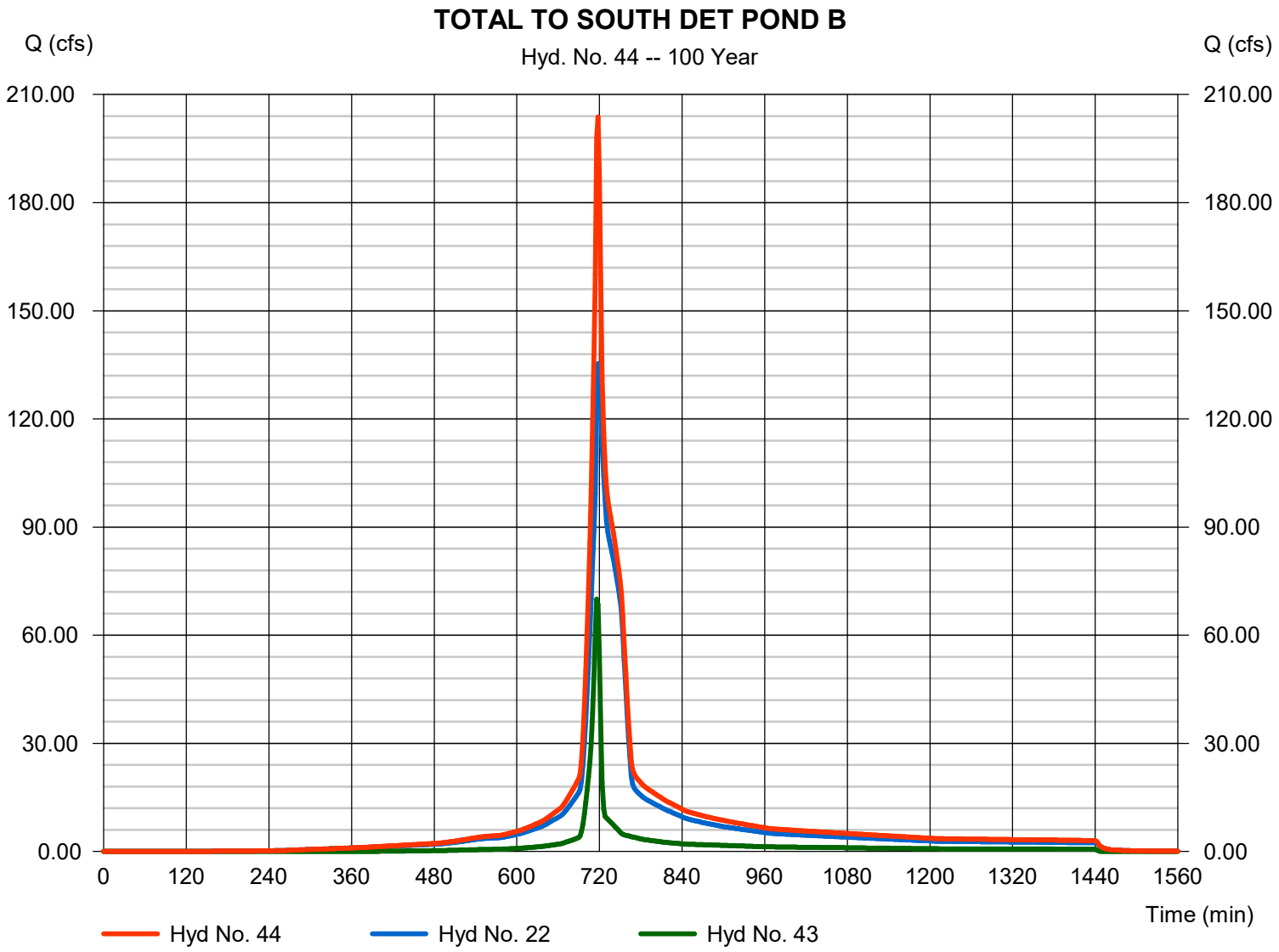


Hydrograph Report

Hyd. No. 44

TOTAL TO SOUTH DET POND B

Hydrograph type	= Combine	Peak discharge	= 203.78 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 767,286 cuft
Inflow hyds.	= 22, 43	Contrib. drain. area	= 10.360 ac



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 1 / 2022

Pond No. 2 - Pond B-South Detention Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2021.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2021.00	24	0	0
1.00	2022.00	2,752	1,011	1,011
2.00	2023.00	9,028	5,588	6,599
3.00	2024.00	16,214	12,446	19,044
4.00	2025.00	23,731	19,852	38,896
5.00	2026.00	31,571	27,555	66,451
6.00	2027.00	38,958	35,196	101,647
7.00	2028.00	44,308	41,600	143,247
8.00	2029.00	48,858	46,560	189,807
9.00	2030.00	52,814	50,818	240,625
10.00	2031.00	56,575	54,678	295,304
11.00	2032.00	60,436	58,489	353,793
12.00	2033.00	64,395	62,399	416,191
13.00	2034.00	68,452	66,407	482,598
14.00	2035.00	72,607	70,512	553,110
15.00	2036.00	76,860	74,716	627,826

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 54.00	30.00	Inactive	0.00
Span (in)	= 54.00	30.00	24.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 2021.00	2021.01	2027.00	0.00
Length (ft)	= 150.00	0.50	150.00	0.00
Slope (%)	= 2.00	1.00	2.00	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)	= 18.85	Inactive	0.00	0.00
Crest El. (ft)	= 2027.00	2028.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2021.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.10	101	2021.10	0.06 ic	0.05 ic	0.00	---	0.00	0.00	---	---	---	---	0.050
0.20	202	2021.20	0.20 ic	0.20 ic	0.00	---	0.00	0.00	---	---	---	---	0.200
0.30	303	2021.30	0.48 ic	0.47 ic	0.00	---	0.00	0.00	---	---	---	---	0.469
0.40	404	2021.40	0.81 ic	0.81 ic	0.00	---	0.00	0.00	---	---	---	---	0.810
0.50	505	2021.50	1.26 ic	1.26 ic	0.00	---	0.00	0.00	---	---	---	---	1.263
0.60	607	2021.60	1.85 ic	1.79 ic	0.00	---	0.00	0.00	---	---	---	---	1.785
0.70	708	2021.70	2.43 ic	2.43 ic	0.00	---	0.00	0.00	---	---	---	---	2.433
0.80	809	2021.80	3.11 ic	3.11 ic	0.00	---	0.00	0.00	---	---	---	---	3.112
0.90	910	2021.90	3.93 ic	3.93 ic	0.00	---	0.00	0.00	---	---	---	---	3.928
1.00	1,011	2022.00	4.86 ic	4.73 ic	0.00	---	0.00	0.00	---	---	---	---	4.734
1.10	1,570	2022.10	5.63 ic	5.63 ic	0.00	---	0.00	0.00	---	---	---	---	5.630
1.20	2,128	2022.20	6.75 ic	6.63 ic	0.00	---	0.00	0.00	---	---	---	---	6.635
1.30	2,687	2022.30	7.72 ic	7.72 ic	0.00	---	0.00	0.00	---	---	---	---	7.719
1.40	3,246	2022.40	9.08 ic	8.82 ic	0.00	---	0.00	0.00	---	---	---	---	8.820
1.50	3,805	2022.50	10.14 ic	10.02 ic	0.00	---	0.00	0.00	---	---	---	---	10.02
1.60	4,363	2022.60	11.27 ic	11.23 ic	0.00	---	0.00	0.00	---	---	---	---	11.23
1.70	4,922	2022.70	12.48 ic	12.44 ic	0.00	---	0.00	0.00	---	---	---	---	12.44
1.80	5,481	2022.80	13.76 ic	13.76 ic	0.00	---	0.00	0.00	---	---	---	---	13.76
1.90	6,040	2022.90	15.12 ic	15.05 ic	0.00	---	0.00	0.00	---	---	---	---	15.05
2.00	6,599	2023.00	16.55 ic	16.26 ic	0.00	---	0.00	0.00	---	---	---	---	16.26
2.10	7,843	2023.10	17.47 ic	17.46 ic	0.00	---	0.00	0.00	---	---	---	---	17.46
2.20	9,088	2023.20	18.90 ic	18.90 ic	0.00	---	0.00	0.00	---	---	---	---	18.90
2.30	10,332	2023.30	20.47 ic	20.04 ic	0.00	---	0.00	0.00	---	---	---	---	20.04
2.40	11,577	2023.40	21.35 ic	21.35 ic	0.00	---	0.00	0.00	---	---	---	---	21.35
2.50	12,821	2023.50	22.30 ic	22.30 ic	0.00	---	0.00	0.00	---	---	---	---	22.30
2.60	14,066	2023.60	23.16 ic	23.16 ic	0.00	---	0.00	0.00	---	---	---	---	23.16

