

**PRELIMINARY STORMWATER ASSESSMENT**

**FOR**

**CAGLE MILL RESIDENTIAL  
AND COMMERCIAL  
DEVELOPMENT**

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# TABLE OF CONTENTS

<b>PROJECT DESCRIPTION .....</b>	<b>2</b>
<b>METHODOLOGY .....</b>	<b>2</b>
<b>HYDROLOGIC ANALYSIS.....</b>	<b>3</b>
Predevelopment Conditions.....	3
Post-Development Conditions .....	4
Study Point(s) .....	5
Additional Information .....	5
<b>STORMWATER MANAGEMENT DESIGN .....</b>	<b>5</b>
Water Quality / Runoff Reduction.....	6
Channel Protection, Overbank Flood Protection, and Extreme Flood Protection .....	6
<b>RUNOFF SUMMARY TABLES .....</b>	<b>6</b>
<b>DOWNSTREAM ANALYSIS.....</b>	<b>7</b>
<b>CONCLUSION .....</b>	<b>7</b>

## APPENDICES

- Appendix A: Location Map, FEMA Firmette, Flow Summaries, and Rainfall Reports
- Appendix B: "TBD"
- Appendix C: Drainage Maps, StreamStats report, Alta Survey, and Soils Map
- Appendix D: Time of Concentration Calculations
- Appendix E: Hydraflow Hydrograph Model Output
- Appendix F: Georgia TSS Spreadsheet

## **PROJECT DESCRIPTION**

This Preliminary Hydrology Study has been prepared for Cagle Mill, residential and commercial development in Hall County, Georgia. The property has been surveyed at 72.67 acres and is owned by CBD Investments, LLC. Cornelia Highway (GA State Road #365) abuts the site from the northwest side and Cagle Mill Road from the southeast side. The North Oconee River crosses the site.

Based on FIRM Panel Maps 13139C0225F, dated September 29, 2006, The North Oconee River in our site is within a Special Flood Hazard Area Flood Zone "A" (Appendix A).

This project intends to develop the site into two different parcels, commercial and residential areas. In the residential area, there will be 235 units of single-family, 50 units of townhomes, a clubhouse, and an amenities area. The commercial space will be adjacent to Cornelia Highway and mostly contain industrial-use buildings with a visitor's parking lot.

The development is anticipated to disturb about 75 percent of the site area. More detailed explanations will be provided in the final report. The site will drain to the North Oconee River on the west side of the property, which is also part of the floodplain.

The new construction will include the installation of a new BMP as follows:

- Regenerative Stormwater Conveyance: One (1)
- Stormwater wetlands: Two (2)
- Stormwater Wet Pond: One (1)
- Enhance Swale: One (1)
- Bioretention Basins: Two (2)

The following report describes the methodology and the associated analysis results to meet the proposed developments above performance criteria.

## **METHODOLOGY**

Hydrograph modeling and pond routing are performed using Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2018. Soil Conservation Service (SCS) hydrograph method generates Type II 24-hour hydrographs for all pre-and post-developed basins during storm events. SCS runoff curve numbers are taken from the *Georgia Stormwater Management Manual (GSMM)*. Curve numbers are selected based on existing and revised proposed ground covers located on soil group B. Where ground cover is not uniform over a basin area, a weighted curve number is calculated based on the area of each type of ground cover. Time of concentration calculations for each basin (pre- and post- developed) are performed per the procedure found in USDA's Technical Release 55 *Urban Hydrology for Small Watersheds* (TR-55) and Watershed Lag Method.

## HYDROLOGIC ANALYSIS

### Predevelopment Conditions

The existing area of the site is primarily wooded. Existing conditions basin maps can be found in Appendix C. Runoff from 3 basins drain to Study point 1 (SP-1), as follows:

- Existing Basin "A" is 53.31 acres located northwest of the site. The maximum allowable curve number for this basin is 55. This basin has a Time Concentration of 23 minutes.

PRE-DEV BASIN A					
Basin Description		Area Description	Area, A (acres)	Curve Number (CN)	CN*A
A		Woods	53.31	55	2932.1
		Total Area =	53.31	Weighted CN =	55

- Existing Basin "B" is 15.75 acres located southwest of the site. The maximum allowable curve number for this basin is 55. This basin has a Time of Concentration of 21.1 minutes.

PRE-DEV BASIN B					
Basin Description		Area Description	Area, A (acres)	Curve Number (CN)	CN*A
B		Woods	15.75	55	866.3
		Total Area =	15.75	Weighted CN =	55

- Existing Basin "B2" is 70 acres located southeast of the site. The maximum allowable curve number for this basin is 55. This basin has a time of Concentration of 10 minutes.

PRE-DEV BASIN B-2					
Basin Description		Area Description	Area, A (acres)	Curve Number (CN)	CN*A
B		Woods	70.0	55	3850
		Total Area =	70.0	Weighted CN =	55

- Existing Basin "C" is 6.07 acres located southeast of the site. The maximum allowable curve number for this basin is 55. This basin has a Time of Concentration of 22.9 minutes.

PRE-DEV BASIN C					
Basin Description		Area Description	Area, A (acres)	Curve Number (CN)	CN*A
C		Woods	6.07	55	333.9
		Total Area =	6.07	Weighted CN =	55

- Upstream Basin area is 3176.07 acres. To determine the area of the upstream basin, we subtract the entire area to SP-1 based on StreamStats (See appendix C) to the total area of pre-developed basins A, B, and C. We also use StreamStats to determine the impervious, grass area, and wooded percentages. Based on the StreamStats report, the total area drain to SP-1 is 3251.2 acres. The time of concentration of Upstream Basin is 436.7 min. The maximum allowable curve number for Upstream Basin is 67. Below is the breakdown of each area.

UPSTREAM BASIN				
Basin Description	Area Description	Area, A (acres)	Curve Number (CN)	CN*A
UPSTREAM	Grass (Fair Condition)	603.50	69	41641.5
	Woods	1870.67	55	102886.9
	Impervious	701.90	98	68786.2
	<b>Total Area =</b>	<b>3176.07</b>	<b>Weighted CN =</b>	<b>67</b>

### Post-Development Conditions

The revised development encompasses a new commercial and residential area. Three basins are draining to SP-1 in the post-developed condition, as follows:

- Post-Basin “A” consists of 44.56 acres. Since most of the area is new residential development, per GSMM table 3.1.5-1, we use a Curve Number of 85 (1/8 acres or less [townhouse]). This basin has a Time of Concentration of 10.3 minutes.

POST-DEV BASIN A				
Basin Description	Area Description	Area, A (acres)	Curve Number (CN)	CN*A
A	1/8 AC or less (Townhouses)	44.56	85	3787.6
	<b>Total Area =</b>	<b>44.56</b>	<b>Weighted CN =</b>	<b>85</b>

- Post Basin “A” (Bypass) consists of 25.8 acres. The proposed area in this basin is mostly commercial, some residential, and the bridge. We assumed additional impervious on this area is 6.5 acres which makes the curve number 70. The time of concentration of this basin is 18.4 minutes

POST DEV BASIN A (BYPASS)				
Basin Description	Area Description	Area, A (acres)	Curve Number (CN)	CN*A
A	Woods	19.30	61	1177.3
	Impervious	6.50	98	637.0
	<b>Total Area =</b>	<b>25.80</b>	<b>Weighted CN =</b>	<b>70</b>

- Post-Basin “B” consists of 67.44 acres. The majority of the area is phase 2 of the new development approx. 38 acres, the rest will be recreate space or will remain wooded. Hence, we use a Curve Number of 80. This basin has a Time of Concentration of 5 minutes.