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Pond B-South Detention Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.70	15,310	2023.70	24.01 ic	24.01 ic	0.00	---	0.00	0.00	---	---	---	---	24.01
2.80	16,555	2023.80	24.86 ic	24.86 ic	0.00	---	0.00	0.00	---	---	---	---	24.86
2.90	17,800	2023.90	25.76 ic	25.62 ic	0.00	---	0.00	0.00	---	---	---	---	25.62
3.00	19,044	2024.00	26.70 ic	26.32 ic	0.00	---	0.00	0.00	---	---	---	---	26.32
3.10	21,029	2024.10	27.66 ic	27.01 ic	0.00	---	0.00	0.00	---	---	---	---	27.01
3.20	23,014	2024.20	27.82 ic	27.82 ic	0.00	---	0.00	0.00	---	---	---	---	27.82
3.30	25,000	2024.30	28.65 ic	28.65 ic	0.00	---	0.00	0.00	---	---	---	---	28.65
3.40	26,985	2024.40	29.63 ic	29.30 ic	0.00	---	0.00	0.00	---	---	---	---	29.30
3.50	28,970	2024.50	30.63 ic	29.91 ic	0.00	---	0.00	0.00	---	---	---	---	29.91
3.60	30,955	2024.60	30.73 ic	30.72 ic	0.00	---	0.00	0.00	---	---	---	---	30.72
3.70	32,940	2024.70	31.65 ic	31.41 ic	0.00	---	0.00	0.00	---	---	---	---	31.41
3.80	34,925	2024.80	32.69 ic	31.98 ic	0.00	---	0.00	0.00	---	---	---	---	31.98
3.90	36,911	2024.90	32.77 ic	32.76 ic	0.00	---	0.00	0.00	---	---	---	---	32.76
4.00	38,896	2025.00	33.73 ic	33.40 ic	0.00	---	0.00	0.00	---	---	---	---	33.40
4.10	41,651	2025.10	33.98 ic	33.98 ic	0.00	---	0.00	0.00	---	---	---	---	33.98
4.20	44,407	2025.20	34.80 ic	34.75 ic	0.00	---	0.00	0.00	---	---	---	---	34.75
4.30	47,162	2025.30	35.87 ic	35.26 ic	0.00	---	0.00	0.00	---	---	---	---	35.26
4.40	49,918	2025.40	35.96 ic	35.96 ic	0.00	---	0.00	0.00	---	---	---	---	35.96
4.50	52,673	2025.50	36.96 ic	36.54 ic	0.00	---	0.00	0.00	---	---	---	---	36.54
4.60	55,429	2025.60	37.14 ic	37.14 ic	0.00	---	0.00	0.00	---	---	---	---	37.14
4.70	58,184	2025.70	38.06 ic	37.78 ic	0.00	---	0.00	0.00	---	---	---	---	37.78
4.80	60,940	2025.80	38.31 ic	38.31 ic	0.00	---	0.00	0.00	---	---	---	---	38.31
4.90	63,695	2025.90	39.17 ic	38.98 ic	0.00	---	0.00	0.00	---	---	---	---	38.98
5.00	66,451	2026.00	39.46 ic	39.46 ic	0.00	---	0.00	0.00	---	---	---	---	39.46
5.10	69,971	2026.10	40.29 ic	40.14 ic	0.00	---	0.00	0.00	---	---	---	---	40.14
5.20	73,490	2026.20	40.60 ic	40.60 ic	0.00	---	0.00	0.00	---	---	---	---	40.60
5.30	77,010	2026.30	41.42 ic	41.27 ic	0.00	---	0.00	0.00	---	---	---	---	41.27
5.40	80,529	2026.40	41.73 ic	41.72 ic	0.00	---	0.00	0.00	---	---	---	---	41.72
5.50	84,049	2026.50	42.57 ic	42.37 ic	0.00	---	0.00	0.00	---	---	---	---	42.37
5.60	87,569	2026.60	42.84 ic	42.84 ic	0.00	---	0.00	0.00	---	---	---	---	42.84
5.70	91,088	2026.70	43.72 ic	43.44 ic	0.00	---	0.00	0.00	---	---	---	---	43.44
5.80	94,608	2026.80	43.93 ic	43.93 ic	0.00	---	0.00	0.00	---	---	---	---	43.93
5.90	98,128	2026.90	44.88 ic	44.49 ic	0.00	---	0.00	0.00	---	---	---	---	44.49
6.00	101,647	2027.00	45.02 ic	45.02 ic	0.00	---	0.00	0.00	---	---	---	---	45.02
6.10	105,807	2027.10	47.26 ic	45.27 ic	0.00	---	1.98	0.00	---	---	---	---	47.26
6.20	109,967	2027.20	50.84 ic	45.23 ic	0.00	---	5.61	0.00	---	---	---	---	50.84
6.30	114,127	2027.30	55.60 ic	45.02 ic	0.00	---	10.31	0.00	---	---	---	---	55.33
6.40	118,287	2027.40	60.58 ic	44.70 ic	0.00	---	15.87	0.00	---	---	---	---	60.58
6.50	122,447	2027.50	66.52 ic	44.33 ic	0.00	---	22.18	0.00	---	---	---	---	66.52
6.60	126,607	2027.60	73.59 ic	43.73 ic	0.00	---	29.16	0.00	---	---	---	---	72.89
6.70	130,767	2027.70	80.40 ic	43.16 ic	0.00	---	36.75	0.00	---	---	---	---	79.91
6.80	134,927	2027.80	87.80 ic	42.45 ic	0.00	---	44.90	0.00	---	---	---	---	87.35
6.90	139,087	2027.90	95.31 ic	41.67 ic	0.00	---	53.57	0.00	---	---	---	---	95.25
7.00	143,247	2028.00	103.67 ic	40.59 ic	0.00	---	62.77	0.00	---	---	---	---	103.37
7.10	147,903	2028.10	111.73 ic	39.25 ic	0.00	---	72.42	0.00	---	---	---	---	111.66
7.20	152,559	2028.20	119.87 ic	37.36 ic	0.00	---	82.51	0.00	---	---	---	---	119.87
7.30	157,215	2028.30	128.39 ic	35.36 ic	0.00	---	93.03	0.00	---	---	---	---	128.39
7.40	161,871	2028.40	136.97 ic	33.00 ic	0.00	---	103.97	0.00	---	---	---	---	136.97
7.50	166,527	2028.50	145.54 ic	30.24 ic	0.00	---	115.30	0.00	---	---	---	---	145.54
7.60	171,183	2028.60	152.43 ic	27.83 ic	0.00	---	124.60 s	0.00	---	---	---	---	152.43
7.70	175,839	2028.70	157.25 ic	26.23 ic	0.00	---	131.01 s	0.00	---	---	---	---	157.25
7.80	180,495	2028.80	161.37 ic	24.88 ic	0.00	---	136.49 s	0.00	---	---	---	---	161.37
7.90	185,151	2028.90	165.04 ic	23.68 ic	0.00	---	141.37 s	0.00	---	---	---	---	165.04
8.00	189,807	2029.00	168.39 ic	22.59 ic	0.00	---	145.80 s	0.00	---	---	---	---	168.39
8.10	194,889	2029.10	171.47 ic	21.60 ic	0.00	---	149.87 s	0.00	---	---	---	---	171.46
8.20	199,971	2029.20	174.33 ic	20.69 ic	0.00	---	153.64 s	0.00	---	---	---	---	174.33
8.30	205,053	2029.30	177.02 ic	19.85 ic	0.00	---	157.17 s	0.00	---	---	---	---	177.01
8.40	210,135	2029.40	179.55 ic	19.07 ic	0.00	---	160.48 s	0.00	---	---	---	---	179.55
8.50	215,216	2029.50	181.95 ic	18.35 ic	0.00	---	163.60 s	0.00	---	---	---	---	181.95
8.60	220,298	2029.60	184.25 ic	17.68 ic	0.00	---	166.56 s	0.00	---	---	---	---	184.24
8.70	225,380	2029.70	186.44 ic	17.06 ic	0.00	---	169.38 s	0.00	---	---	---	---	186.44
8.80	230,462	2029.80	188.55 ic	16.47 ic	0.00	---	172.07 s	0.00	---	---	---	---	188.54
8.90	235,544	2029.90	190.59 ic	15.92 ic	0.00	---	174.66 s	0.00	---	---	---	---	190.59
9.00	240,625	2030.00	192.57 ic	15.41 ic	0.00	---	177.15 s	0.00	---	---	---	---	192.56
9.10	246,093	2030.10	194.48 ic	14.93 ic	0.00	---	179.55 s	0.00	---	---	---	---	194.47
9.20	251,561	2030.20	196.34 ic	14.47 ic	0.00	---	181.85 s	0.00	---	---	---	---	196.32
9.30	257,029	2030.30	198.15 ic	14.05 ic	0.00	---	184.10 s	0.00	---	---	---	---	198.14
9.40	262,497	2030.40	199.92 ic	13.64 ic	0.00	---	186.25 s	0.00	---	---	---	---	199.89
9.50	267,964	2030.50	201.64 ic	13.26 ic	0.00	---	188.37 s	0.00	---	---	---	---	201.63
9.60	273,432	2030.60	203.34 ic	12.90 ic	0.00	---	190.42 s	0.00	---	---	---	---	203.31
9.70	278,900	2030.70	205.00 ic	12.55 ic	0.00	---	192.42 s	0.00	---	---	---	---	204.97
9.80	284,368	2030.80	206.62 ic	12.23 ic	0.00	---	194.38 s	0.00	---	---	---	---	206.61

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Pond B-South Detention Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
9.90	289,836	2030.90	208.23 ic	11.92 ic	0.00	---	196.29 s	0.00	---	---	---	---	208.21
10.00	295,304	2031.00	209.81 ic	11.62 ic	0.00	---	198.16 s	0.00	---	---	---	---	209.79
10.10	301,152	2031.10	211.36 ic	11.35 ic	0.00	---	200.00 s	0.00	---	---	---	---	211.34
10.20	307,001	2031.20	212.89 ic	11.08 ic	0.00	---	201.80 s	0.00	---	---	---	---	212.88
10.30	312,850	2031.30	214.40 ic	10.82 ic	0.00	---	203.55 s	0.00	---	---	---	---	214.37
10.40	318,699	2031.40	215.89 ic	10.58 ic	0.00	---	205.27 s	0.00	---	---	---	---	215.85
10.50	324,548	2031.50	217.36 ic	10.35 ic	0.00	---	207.00 s	0.00	---	---	---	---	217.35
10.60	330,397	2031.60	218.81 ic	10.13 ic	0.00	---	208.67 s	0.00	---	---	---	---	218.80
10.70	336,246	2031.70	220.25 ic	9.91 ic	0.00	---	210.31 s	0.00	---	---	---	---	220.23
10.80	342,095	2031.80	221.67 ic	9.71 ic	0.00	---	211.94 s	0.00	---	---	---	---	221.65
10.90	347,944	2031.90	223.07 ic	9.51 ic	0.00	---	213.52 s	0.00	---	---	---	---	223.03
11.00	353,793	2032.00	224.47 ic	9.33 ic	0.00	---	215.12 s	0.00	---	---	---	---	224.44
11.10	360,032	2032.10	225.85 ic	9.15 ic	0.00	---	216.66 s	0.00	---	---	---	---	225.81
11.20	366,272	2032.20	227.22 ic	8.97 ic	0.00	---	218.23 s	0.00	---	---	---	---	227.20
11.30	372,512	2032.30	228.57 ic	8.81 ic	0.00	---	219.75 s	0.00	---	---	---	---	228.56
11.40	378,752	2032.40	229.91 ic	8.65 ic	0.00	---	221.26 s	0.00	---	---	---	---	229.91
11.50	384,992	2032.50	231.24 ic	8.49 ic	0.00	---	222.70 s	0.00	---	---	---	---	231.19
11.60	391,232	2032.60	232.56 ic	8.34 ic	0.00	---	224.22 s	0.00	---	---	---	---	232.56
11.70	397,472	2032.70	233.88 ic	8.20 ic	0.00	---	225.62 s	0.00	---	---	---	---	233.82
11.80	403,712	2032.80	235.18 ic	8.06 ic	0.00	---	227.06 s	0.00	---	---	---	---	235.12
11.90	409,951	2032.90	236.47 ic	7.93 ic	0.00	---	228.49 s	0.00	---	---	---	---	236.41
12.00	416,191	2033.00	237.75 ic	7.79 ic	0.00	---	229.87 s	0.00	---	---	---	---	237.67
12.10	422,832	2033.10	239.02 ic	7.67 ic	0.00	---	231.28 s	0.00	---	---	---	---	238.95
12.20	429,473	2033.20	240.28 ic	7.55 ic	0.00	---	232.72 s	0.00	---	---	---	---	240.27
12.30	436,113	2033.30	241.54 ic	7.43 ic	0.00	---	234.09 s	0.00	---	---	---	---	241.52
12.40	442,754	2033.40	242.79 ic	7.32 ic	0.00	---	235.39 s	0.00	---	---	---	---	242.71
12.50	449,395	2033.50	244.02 ic	7.21 ic	0.00	---	236.74 s	0.00	---	---	---	---	243.95
12.60	456,035	2033.60	245.26 ic	7.10 ic	0.00	---	238.05 s	0.00	---	---	---	---	245.15
12.70	462,676	2033.70	246.48 ic	7.00 ic	0.00	---	239.43 s	0.00	---	---	---	---	246.43
12.80	469,317	2033.80	247.69 ic	6.90 ic	0.00	---	240.79 s	0.00	---	---	---	---	247.69
12.90	475,957	2033.90	248.90 ic	6.80 ic	0.00	---	242.02 s	0.00	---	---	---	---	248.82
13.00	482,598	2034.00	250.11 ic	6.71 ic	0.00	---	243.29 s	0.00	---	---	---	---	250.00
13.10	489,649	2034.10	251.30 ic	6.62 ic	0.00	---	244.61 s	0.00	---	---	---	---	251.23
13.20	496,700	2034.20	252.49 ic	6.53 ic	0.00	---	245.94 s	0.00	---	---	---	---	252.47
13.30	503,752	2034.30	253.67 ic	6.44 ic	0.00	---	247.16 s	0.00	---	---	---	---	253.60
13.40	510,803	2034.40	254.85 ic	6.35 ic	0.00	---	248.38 s	0.00	---	---	---	---	254.74
13.50	517,854	2034.50	256.01 ic	6.28 ic	0.00	---	249.73 s	0.00	---	---	---	---	256.01
13.60	524,905	2034.60	257.18 ic	6.19 ic	0.00	---	250.87 s	0.00	---	---	---	---	257.06
13.70	531,956	2034.70	258.33 ic	6.12 ic	0.00	---	252.18 s	0.00	---	---	---	---	258.30
13.80	539,008	2034.80	259.48 ic	6.04 ic	0.00	---	253.40 s	0.00	---	---	---	---	259.44
13.90	546,059	2034.90	260.63 ic	5.97 ic	0.00	---	254.63 s	0.00	---	---	---	---	260.59
14.00	553,110	2035.00	261.77 ic	5.90 ic	0.00	---	255.87 s	0.00	---	---	---	---	261.77
14.10	560,582	2035.10	262.90 ic	5.82 ic	0.00	---	256.93 s	0.00	---	---	---	---	262.76
14.20	568,053	2035.20	264.03 ic	5.76 ic	0.00	---	258.19 s	0.00	---	---	---	---	263.95
14.30	575,525	2035.30	265.15 ic	5.69 ic	0.00	---	259.39 s	0.00	---	---	---	---	265.09
14.40	582,997	2035.40	266.27 ic	5.62 ic	0.00	---	260.47 s	0.00	---	---	---	---	266.09
14.50	590,468	2035.50	267.38 ic	5.57 ic	0.00	---	261.81 s	0.00	---	---	---	---	267.37
14.60	597,940	2035.60	268.49 ic	5.50 ic	0.00	---	262.88 s	0.00	---	---	---	---	268.38
14.70	605,412	2035.70	269.59 ic	5.44 ic	0.00	---	264.10 s	0.00	---	---	---	---	269.54
14.80	612,883	2035.80	270.69 ic	5.38 ic	0.00	---	265.19 s	0.00	---	---	---	---	270.57
14.90	620,355	2035.90	271.78 ic	5.32 ic	0.00	---	266.40 s	0.00	---	---	---	---	271.72
15.00	627,826	2036.00	272.87 ic	5.27 ic	0.00	---	267.41 s	0.00	---	---	---	---	272.68

...End

Hydrograph Report

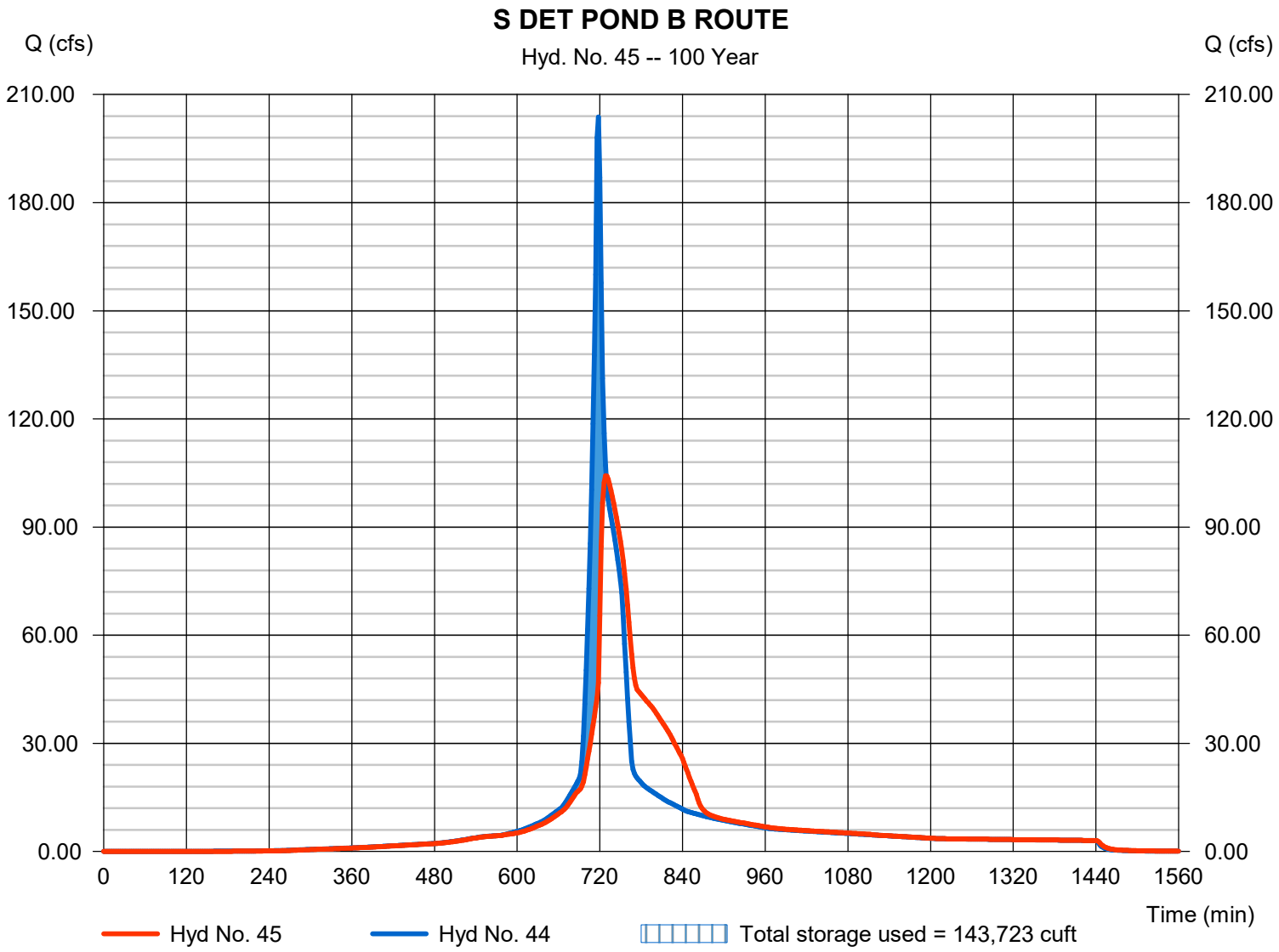
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 1 / 2022

Hyd. No. 45

S DET POND B ROUTE

Hydrograph type	=	Reservoir	Peak discharge	=	104.21 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	767,232 cuft
Inflow hyd. No.	=	44 - TOTAL TO SOUTH DET POND B	Max. Elevation	=	2028.01 ft
Reservoir name	=	Pond B-South Detention Pond	Max. Storage	=	143,723 cuft

Storage Indication method used.