POST-DEV BASIN B				
Basin Description	Area Description	Area, A (acres)	Curve Number (CN)	CN*A
B	1/8 AC or less (Townhouses)	1.95	85	165.8
	<b>Total Area =</b>	<b>1.95</b>	<b>Weighted CN =</b>	<b>85</b>

**Water Quality / Runoff Reduction**

According to the Georgia Stormwater Management Manual, Section 2.2.2:

“Treat the runoff from 85% of the storms that occur in an average year and reduce average annual post-development total suspended solids loadings by 80%. Average rainfall events across that state of Georgia equates to treating storm events of 1.2 inches or less, as well as the first 1.2 inches of runoff for all more significant storm events.

Communities that adopt runoff reduction may waive the water quality treatment volume from this standard if 100% of the 1.0-inch runoff reduction volume is achieved.”

As can be seen by referring to the TSS spreadsheet summary in Appendix F, this site does not achieve 100% Runoff Reduction (RRv), but 80% of the total TSS is removed.

**Channel Protection, Overbank Flood Protection, and Extreme Flood Protection**

The Channel Protection criteria are typically achieved by providing 24 hours of extended detention for runoff generated by the 1-year, 24-hour rainfall event. The overbank flood protection criteria generally are achieved by attenuating the post-development flows not to exceed the predevelopment flows for the 1, 2, 5, 10, and 25-year storm events. The extreme flood protection criteria are typically achieved by safely controlling and conveying the 100-year storm event.

It is recommended that these criteria not be required for this project due to the nature of the development and the site’s proximity to the 100-year floodplain. While this site is anticipated to contribute pollutants via stormwater runoff to be treated by the water quality measures listed above, the expected increase in peak runoff flows will not be significant, and flooding will not be exacerbated. See below for a summary of peak runoff rates for all storm events and Appendix E for Hydraflow Hydrograph model results.

**RUNOFF SUMMARY TABLES**

The tables below summarize runoff contributions to the Study Point 1 (SP-1)

Return Frequency	PRE DEV BASIN A (Hyd 8) (CFS)	POST DEV BASIN A (Hyd 20) (CFS)	NET INCREASE (CFS)
1	292.32	295.02	2.7
2	394.61	397.57	2.96
5	586.83	590.12	3.29
10	765.47	768.95	3.48
25	1037.95	1041.59	3.64
50	1263.74	1267.44	3.7
100	1504.81	1508.51	3.7

- Post-Basin “C” consists of 2.82 acres. Since most of the area is new residential development, per GSMM table 3.1.5-1, we use a Curve Number of 85 (1/8 acres or less [townhouse]). This basin has a Time of Concentration of 9.3 minutes.

POST-DEV BASIN C					
Basin Description		Area Description	Area, A (acres)	Curve Number (CN)	CN*A
C		1/8 AC or less (Townhouses)	2.82	85	239.7
		<b>Total Area =</b>	<b>2.82</b>	<b>Weighted CN =</b>	<b>85</b>

- Upstream Basin remains the same under Post-Developed conditions.

**Study Point(s)**

**Study Point 1 (SP-1)**

SP-1 is located on North Oconee creek on the west side of the site. As mentioned, Basin A, B, C, and Upstream will be combined and drained to SP-1.

Delineation of all pre-developed and post-develop basins was based on StreamStats and Hall County GIS topography of the surrounding. All off-site area surfaces were determined based on aerial imagery from Hall County GIS. Below is a summary of areas contributing to each basin to compare predevelopment and post-development maps.

SP	Description	Pre-Developed Drainage Areas (acres)			Post-Developed Drainage Areas (acres)			
		Off-	On-	Total	Off-	On-	By-	Total
SP-1	Basin A		53.31	53.31		44.56	25.80	70.36
	Basin B		15.75	15.75		1.95		1.95
	Basin C		6.07	6.07		2.82		2.82
	Upstream Basin	3176.07		3176.07			3176.07	3176.07
Total Drainage Area analyzed in Study Point 1:			Pre-	3251.20			Post-	3251.20

**Study Point 2 (SP-2)**

SP-2 is located at the confluence of a tributary of North Oconee feeds into the creek. Basin B-2 will drain to SP-2.

**Additional Information**

For further information on the hydrologic analysis of this project, see the Pre/Post Development Drainage Maps and StreamStats report in Appendix C. For Time of Concentration Calculations, see Appendix D. See Appendix A for summary peak runoff rates for all storm events and Appendix E for Hydraflow Hydrograph model results.

**STORMWATER MANAGEMENT DESIGN**

This section describes what stormwater management measures are proposed to meet the performance criteria for the post-development condition. A BMP inspection schedule and checklist will be provided separately before approval.

## **DOWNSTREAM ANALYSIS**

As described in the Georgia Stormwater Management Manual, the point at which the site accounts for 10% of the total drainage basin (10% point) typically reveals the most severe issues regarding the timing of hydrographs.

Since the site area (72.67 ac) is less than 10% of the total drainage area (3,251.52 ac), a downstream analysis will be located at SP-1.

## **CONCLUSION**

This report demonstrates that the stormwater management practices designed herein will satisfy stormwater management and storm drainage requirements for the project based upon the following conclusions:

- 1) Water Quality is provided by using BMPs, reducing the Total Suspended Solids.
- 2) Peak flows are anticipated to increase due to this project, but not significantly. In addition, the site is adjacent to the Creek floodplain area. Due to these conditions, it is recommended that the Channel Protection, Overbank Flood Protection, and Extreme Flood Protection criteria be waived for this project.
- 3) No adverse downstream impacts are anticipated due to this development per hydraulic analysis.

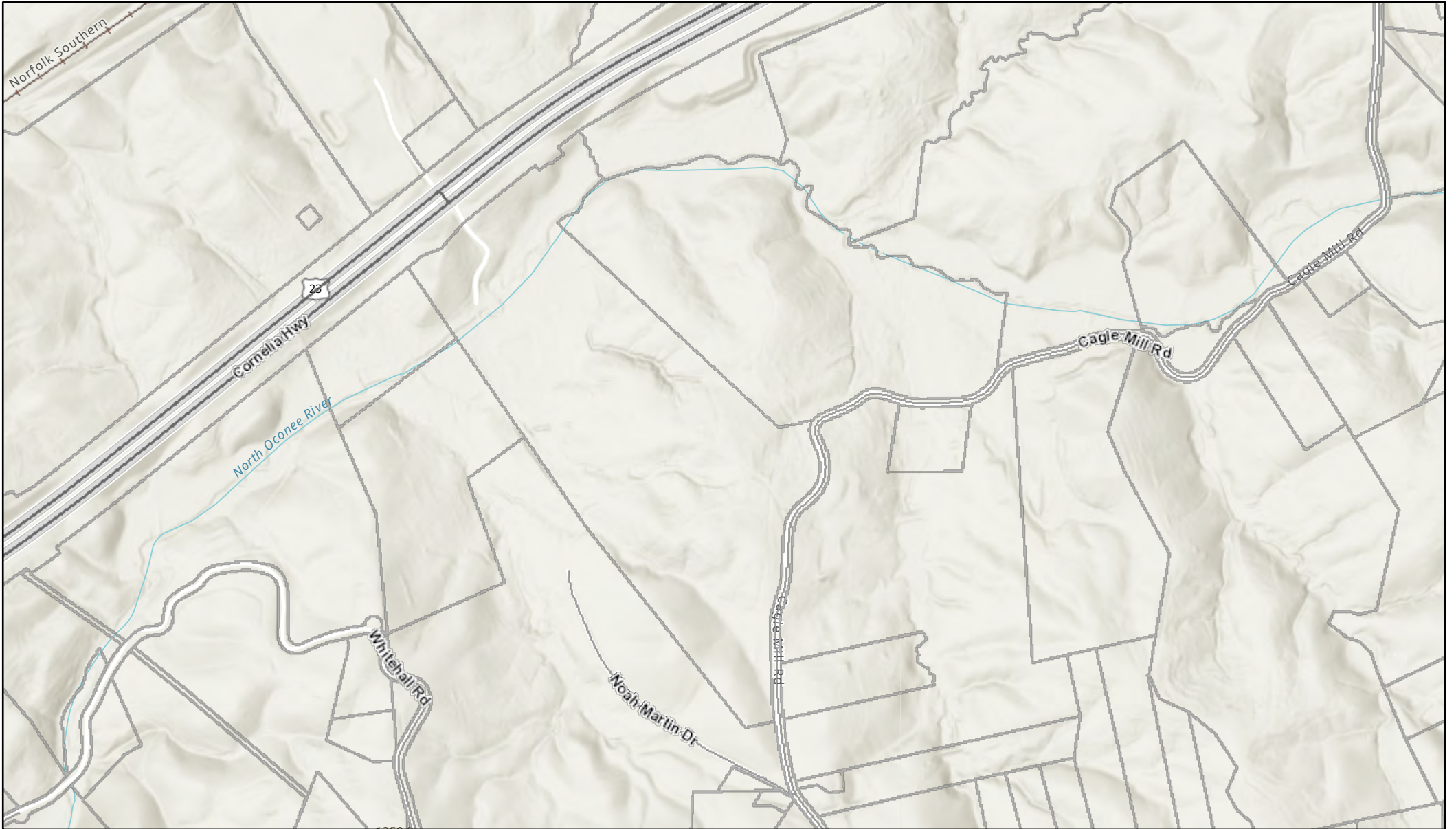
The stormwater management facilities will continue to meet the regulatory requirements discussed herein only if the facilities are adequately maintained regularly. Any sediment or trash that accumulates in the facilities should be removed immediately.

*This report and associated construction plans only pertain to the topics stated herein. The designer has not evaluated with regards to any other topic including, but not limited to: structural or geotechnical evaluations, environmental evaluations, etc.*



## **Appendix A**

# Location Map



8/4/2022, 11:33:36 AM

- |                 |                |             |           |                    |
|-----------------|----------------|-------------|-----------|--------------------|
| Parcel Boundary | BUFORD         | GAINESVILLE | OAKWOOD   | Arterial-Collector |
| Counties        | CLERMONT       | GILLSVILLE  | RESTHAVEN | Interstate         |
| Citylimits      | FLOWERY BRANCH | LULA        | Roads     | Railway            |
| BRASELTON       |                |             | Local     |                    |

1:11,015

0 412.5 825 1,650 ft

0 125 250 500 m

Esri Community Maps Contributors, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, Esri, NASA, NGA, USGS, FEMA, GHCGIS

Web AppBuilder for ArcGIS

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.

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 in this jurisdiction.

The projection used in the preparation of this map was Georgia State Plane West Zone (FIPS zone 1002). The horizontal datum was NAD 83, GRS 80 spheroid. Differences in datum, spheroid, projection or State Plane 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 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 about the bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from Digital Orthophotos produced by Hall County, Georgia and the Center for GIS, Georgia Institute of Technology at a scale of 1:12,000 and dated 2005 or later.

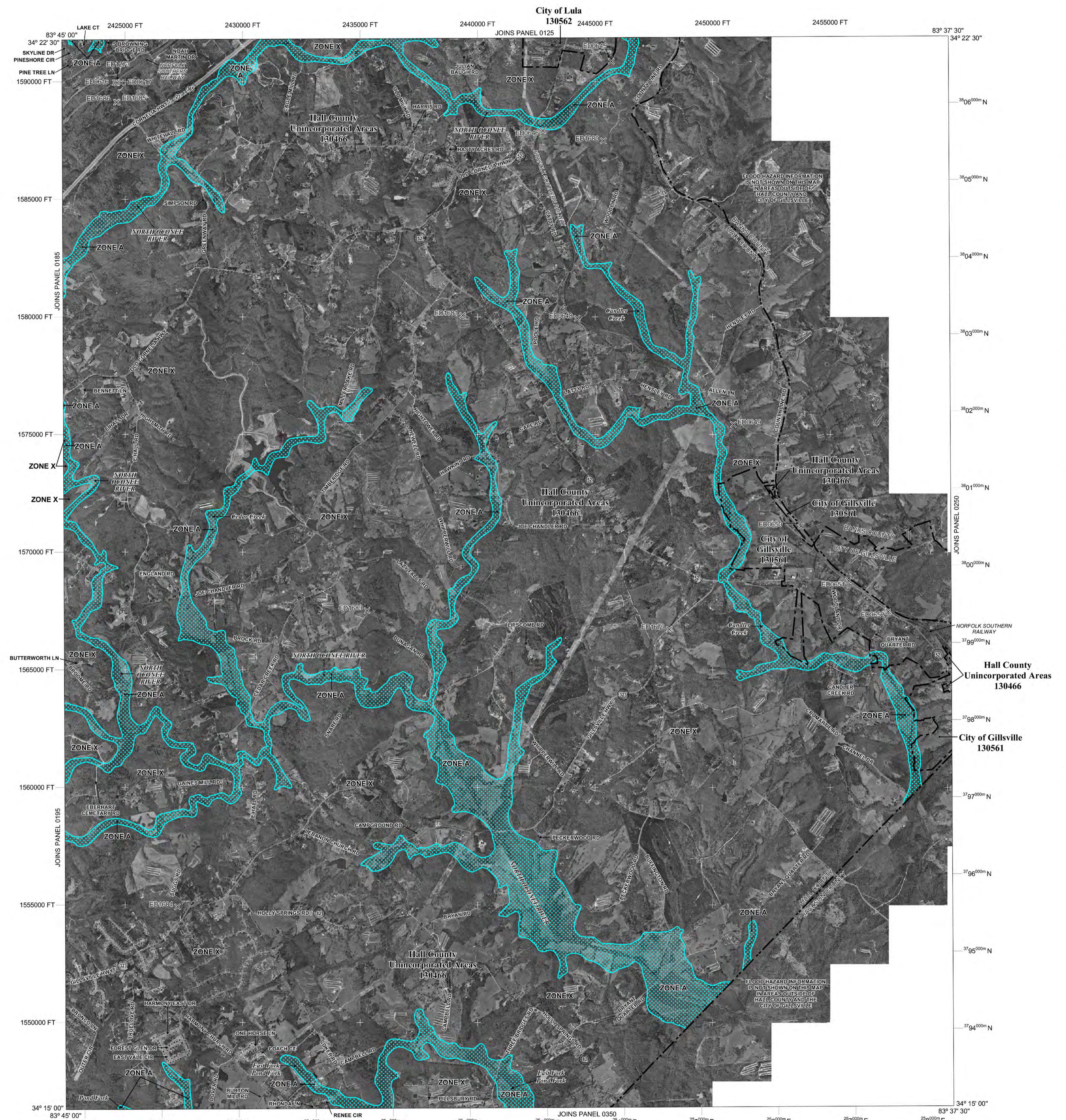
The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the Flood Insurance Study report. As a result of improved topographic data, the profile baseline, in some cases, may deviate significantly from the channel centerline or appear outside the Special Flood Hazard Area.