Drainage Area Runoff and Time of Concentration

Drainage Area: **POSTDEV TO POND C (WETPOND)**
POSTDEVELOPMENT

Composite Curve Number (CN)						Notes:
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	1) Impervious lot area calculated on "Typical Lot Impervious Area Estimate" table elsewhere 2) Wet pond normal pool water surface area is counted as impervious area for hydrology
CN_1	B	Open space	61	2.37	144.70	
CN_2	C	Open space	74	4.65	344.43	
CN_3	B	Imperv. (measured)	98	0.24	23.38	
CN_4	C	Imperv. (measured)	98	0.85	83.25	
CN_5	B	Imperv. (est. lots)	98	0.25	24.89	
CN_6	C	Imperv. (est. lots)	98	2.19	214.52	
CN_7	B	Imperv. (water surf.)	98	0.89	87.00	
CN_8					0.00	
CN_9					0.00	
CN_{10}					0.00	
				Total	**11.45**	**922.18**
				Composite CN =		**81**

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Other Tt	Estimate				5.0
2						
3						
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**5.0**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	81	81	81
Storage (in.) S=1000/CN-10	2.35	2.35	2.35
Initial abstraction (in.), I_a=0.2S	0.47	0.47	0.47
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.78	2.17	4.29
Runoff volume (ac-ft), RV = Q/12*A	0.74	2.07	4.09
Flow rate (cfs), q_{peak} from hydrograph	15.10	41.81	80.72

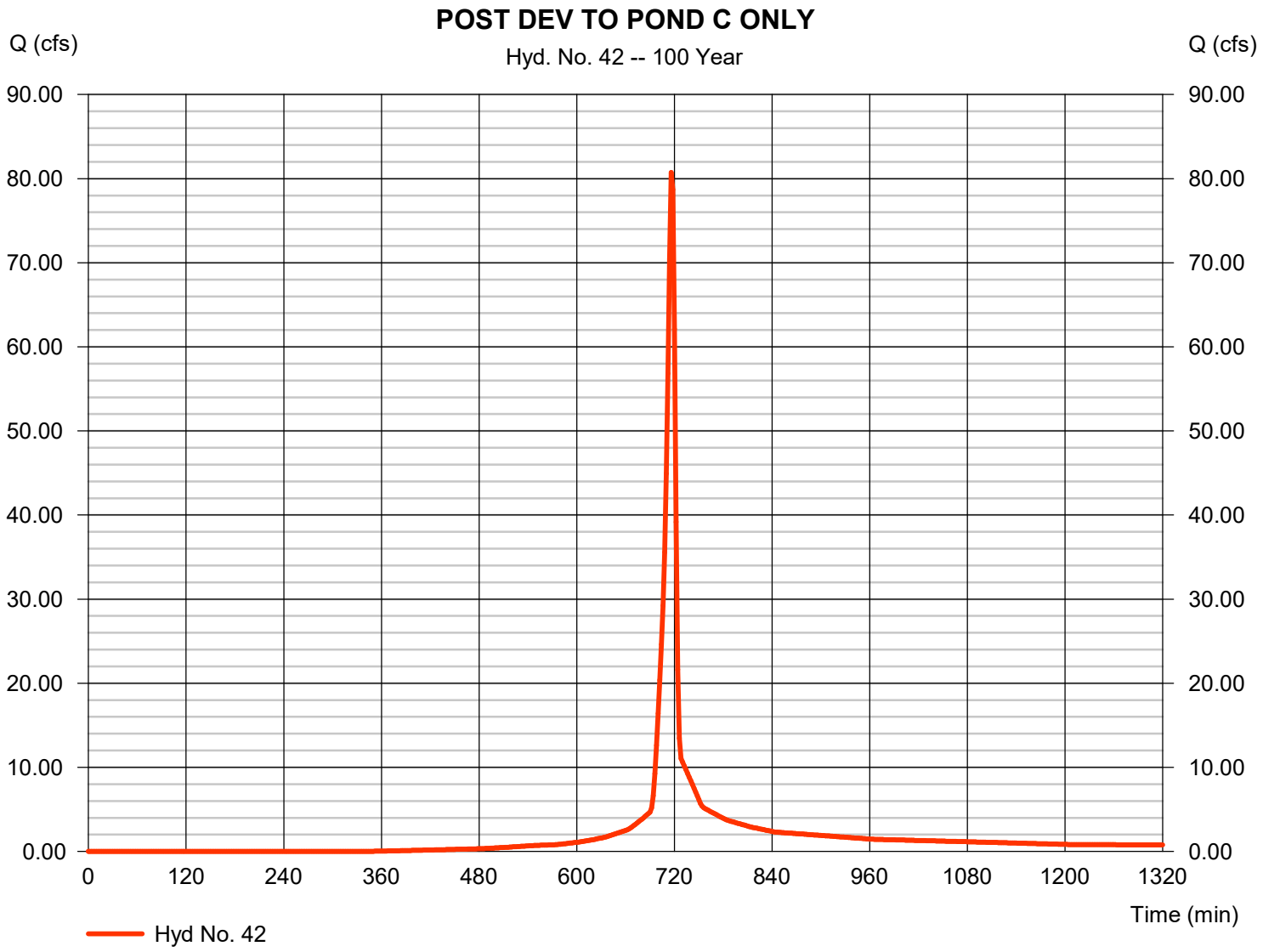
Hydrograph Number: 42

Hydrograph Report

Hyd. No. 42

POST DEV TO POND C ONLY

Hydrograph type	= SCS Runoff	Peak discharge	= 80.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 167,038 cuft
Drainage area	= 11.450 ac	Curve number	= 81
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

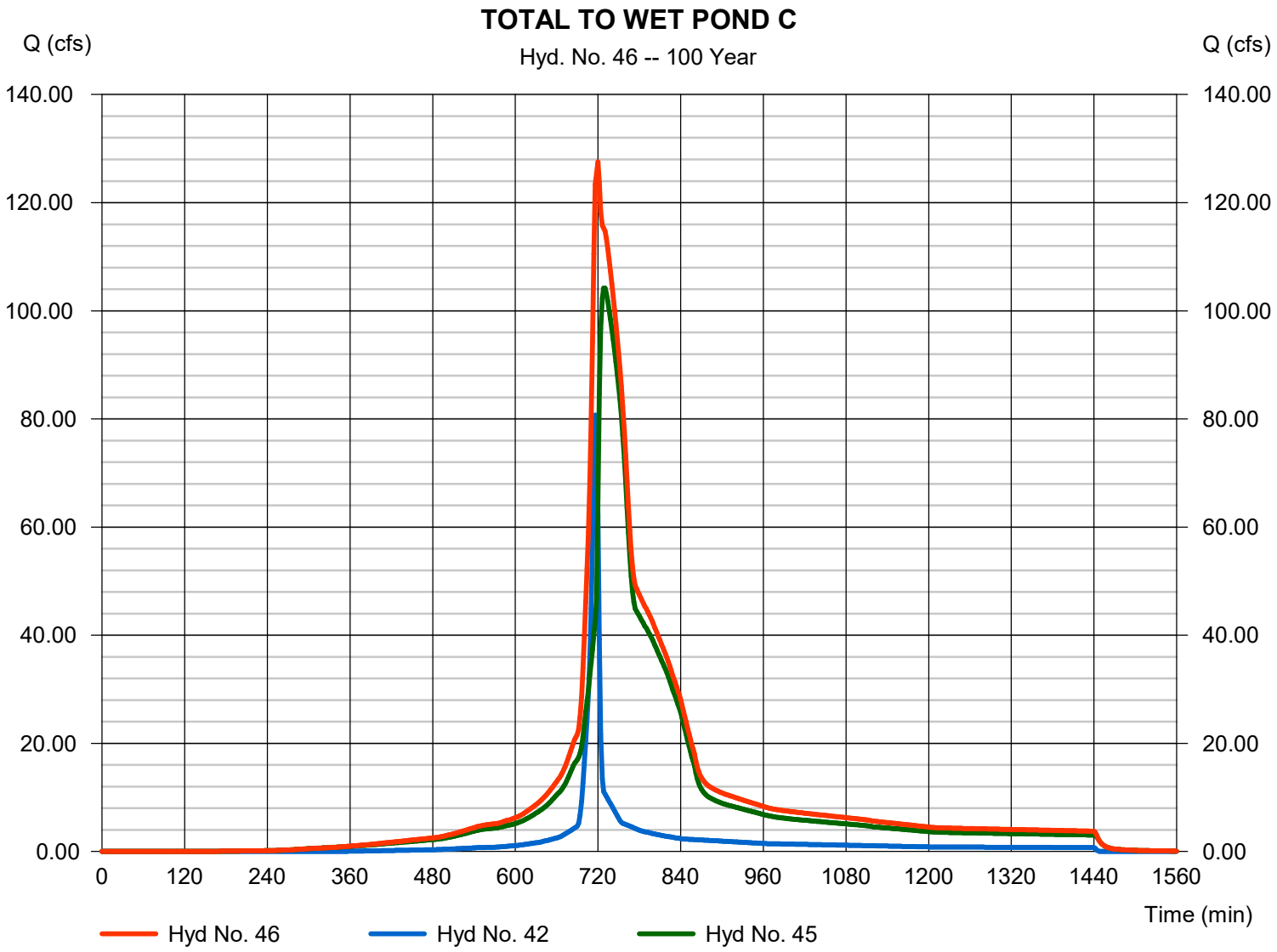


Hydrograph Report

Hyd. No. 46

TOTAL TO WET POND C

Hydrograph type	= Combine	Peak discharge	= 127.53 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 934,271 cuft
Inflow hyds.	= 42, 45	Contrib. drain. area	= 11.450 ac