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 their website at www.fema.gov/msc.

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 www.fema.gov.



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.
ZONE A, ZONE AH, ZONE AO, ZONE AR, ZONE A99, ZONE V, ZONE VE
FLOODWAY AREAS IN ZONE AE
OTHER FLOOD AREAS
ZONE X, ZONE D, ZONE X
COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
OTHERWISE PROTECTED AREAS (OPAs)
MAP REPOSITORY
EFFECTIVE DATE OF COUNTY WIDE FLOOD INSURANCE RATE MAP
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
MAP SCALE 1" = 2000'

NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0225F
FIRM
FLOOD INSURANCE RATE MAP
HALL COUNTY, GEORGIA AND INCORPORATED AREAS
PANEL 225 OF 377
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
GILLSVILLE, CITY OF 130561 0225 F
HALL COUNTY 130466 0225 F
LULA, CITY OF 130562 0225 F
MAP NUMBER 13139C0225F
MAP REVISED SEPTEMBER 29, 2006
Federal Emergency Management Agency



**NOAA Atlas 14, Volume 9, Version 2**  
**Location name: Lula, Georgia, USA\***  
**Latitude: 34.3726°, Longitude: -83.7237°**  
**Elevation: 1044 ft\*\***

\* source: ESRI Maps  
 \*\* source: USGS



**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps & aerials](#)

**PF tabular**

<b>PDS-based point precipitation frequency estimates with 90% confidence intervals (ir</b>									
<b>Duration</b>	<b>Average recurrence interval (years)</b>								
	<b>1</b>	<b>2</b>	<b>5</b>	<b>10</b>	<b>25</b>	<b>50</b>	<b>100</b>	<b>200</b>	
<b>5-min</b>	<b>5.04</b> (4.13-6.24)	<b>5.76</b> (4.70-7.13)	<b>6.95</b> (5.66-8.60)	<b>7.94</b> (6.47-9.86)	<b>9.34</b> (7.46-11.7)	<b>10.4</b> (8.22-13.2)	<b>11.5</b> (8.90-14.7)	<b>12.7</b> (9.55-16.3)	(1
<b>10-min</b>	<b>3.69</b> (3.02-4.57)	<b>4.22</b> (3.45-5.22)	<b>5.08</b> (4.15-6.30)	<b>5.81</b> (4.73-7.22)	<b>6.83</b> (5.46-8.60)	<b>7.63</b> (6.01-9.65)	<b>8.44</b> (6.52-10.8)	<b>9.27</b> (6.99-12.0)	(7
<b>15-min</b>	<b>3.00</b> (2.46-3.71)	<b>3.43</b> (2.80-4.24)	<b>4.13</b> (3.38-5.12)	<b>4.73</b> (3.85-5.87)	<b>5.56</b> (4.44-7.00)	<b>6.20</b> (4.89-7.85)	<b>6.86</b> (5.30-8.76)	<b>7.54</b> (5.68-9.73)	(6
<b>30-min</b>	<b>2.08</b> (1.70-2.58)	<b>2.39</b> (1.95-2.95)	<b>2.89</b> (2.36-3.58)	<b>3.31</b> (2.69-4.11)	<b>3.90</b> (3.11-4.90)	<b>4.35</b> (3.43-5.50)	<b>4.81</b> (3.72-6.14)	<b>5.28</b> (3.98-6.81)	(4
<b>60-min</b>	<b>1.33</b> (1.09-1.65)	<b>1.52</b> (1.24-1.88)	<b>1.84</b> (1.50-2.28)	<b>2.11</b> (1.72-2.62)	<b>2.51</b> (2.01-3.17)	<b>2.83</b> (2.24-3.59)	<b>3.16</b> (2.45-4.05)	<b>3.51</b> (2.66-4.55)	(2
<b>2-hr</b>	<b>0.813</b> (0.672-0.993)	<b>0.922</b> (0.762-1.13)	<b>1.11</b> (0.919-1.36)	<b>1.28</b> (1.06-1.58)	<b>1.54</b> (1.25-1.93)	<b>1.74</b> (1.39-2.19)	<b>1.96</b> (1.54-2.49)	<b>2.19</b> (1.68-2.82)	(1
<b>3-hr</b>	<b>0.610</b> (0.507-0.740)	<b>0.688</b> (0.572-0.835)	<b>0.828</b> (0.687-1.01)	<b>0.955</b> (0.790-1.16)	<b>1.15</b> (0.941-1.43)	<b>1.31</b> (1.06-1.64)	<b>1.48</b> (1.17-1.87)	<b>1.67</b> (1.29-2.13)	(1
<b>6-hr</b>	<b>0.381</b> (0.320-0.456)	<b>0.427</b> (0.359-0.512)	<b>0.511</b> (0.429-0.613)	<b>0.587</b> (0.491-0.707)	<b>0.704</b> (0.584-0.870)	<b>0.801</b> (0.654-0.993)	<b>0.907</b> (0.726-1.14)	<b>1.02</b> (0.798-1.29)	(0
<b>12-hr</b>	<b>0.238</b> (0.203-0.282)	<b>0.268</b> (0.228-0.317)	<b>0.319</b> (0.270-0.378)	<b>0.364</b> (0.308-0.433)	<b>0.431</b> (0.360-0.523)	<b>0.485</b> (0.399-0.591)	<b>0.542</b> (0.438-0.668)	<b>0.603</b> (0.476-0.752)	(0.
<b>24-hr</b>	<b>0.146</b> (0.126-0.171)	<b>0.165</b> (0.142-0.194)	<b>0.198</b> (0.169-0.231)	<b>0.225</b> (0.192-0.264)	<b>0.263</b> (0.221-0.314)	<b>0.294</b> (0.244-0.352)	<b>0.325</b> (0.264-0.394)	<b>0.357</b> (0.284-0.438)	(0.
<b>2-day</b>	<b>0.086</b> (0.075-0.099)	<b>0.098</b> (0.085-0.113)	<b>0.117</b> (0.101-0.135)	<b>0.133</b> (0.115-0.154)	<b>0.156</b> (0.132-0.183)	<b>0.173</b> (0.145-0.205)	<b>0.191</b> (0.157-0.229)	<b>0.209</b> (0.168-0.254)	(0.
<b>3-day</b>	<b>0.063</b> (0.055-0.073)	<b>0.071</b> (0.062-0.082)	<b>0.085</b> (0.074-0.097)	<b>0.096</b> (0.084-0.111)	<b>0.112</b> (0.096-0.131)	<b>0.125</b> (0.105-0.147)	<b>0.138</b> (0.114-0.164)	<b>0.151</b> (0.122-0.182)	(0.
<b>4-day</b>	<b>0.051</b> (0.045-0.058)	<b>0.057</b> (0.050-0.065)	<b>0.068</b> (0.059-0.077)	<b>0.077</b> (0.067-0.088)	<b>0.089</b> (0.077-0.104)	<b>0.099</b> (0.084-0.116)	<b>0.109</b> (0.091-0.129)	<b>0.119</b> (0.097-0.143)	(0.
<b>7-day</b>	<b>0.035</b> (0.031-0.039)	<b>0.038</b> (0.034-0.043)	<b>0.045</b> (0.040-0.051)	<b>0.050</b> (0.044-0.057)	<b>0.058</b> (0.050-0.067)	<b>0.064</b> (0.055-0.074)	<b>0.070</b> (0.059-0.082)	<b>0.077</b> (0.063-0.091)	(0.
<b>10-day</b>	<b>0.028</b> (0.025-0.031)	<b>0.030</b> (0.027-0.034)	<b>0.035</b> (0.031-0.040)	<b>0.039</b> (0.035-0.044)	<b>0.045</b> (0.039-0.051)	<b>0.049</b> (0.042-0.057)	<b>0.054</b> (0.046-0.063)	<b>0.058</b> (0.048-0.069)	(0.
<b>20-day</b>	<b>0.018</b> (0.017-0.020)	<b>0.020</b> (0.018-0.022)	<b>0.023</b> (0.021-0.026)	<b>0.025</b> (0.023-0.028)	<b>0.029</b> (0.025-0.032)	<b>0.031</b> (0.027-0.035)	<b>0.034</b> (0.029-0.039)	<b>0.036</b> (0.030-0.042)	(0.
<b>30-day</b>	<b>0.015</b> (0.014-0.016)	<b>0.016</b> (0.015-0.018)	<b>0.019</b> (0.017-0.020)	<b>0.020</b> (0.018-0.022)	<b>0.023</b> (0.020-0.025)	<b>0.024</b> (0.021-0.027)	<b>0.026</b> (0.022-0.030)	<b>0.028</b> (0.023-0.032)	(0.

<b>45-day</b>	<b>0.012</b> (0.011-0.014)	<b>0.014</b> (0.012-0.015)	<b>0.015</b> (0.014-0.017)	<b>0.017</b> (0.015-0.018)	<b>0.018</b> (0.016-0.020)	<b>0.020</b> (0.017-0.022)	<b>0.021</b> (0.018-0.023)	<b>0.022</b> (0.018-0.025)	(0.
<b>60-day</b>	<b>0.011</b> (0.010-0.012)	<b>0.012</b> (0.011-0.013)	<b>0.013</b> (0.012-0.015)	<b>0.015</b> (0.013-0.016)	<b>0.016</b> (0.014-0.017)	<b>0.017</b> (0.015-0.019)	<b>0.018</b> (0.015-0.020)	<b>0.018</b> (0.016-0.021)	(0.

<sup>1</sup> 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 a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

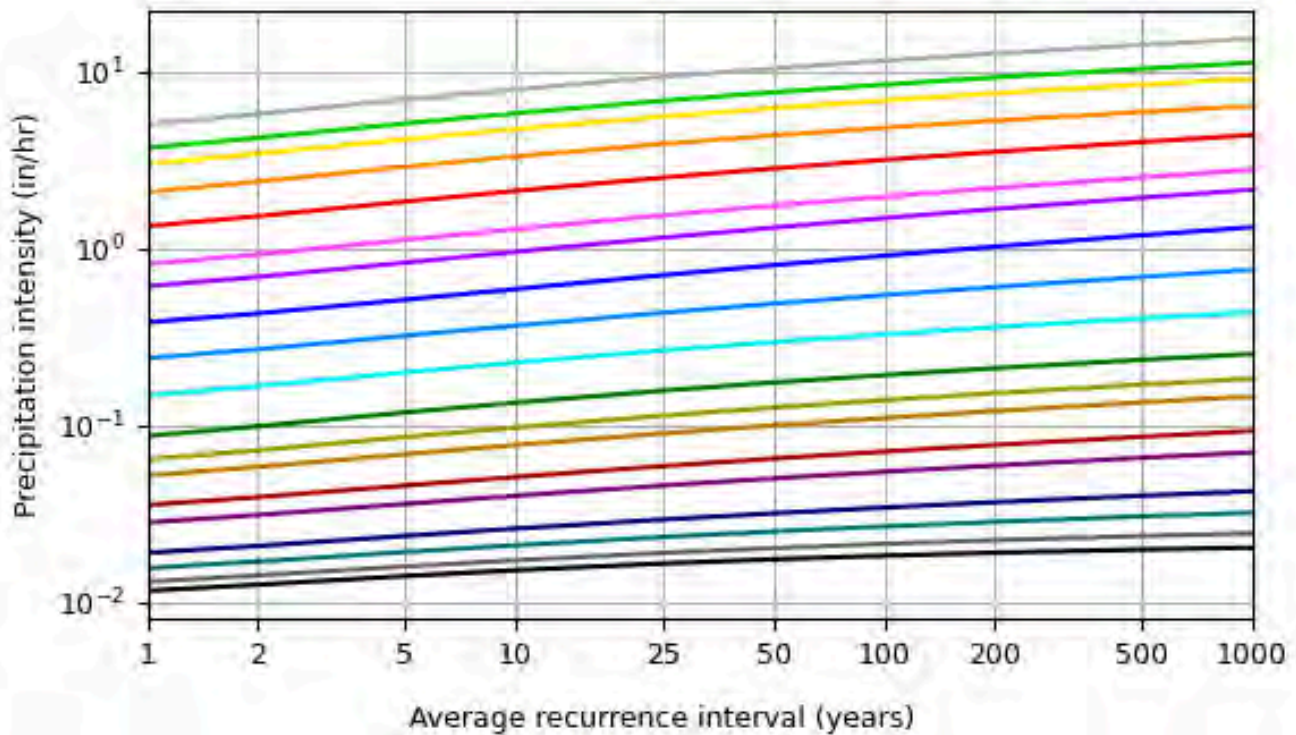
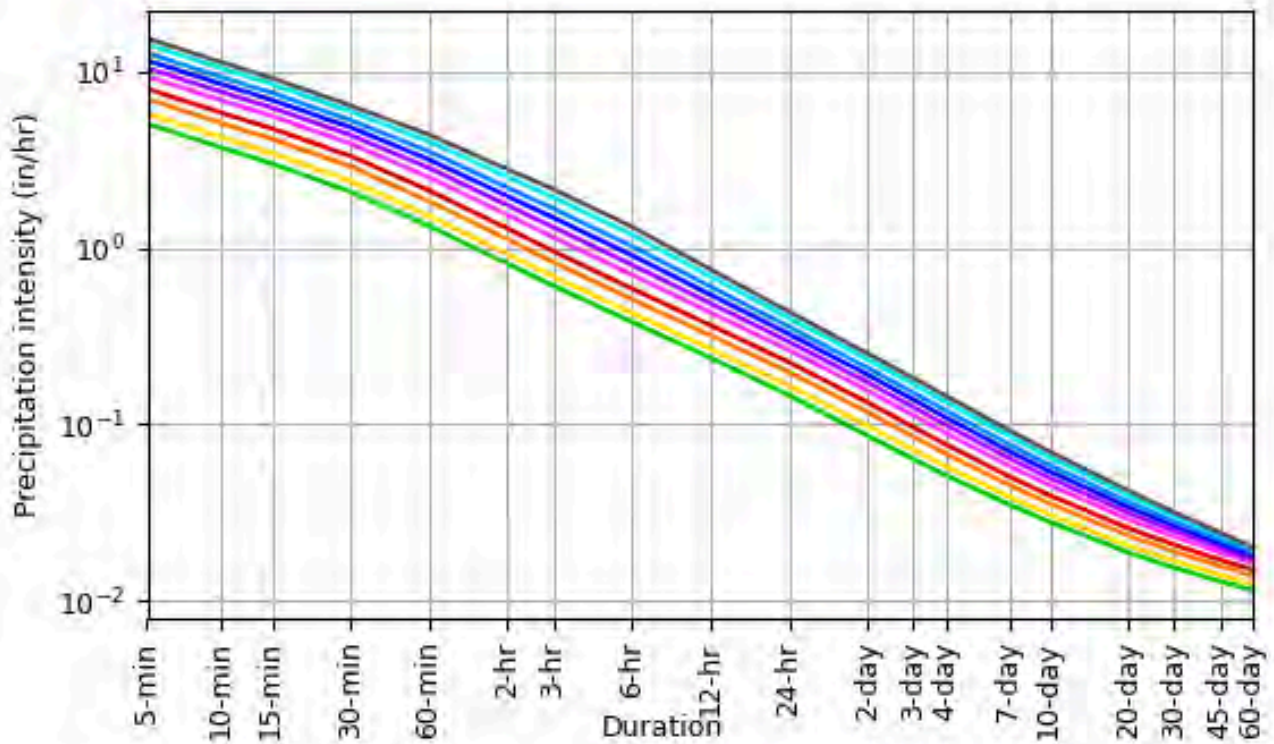
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