Pond Report

Pond No. 5 - Pond C-Wet pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2009.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2009.00	18,345	0	0
1.00	2010.00	20,327	19,326	19,326
2.00	2011.00	22,469	21,387	40,713
3.00	2012.00	24,665	23,556	64,269
4.00	2013.00	26,917	25,780	90,049
5.00	2014.00	29,221	28,058	118,107
6.00	2015.00	34,309	31,728	149,835
7.00	2016.00	49,569	41,702	191,537
8.00	2017.00	52,449	50,997	242,534
9.00	2018.00	55,399	53,912	296,446
10.00	2019.00	58,415	56,895	353,340
11.00	2020.00	61,487	59,938	413,279

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	8.00	0.00	0.00
Span (in)	= 24.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 2009.00	2015.30	0.00	0.00
Length (ft)	= 65.00	0.50	0.00	0.00
Slope (%)	= 2.00	1.00	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)	= 12.57	20.00	0.00	0.00
Crest El. (ft)	= 2016.50	2017.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	2009.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.10	1,933	2009.10	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.20	3,865	2009.20	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.30	5,798	2009.30	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.40	7,730	2009.40	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.50	9,663	2009.50	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.60	11,595	2009.60	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.70	13,528	2009.70	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.80	15,460	2009.80	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.90	17,393	2009.90	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	19,326	2010.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.10	21,464	2010.10	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.20	23,603	2010.20	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.30	25,742	2010.30	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.40	27,880	2010.40	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.50	30,019	2010.50	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.60	32,158	2010.60	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.70	34,296	2010.70	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.80	36,435	2010.80	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.90	38,574	2010.90	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.00	40,713	2011.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.10	43,068	2011.10	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.20	45,424	2011.20	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.30	47,779	2011.30	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.40	50,135	2011.40	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.50	52,491	2011.50	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.60	54,846	2011.60	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.70	57,202	2011.70	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.80	59,557	2011.80	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
2.90	61,913	2011.90	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
3.00	64,269	2012.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000

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Pond C-Wet pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.10	66,847	2012.10	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
3.20	69,425	2012.20	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
3.30	72,003	2012.30	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
3.40	74,581	2012.40	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
3.50	77,159	2012.50	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
3.60	79,737	2012.60	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
3.70	82,315	2012.70	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
3.80	84,893	2012.80	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
3.90	87,471	2012.90	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.00	90,049	2013.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.10	92,855	2013.10	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.20	95,661	2013.20	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.30	98,466	2013.30	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.40	101,272	2013.40	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.50	104,078	2013.50	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.60	106,884	2013.60	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.70	109,690	2013.70	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.80	112,496	2013.80	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
4.90	115,301	2013.90	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.00	118,107	2014.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.10	121,280	2014.10	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.20	124,453	2014.20	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.30	127,626	2014.30	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.40	130,798	2014.40	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.50	133,971	2014.50	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.60	137,144	2014.60	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.70	140,317	2014.70	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.80	143,489	2014.80	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
5.90	146,662	2014.90	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
6.00	149,835	2015.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
6.10	154,005	2015.10	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
6.20	158,175	2015.20	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
6.30	162,346	2015.30	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
6.40	166,516	2015.40	0.04 ic	0.04 ic	---	---	0.00	0.00	---	---	---	---	0.036
6.50	170,686	2015.50	0.13 ic	0.13 ic	---	---	0.00	0.00	---	---	---	---	0.135
6.60	174,856	2015.60	0.29 ic	0.29 ic	---	---	0.00	0.00	---	---	---	---	0.286
6.70	179,026	2015.70	0.48 ic	0.47 ic	---	---	0.00	0.00	---	---	---	---	0.472
6.80	183,196	2015.80	0.69 ic	0.68 ic	---	---	0.00	0.00	---	---	---	---	0.680
6.90	187,366	2015.90	0.89 ic	0.87 ic	---	---	0.00	0.00	---	---	---	---	0.872
7.00	191,537	2016.00	1.02 ic	1.02 ic	---	---	0.00	0.00	---	---	---	---	1.018
7.10	196,636	2016.10	1.20 ic	1.15 ic	---	---	0.00	0.00	---	---	---	---	1.148
7.20	201,736	2016.20	1.27 ic	1.26 ic	---	---	0.00	0.00	---	---	---	---	1.265
7.30	206,836	2016.30	1.41 ic	1.37 ic	---	---	0.00	0.00	---	---	---	---	1.372
7.40	211,935	2016.40	1.48 ic	1.47 ic	---	---	0.00	0.00	---	---	---	---	1.471
7.50	217,035	2016.50	1.56 ic	1.56 ic	---	---	0.00	0.00	---	---	---	---	1.564
7.60	222,135	2016.60	3.03 ic	1.65 ic	---	---	1.32	0.00	---	---	---	---	2.973
7.70	227,235	2016.70	5.47 ic	1.74 ic	---	---	3.74	0.00	---	---	---	---	5.475
7.80	232,334	2016.80	8.76 ic	1.81 ic	---	---	6.87	0.00	---	---	---	---	8.686
7.90	237,434	2016.90	12.47 ic	1.89 ic	---	---	10.58	0.00	---	---	---	---	12.47
8.00	242,534	2017.00	16.76 ic	1.96 ic	---	---	14.80	0.00	---	---	---	---	16.76
8.10	247,925	2017.10	21.49 ic	2.04 ic	---	---	19.45	0.00	---	---	---	---	21.49
8.20	253,316	2017.20	26.62 ic	2.10 ic	---	---	24.51	0.00	---	---	---	---	26.62
8.30	258,707	2017.30	32.12 ic	2.17 ic	---	---	29.95	0.00	---	---	---	---	32.12
8.40	264,098	2017.40	37.59 ic	1.86 ic	---	---	35.73	0.00	---	---	---	---	37.59
8.50	269,490	2017.50	39.59 ic	1.35 ic	---	---	38.24 s	0.00	---	---	---	---	39.59
8.60	274,881	2017.60	40.35 ic	1.17 ic	---	---	39.17 s	1.64	---	---	---	---	41.98
8.70	280,272	2017.70	40.92 ic	1.03 ic	---	---	39.89 s	4.65	---	---	---	---	45.57
8.80	285,663	2017.80	41.41 ic	0.93 ic	---	---	40.48 s	8.54	---	---	---	---	49.94
8.90	291,054	2017.90	41.83 ic	0.84 ic	---	---	40.99 s	13.14	---	---	---	---	54.98
9.00	296,446	2018.00	42.22 ic	0.77 ic	---	---	41.45 s	18.38	---	---	---	---	60.60
9.10	302,135	2018.10	42.58 ic	0.70 ic	---	---	41.86 s	24.17	---	---	---	---	66.73
9.20	307,825	2018.20	42.91 ic	0.65 ic	---	---	42.26 s	30.45	---	---	---	---	73.36
9.30	313,514	2018.30	43.23 ic	0.61 ic	---	---	42.63 s	37.20	---	---	---	---	80.43
9.40	319,203	2018.40	43.54 ic	0.56 ic	---	---	42.97 s	44.39	---	---	---	---	87.92
9.50	324,893	2018.50	43.84 ic	0.53 ic	---	---	43.30 s	51.99	---	---	---	---	95.82
9.60	330,582	2018.60	44.13 ic	0.50 ic	---	---	43.62 s	59.98	---	---	---	---	104.10
9.70	336,272	2018.70	44.41 ic	0.47 ic	---	---	43.93 s	68.34	---	---	---	---	112.74
9.80	341,961	2018.80	44.69 ic	0.44 ic	---	---	44.24 s	77.06	---	---	---	---	121.74
9.90	347,651	2018.90	44.96 ic	0.42 ic	---	---	44.53 s	86.12	---	---	---	---	131.07
10.00	353,340	2019.00	45.23 ic	0.40 ic	---	---	44.81 s	95.53	---	---	---	---	140.74
10.10	359,334	2019.10	45.50 ic	0.38 ic	---	---	45.11 s	105.24	---	---	---	---	150.73
10.20	365,328	2019.20	45.76 ic	0.36 ic	---	---	45.38 s	115.25	---	---	---	---	161.00

Continues on next page...