## PF graphical

# PDS-based intensity-duration-frequency (IDF) curves

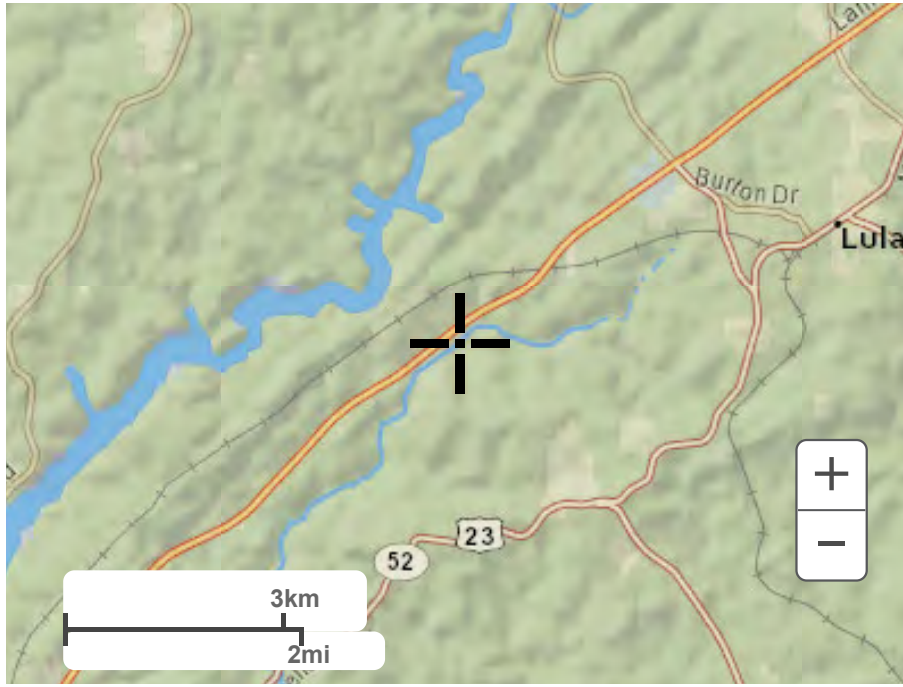
Latitude: 34.3726°, Longitude: -83.7237°



[Back to Top](#)

**Maps & aerials**

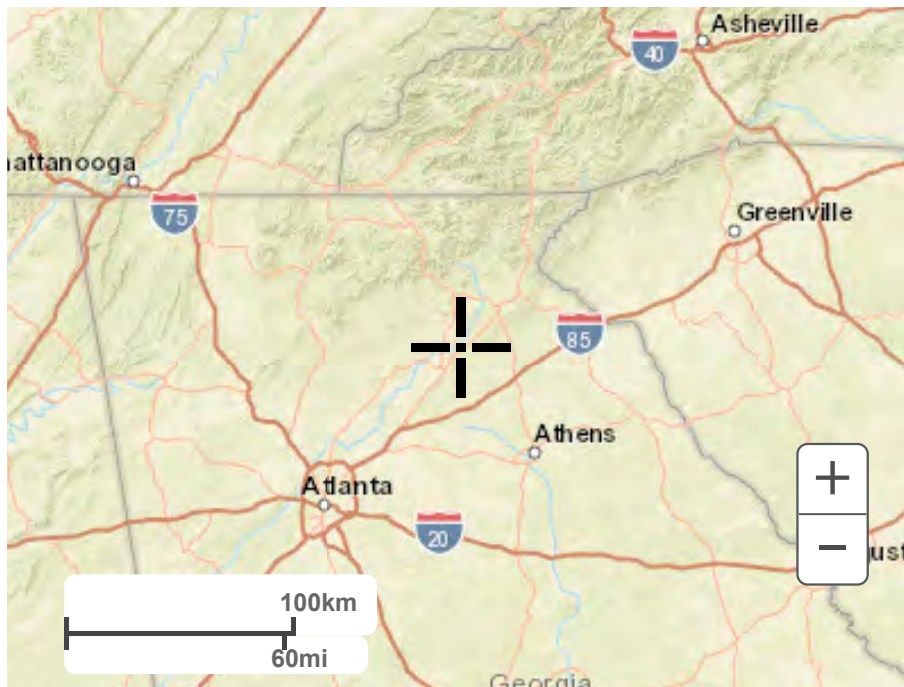
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

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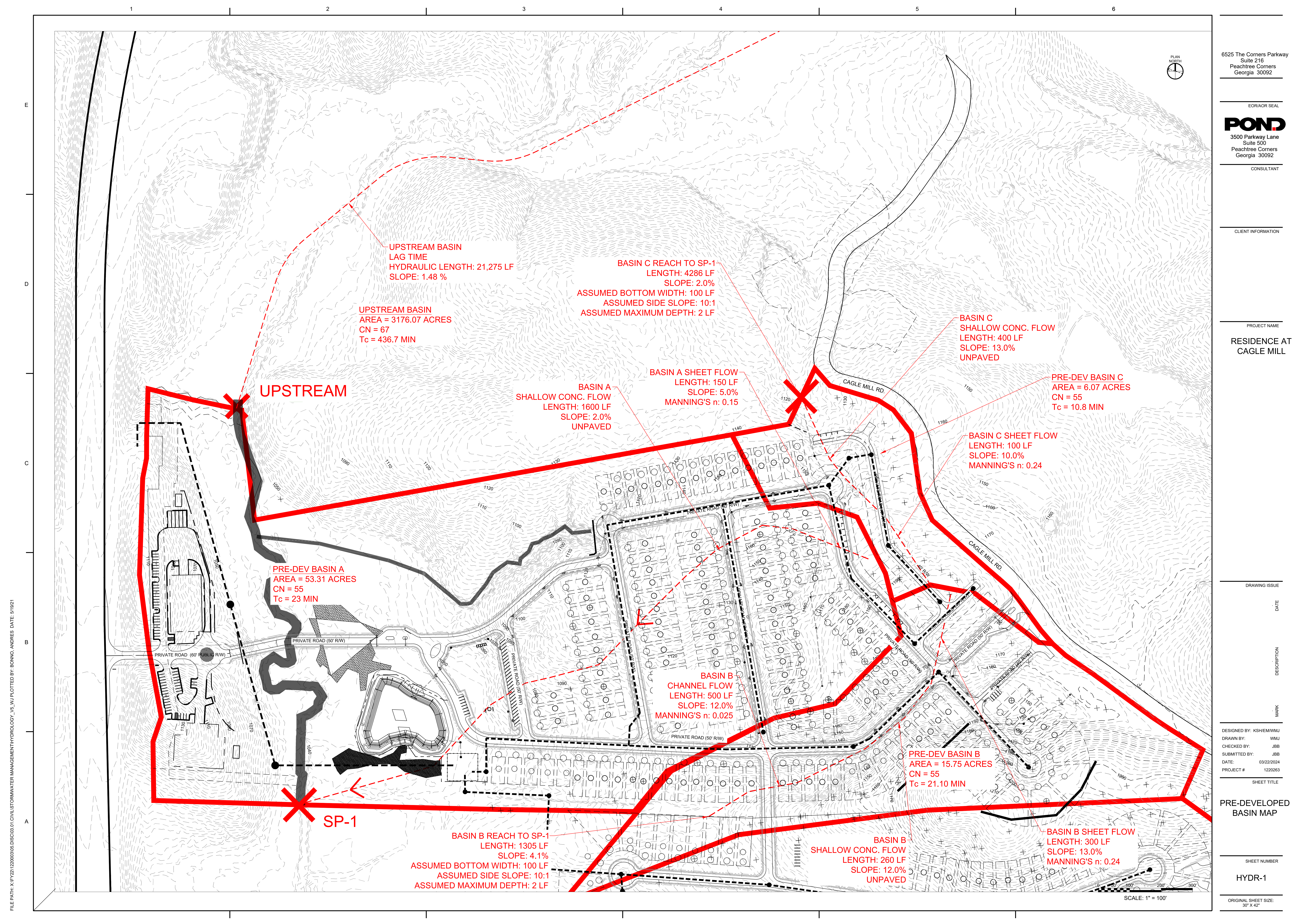
[US Department of Commerce](#)  
[National Oceanic and Atmospheric Administration](#)  
[National Weather Service](#)  
[National Water Center](#)  
1325 East West Highway  
Silver Spring, MD 20910  
Questions?: [HDSC.Questions@noaa.gov](mailto:HDSC.Questions@noaa.gov)

[Disclaimer](#)



## **Appendix B**

## **Appendix C**



FILE PATH: X:\F\21122000\GIS\DISC\03\_01\_CIVIL\STORMWATER\MANAGEMENT\HYDROLOGY\_V5\_VUJ\_PLOTTED BY BONNO, ANDRES DATE: 5/19/21



6525 The Corners Parkway  
Suite 216  
Peachtree Corners  
Georgia 30092

EOR/AOR SEAL  
**POND**  
3500 Parkway Lane  
Suite 500  
Peachtree Corners  
Georgia 30092  
CONSULTANT

CLIENT INFORMATION

PROJECT NAME  
**RESIDENCE AT  
CAGLE MILL**

DRAWING ISSUE

DATE

DESCRIPTION

MARK

DESIGNED BY: KSHIEMWJ  
DRAWN BY: WMJ  
CHECKED BY: JBB  
SUBMITTED BY: JBB  
DATE: 03/22/2024  
PROJECT #: 1220263

SHEET TITLE

**PRE-DEVELOPED  
BASIN MAP**

SHEET NUMBER

**HYDR-1**

ORIGINAL SHEET SIZE:  
30" X 42"

**UPSTREAM BASIN**  
LAG TIME  
HYDRAULIC LENGTH: 21,275 LF  
SLOPE: 1.48 %

**UPSTREAM BASIN**  
AREA = 3176.07 ACRES  
CN = 67  
Tc = 436.7 MIN

**BASIN C REACH TO SP-1**  
LENGTH: 4286 LF  
SLOPE: 2.0%  
ASSUMED BOTTOM WIDTH: 100 LF  
ASSUMED SIDE SLOPE: 10:1  
ASSUMED MAXIMUM DEPTH: 2 LF

**BASIN C SHALLOW CONC. FLOW**  
LENGTH: 400 LF  
SLOPE: 13.0%  
UNPAVED

**PRE-DEV BASIN C**  
AREA = 6.07 ACRES  
CN = 55  
Tc = 10.8 MIN

**UPSTREAM**

**BASIN A SHALLOW CONC. FLOW**  
LENGTH: 1600 LF  
SLOPE: 2.0%  
UNPAVED

**BASIN A SHEET FLOW**  
LENGTH: 150 LF  
SLOPE: 5.0%  
MANNING'S n: 0.15

**BASIN C SHEET FLOW**  
LENGTH: 100 LF  
SLOPE: 10.0%  
MANNING'S n: 0.24

**PRE-DEV BASIN A**  
AREA = 53.31 ACRES  
CN = 55  
Tc = 23 MIN

**BASIN B CHANNEL FLOW**  
LENGTH: 500 LF  
SLOPE: 12.0%  
MANNING'S n: 0.025

**PRE-DEV BASIN B**  
AREA = 15.75 ACRES  
CN = 55  
Tc = 21.10 MIN

**SP-1**

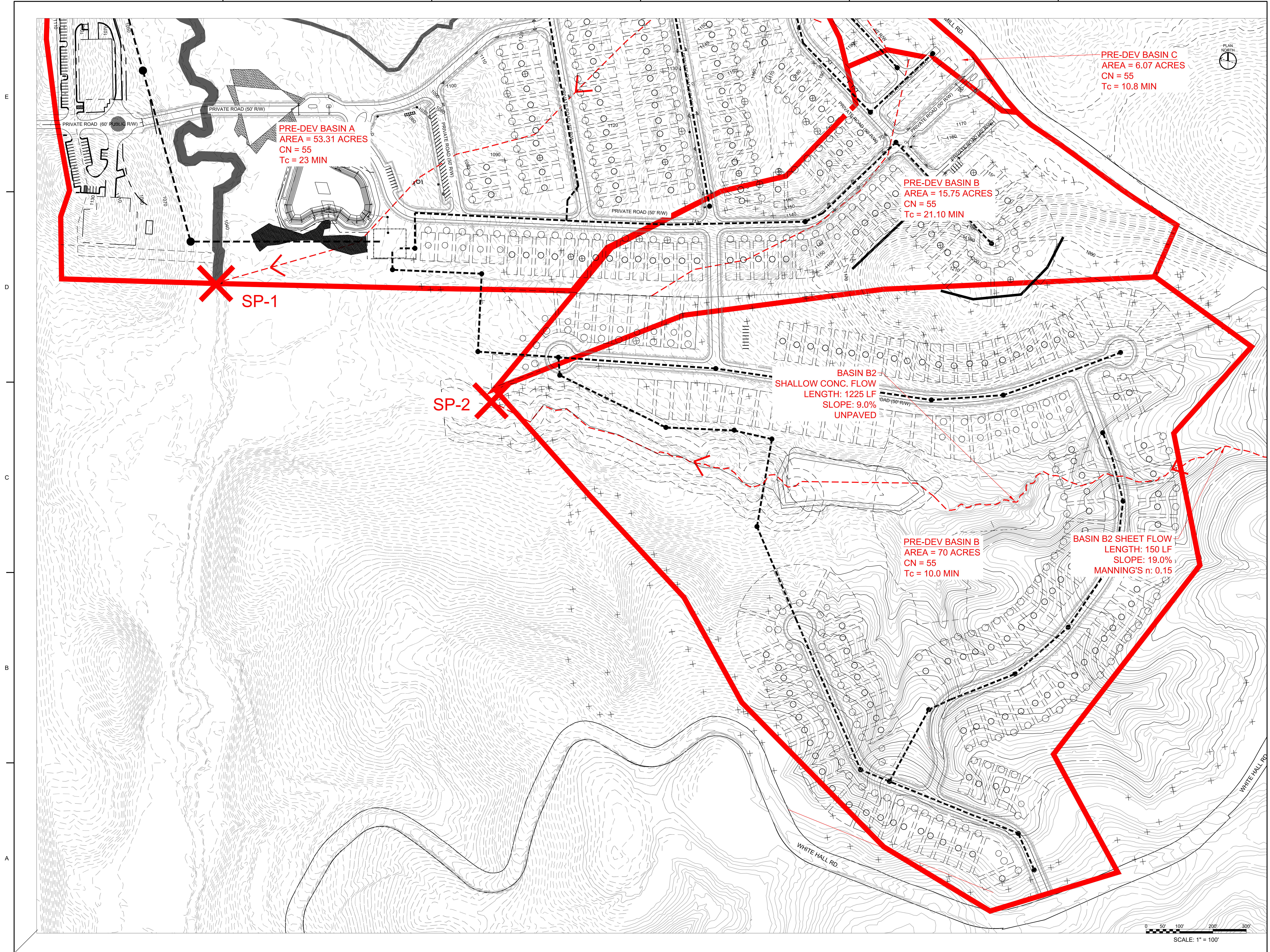
**BASIN B REACH TO SP-1**  
LENGTH: 1305 LF  
SLOPE: 4.1%  
ASSUMED BOTTOM WIDTH: 100 LF  
ASSUMED SIDE SLOPE: 10:1  
ASSUMED MAXIMUM DEPTH: 2 LF