Pond C-Wet pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
10.30	371,322	2019.30	46.02 ic	0.35 ic	---	---	45.65 s	125.57	---	---	---	---	171.57
10.40	377,316	2019.40	46.28 ic	0.33 ic	---	---	45.91 s	136.18	---	---	---	---	182.42
10.50	383,309	2019.50	46.53 ic	0.32 ic	---	---	46.16 s	147.06	---	---	---	---	193.54
10.60	389,303	2019.60	46.78 ic	0.31 ic	---	---	46.43 s	158.23	---	---	---	---	204.97
10.70	395,297	2019.70	47.03 ic	0.29 ic	---	---	46.70 s	169.66	---	---	---	---	216.66
10.80	401,291	2019.80	47.28 ic	0.28 ic	---	---	46.94 s	181.36	---	---	---	---	228.58
10.90	407,285	2019.90	47.53 ic	0.27 ic	---	---	47.20 s	193.31	---	---	---	---	240.78
11.00	413,279	2020.00	47.77 ic	0.26 ic	---	---	47.44 s	205.55	---	---	---	---	253.25

...End

Hydrograph Report

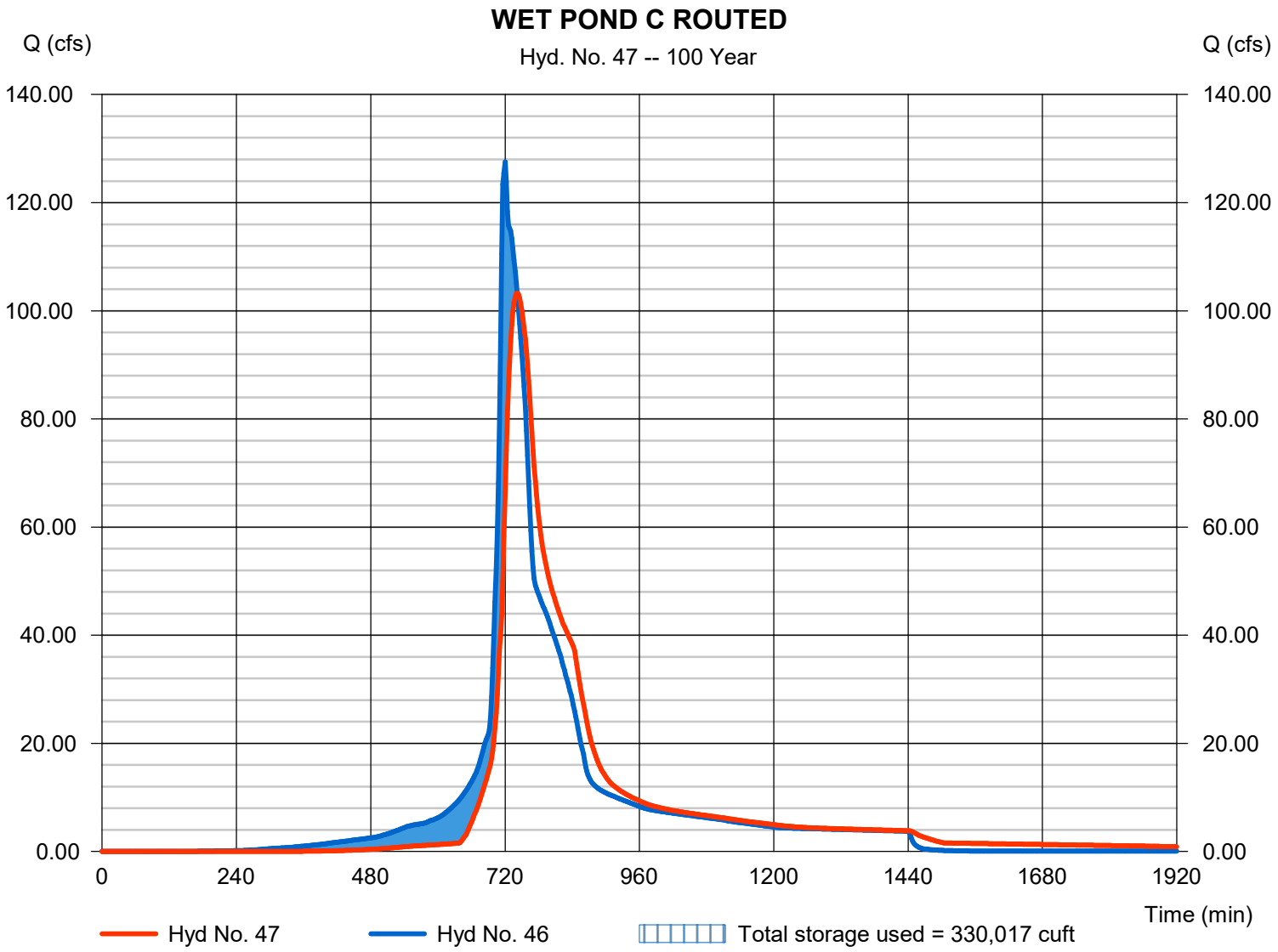
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 1 / 2022

Hyd. No. 47

WET POND C ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 103.27 cfs
Storm frequency	= 100 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 930,375 cuft
Inflow hyd. No.	= 46 - TOTAL TO WET POND C	Max. Elevation	= 2018.59 ft
Reservoir name	= Pond C-Wet pond	Max. Storage	= 330,017 cuft

Storage Indication method used. Wet pond routing start elevation = 2015.30 ft.

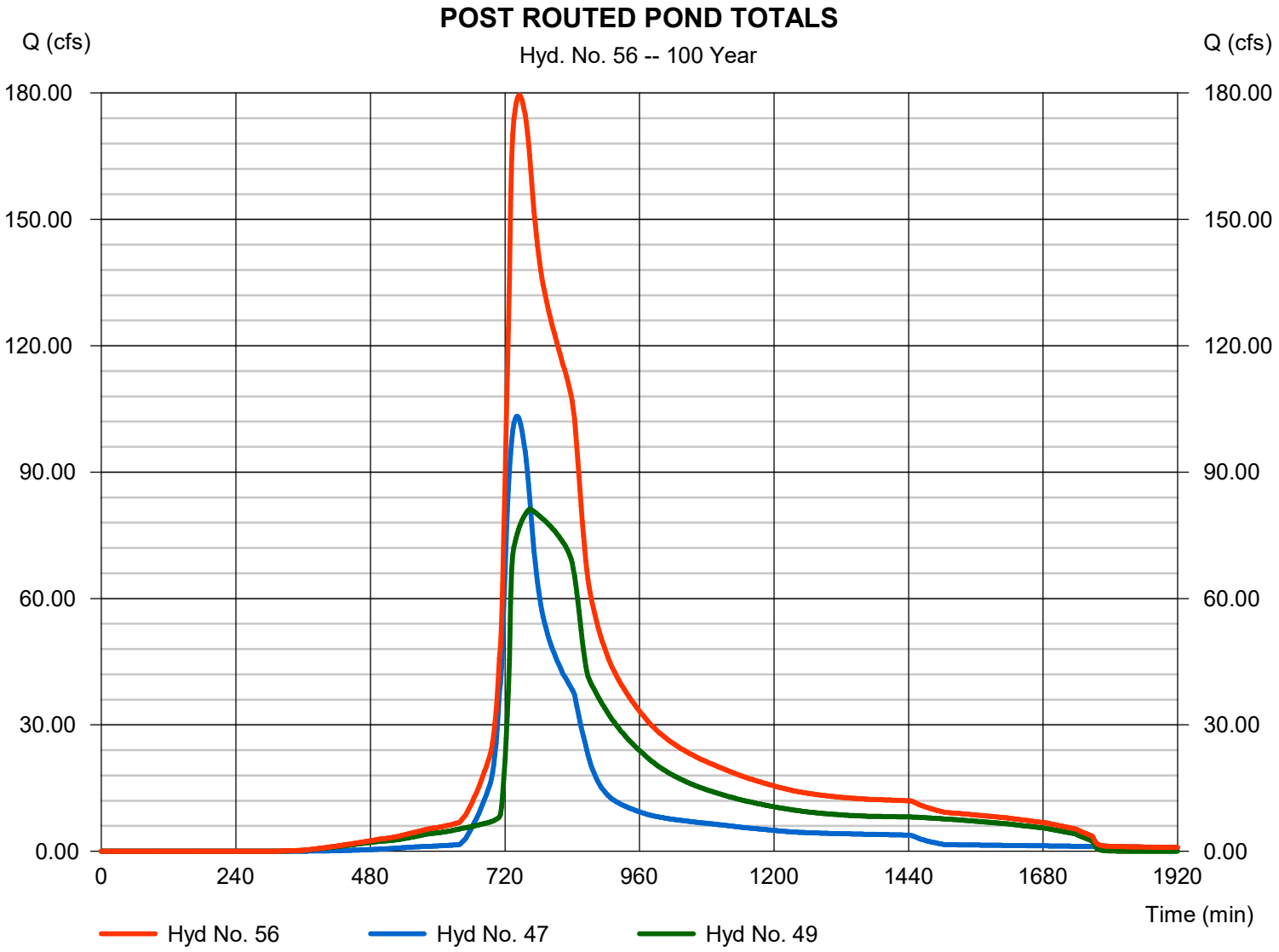


Hydrograph Report

Hyd. No. 56

POST ROUTED POND TOTALS

Hydrograph type	= Combine	Peak discharge	= 179.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 2,273,620 cuft
Inflow hyds.	= 47, 49	Contrib. drain. area	= 0.000 ac



Typical Lot Impervious Area Estimates

South/Glade side dwelling unit assumed impervious area (sf):	1,382
North/Village side dwelling unit assumed impervious area (sf):	3,454

Hydrologic Soil Group B Dwelling Unit Impervious Estimate						
	South/Glade		North/Village		Total Impervious Area	
Drainage Area	No. units	Imperv. area (sf)	No. units	Imperv. area (sf)	(sf)	(ac.)
0	0	0	2	6,908	6,908	0.159
1	0	0	3	10,362	10,362	0.238
2	0	0	27.5	94,985	94,985	2.181
3	0	0	2.5	8,635	8,635	0.198
	0	0		0	0	0.000

Hydrologic Soil Group C Dwelling Unit Impervious Estimate						
	South/Glade		North/Village		Total Impervious Area	
Drainage Area	No. units	Imperv. area (sf)	No. units	Imperv. area (sf)	(sf)	(ac.)
0	0	0	1	3,454	3,454	0.079
1	0	0	0	0	0	0.000
2	0	0	0	0	0	0.000
3	0	0	0	0	0	0.000
	0	0	0	0	0	0.000

Drainage Area Runoff and Time of Concentration

Drainage Area: **0**

POSTDEVELOPMENT

Composite Curve Number (CN)						**Notes:**
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	1.67	101.79	
CN_2	C	Open space	74	0.30	21.86	
CN_3	B	Imperv. (measured)	98	0.07	6.61	
CN_4	C	Imperv. (measured)	98	0.06	5.72	
CN_5	B	Imperv. (est. lots)	98	0.16	15.54	
CN_6	C	Imperv. (est. lots)	98	0.08	7.77	
CN_7	B	Imperv. (water surf.)	98		0.00	
CN_8	B	Woods	55		0.00	
CN_9	C	Woods	70		0.00	
CN_{10}					0.00	
				Total	**2.33**	**159.29**
				Composite CN =		**68**

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Grass	100	0.13	0.156	4.2
2	Shallow Conc.	Unpaved	43		0.038	0.2
3	Channel	Natural Channel	257	0.03	0.011	1.8
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**6.2**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	68	68	68
Storage (in.) S=1000/CN-10	4.71	4.71	4.71
Initial abstraction (in.), I_a=0.2S	0.94	0.94	0.94
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.29	1.24	2.96
Runoff volume (ac-ft), RV = Q/12*A	0.06	0.24	0.57
Flow rate (cfs), q_{peak} from hydrograph			11.66

Hydrograph Number: 64

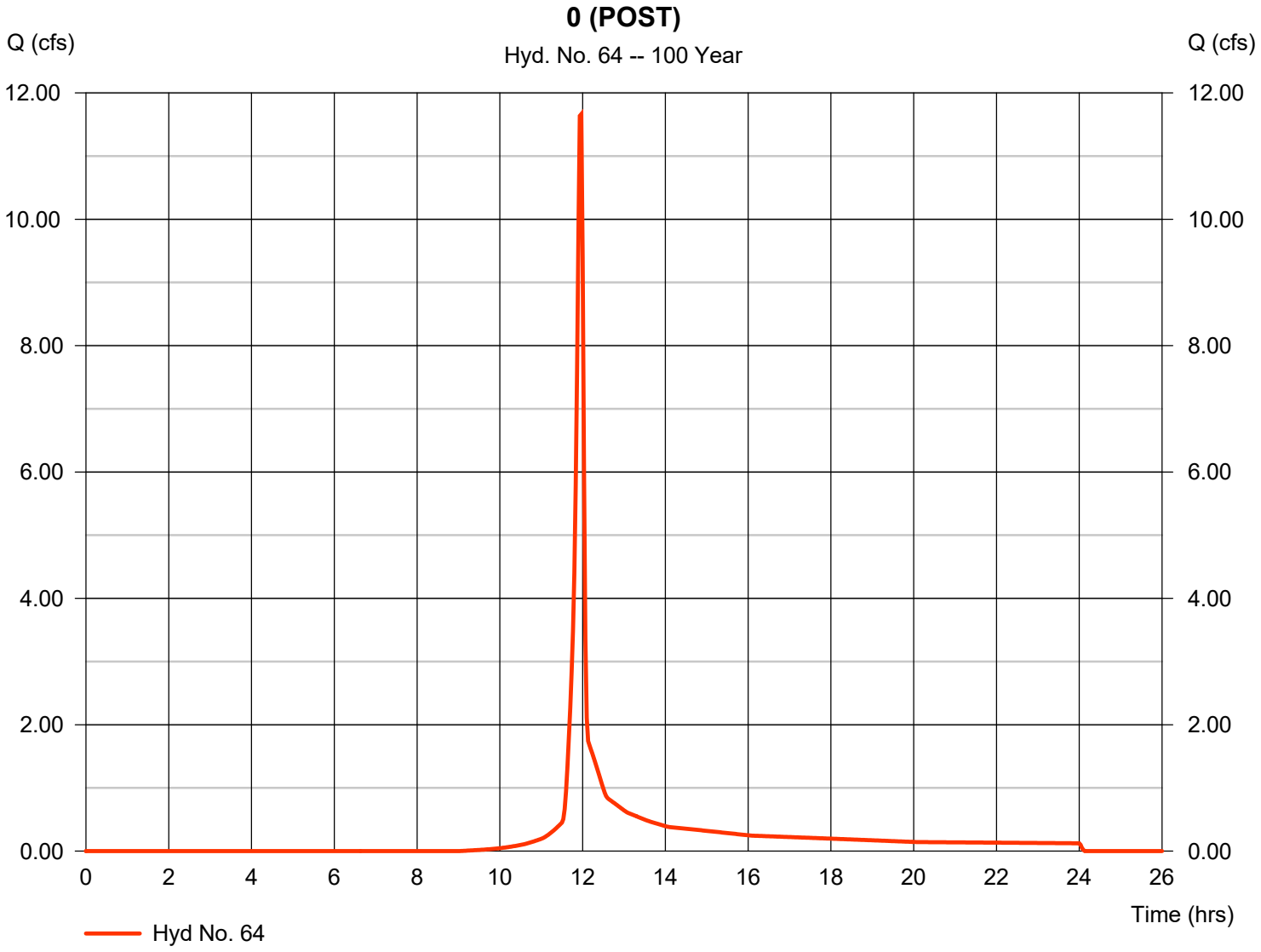
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 64

0 (POST)

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.66 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	23,495 cuft
Drainage area	=	2.330 ac	Curve number	=	68
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.20 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Drainage Area Runoff and Time of Concentration

Drainage Area: 1

POSTDEVELOPMENT

Composite Curve Number (CN)						Notes:
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	1.64	99.95	
CN_2	C	Open space	74	0.19	14.22	
CN_3	B	Imperv. (measured)	98	0.07	6.53	
CN_4	C	Imperv. (measured)	98		0.00	
CN_5	B	Imperv. (est. lots)	98	0.24	23.31	
CN_6	C	Imperv. (est. lots)	98		0.00	
CN_7	B	Imperv. (water surf.)	98		0.00	
CN_8	B	Woods	55	0.69	37.85	
CN_9	C	Woods	70	0.85	59.64	
CN_{10}					0.00	
			Total	**3.68**	**241.50**	
				Composite CN =	**66**	

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Woods	100	0.4	0.073	13.9
2	Shallow Conc.	Unpaved	418		0.165	1.1
3	Channel	Natural Channel	47	0.03	0.018	0.3
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**15.2**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	66	66	66
Storage (in.) S=1000/CN-10	5.15	5.15	5.15
Initial abstraction (in.), I_a=0.2S	1.03	1.03	1.03
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.24	1.12	2.77
Runoff volume (ac-ft), RV = Q/12*A	0.07	0.34	0.85
Flow rate (cfs), q_{peak} from hydrograph			12.74

Hydrograph Number: 65

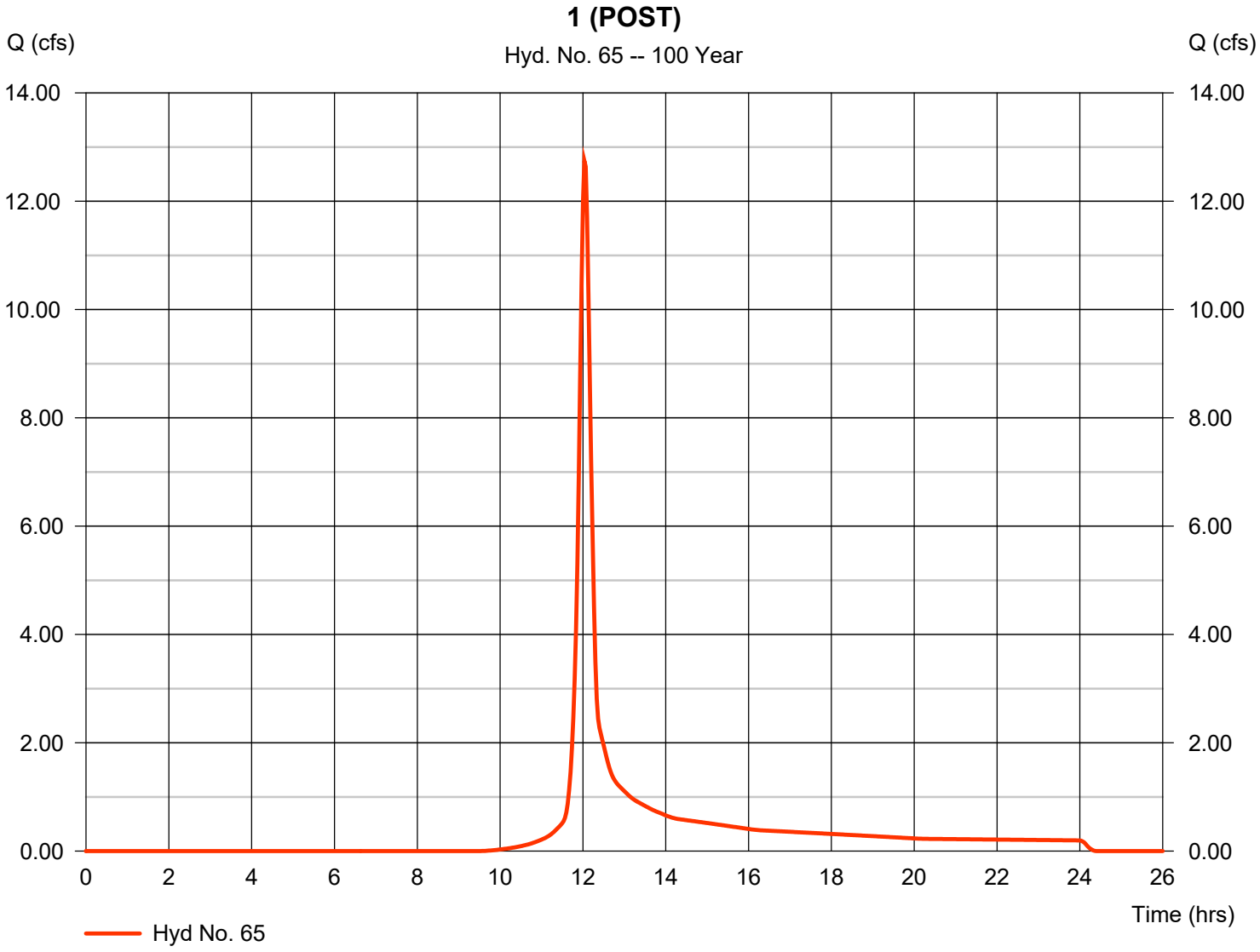
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 65

1 (POST)

Hydrograph type	= SCS Runoff	Peak discharge	= 12.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 36,090 cuft
Drainage area	= 3.680 ac	Curve number	= 66
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.20 min
Total precip.	= 6.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Drainage Area Runoff and Time of Concentration

Drainage Area: **2**

POSTDEVELOPMENT

Composite Curve Number (CN)						**Notes:**
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	7.45	454.41	
CN_2	C	Open space	74		0.00	
CN_3	B	Imperv. (measured)	98	1.88	184.01	
CN_4	C	Imperv. (measured)	98		0.00	
CN_5	B	Imperv. (est. lots)	98	2.18	213.69	
CN_6	C	Imperv. (est. lots)	98		0.00	
CN_7	B	Imperv. (water surf.)	98		0.00	
CN_8	B	Woods	55	0.90	49.66	
CN_9	C	Woods	70	0.49	34.25	
CN_{10}					0.00	
			Total	**12.90**	**936.02**	
				Composite CN =	**73**	

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Grass	100	0.13	0.212	3.7
2	Shallow Conc.	Unpaved	175		0.014	1.5
3	Channel	Roadside Channel	1018	0.027	0.051	3.0
4	Channel	Natural Channel	112	0.014	0.03	0.2
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**8.5**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	73	73	73
Storage (in.) S=1000/CN-10	3.70	3.70	3.70
Initial abstraction (in.), I_a=0.2S	0.74	0.74	0.74
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.44	1.57	3.46
Runoff volume (ac-ft), RV = Q/12*A	0.48	1.69	3.72
Flow rate (cfs), q_{peak} from hydrograph			70.72

Hydrograph Number: 66

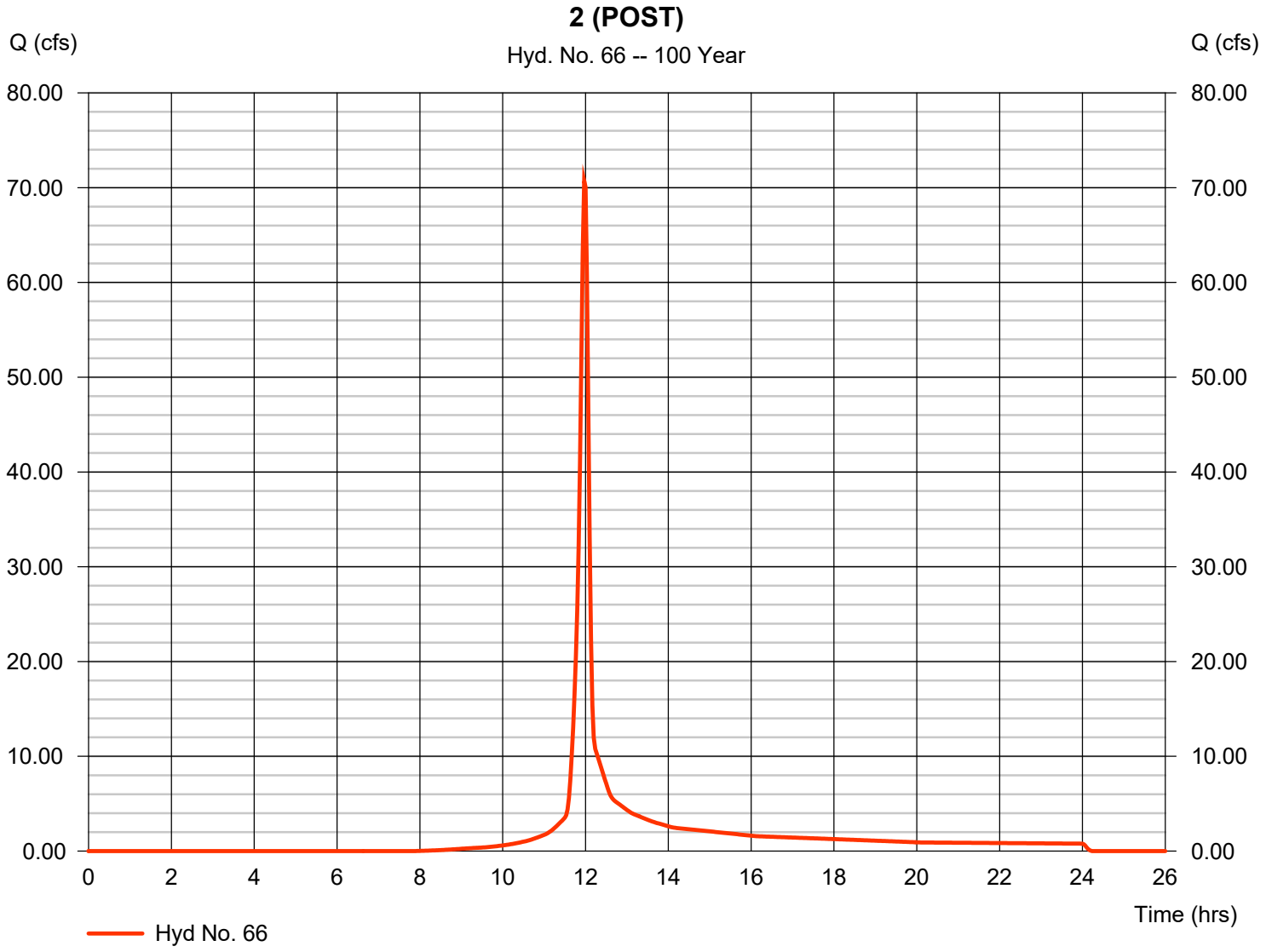
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 66

2 (POST)

Hydrograph type	=	SCS Runoff	Peak discharge	=	70.72 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	161,887 cuft
Drainage area	=	12.900 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	8.50 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Drainage Area Runoff and Time of Concentration

Drainage Area: **3**

POSTDEVELOPMENT

Composite Curve Number (CN)						**Notes:**
	Hydrologic Soil Group	Land Cover	CN	Area, A (ac.)	CN*A	
CN_1	B	Open space	61	0.83	50.70	
CN_2	C	Open space	74	0.39	28.93	
CN_3	B	Imperv. (measured)	98	0.05	4.73	
CN_4	C	Imperv. (measured)	98		0.00	
CN_5	B	Imperv. (est. lots)	98	0.20	19.43	
CN_6	C	Imperv. (est. lots)	98		0.00	
CN_7	B	Imperv. (water surf.)	98		0.00	
CN_8	B	Woods	55	0.74	40.97	
CN_9	C	Woods	70	3.55	248.36	
CN_{10}					0.00	
			Total	**5.76**	**393.11**	
				Composite CN =	**68**	

Time of Concentration, T_c						
2 yr. Precip. (in.) =			2.73			
Flow Segment	Flow Regime	Land Cover	Length (ft)	Roughness Coeff., n	Slope (ft/ft)	Travel Time, T_t (min.)
1	Sheet Flow	Woods	100	0.4	0.051	16.0
2	Shallow Conc.	Unpaved	943		0.107	3.0
3	Channel	Natural Channel	218	0.03	0.01	1.6
4						
5						
6						
7						
8						
9						
10						
					Total Time of Concentration, T_c (min.) =	**20.6**

Runoff			
	1 Yr.	10 Yr.	100 Yr.
Precipitation (in.), P	2.26	4.06	6.44
Composite CN	68	68	68
Storage (in.) S=1000/CN-10	4.71	4.71	4.71
Initial abstraction (in.), I_a=0.2S	0.94	0.94	0.94
Runoff depth (in.), $Q=(P-0.2S)^2/[(P-I_a)+S]$	0.29	1.24	2.96
Runoff volume (ac-ft), RV = Q/12*A	0.14	0.60	1.42
Flow rate (cfs), q_{peak} from hydrograph			18.05

Hydrograph Number: 67

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 11 / 4 / 2022

Hyd. No. 67

3 (POST)

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.05 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	63,060 cuft
Drainage area	=	5.760 ac	Curve number	=	68
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	20.60 min
Total precip.	=	6.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484