**BASIN B SHALLOW CONC. FLOW**  
LENGTH: 260 LF  
SLOPE: 12.0%  
UNPAVED

**BASIN B SHEET FLOW**  
LENGTH: 300 LF  
SLOPE: 13.0%  
MANNING'S n: 0.24

SCALE: 1" = 100'

FILE PATH: X:\FY21\1220003\DISC\03\_01\_CIVIL\STORMWATER MANAGEMENT\HYDROLOGY\_V5\_WJ\ PLOTTED BY: BONNO, ANDRES DATE: 01/19/21



**PRE-DEV BASIN A**  
 AREA = 53.31 ACRES  
 CN = 55  
 Tc = 23 MIN

**PRE-DEV BASIN B**  
 AREA = 15.75 ACRES  
 CN = 55  
 Tc = 21.10 MIN

**PRE-DEV BASIN C**  
 AREA = 6.07 ACRES  
 CN = 55  
 Tc = 10.8 MIN

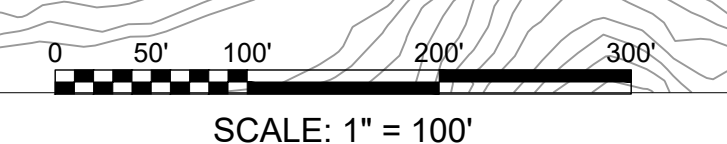
**BASIN B2**  
 SHALLOW CONC. FLOW  
 LENGTH: 1225 LF  
 SLOPE: 9.0%  
 UNPAVED

**PRE-DEV BASIN B**  
 AREA = 70 ACRES  
 CN = 55  
 Tc = 10.0 MIN

**BASIN B2 SHEET FLOW**  
 LENGTH: 150 LF  
 SLOPE: 19.0%  
 MANNING'S n: 0.15

**SP-1**

**SP-2**



6525 The Corners Parkway  
 Suite 216  
 Peachtree Corners  
 Georgia 30092

EOR/AOR SEAL  
**POND**  
 3500 Parkway Lane  
 Suite 500  
 Peachtree Corners  
 Georgia 30092  
 CONSULTANT

CLIENT INFORMATION

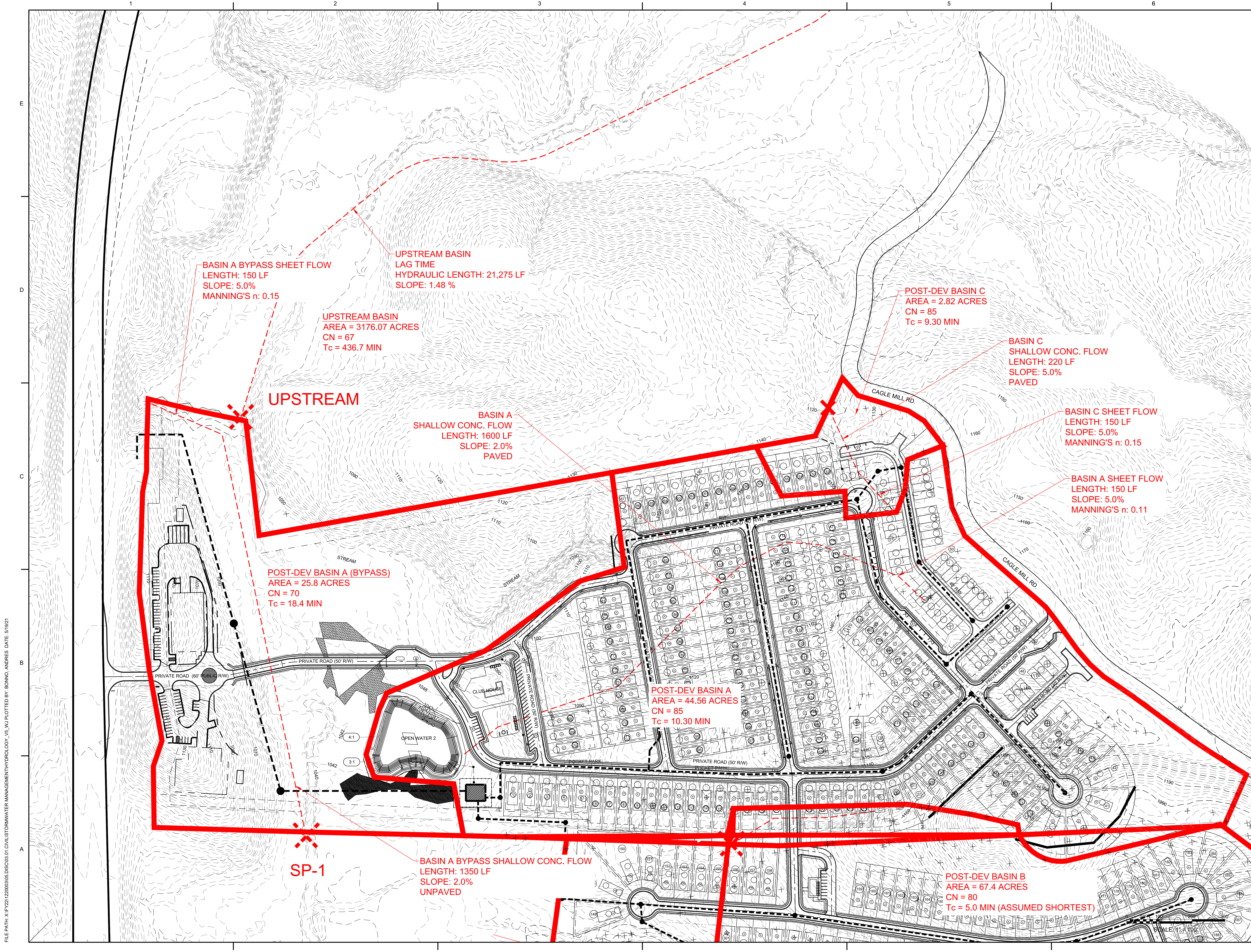
PROJECT NAME  
**RESIDENCE AT  
 CAGLE MILL**

DRAWING ISSUE	
DATE	DESCRIPTION
MARK	
DESIGNED BY: KSHIEMWJ	
DRAWN BY: WMJ	
CHECKED BY: JBB	
SUBMITTED BY: JBB	
DATE: 03/22/2024	
PROJECT # 1220263	
SHEET TITLE	

**PRE-DEVELOPED  
 BASIN MAP**

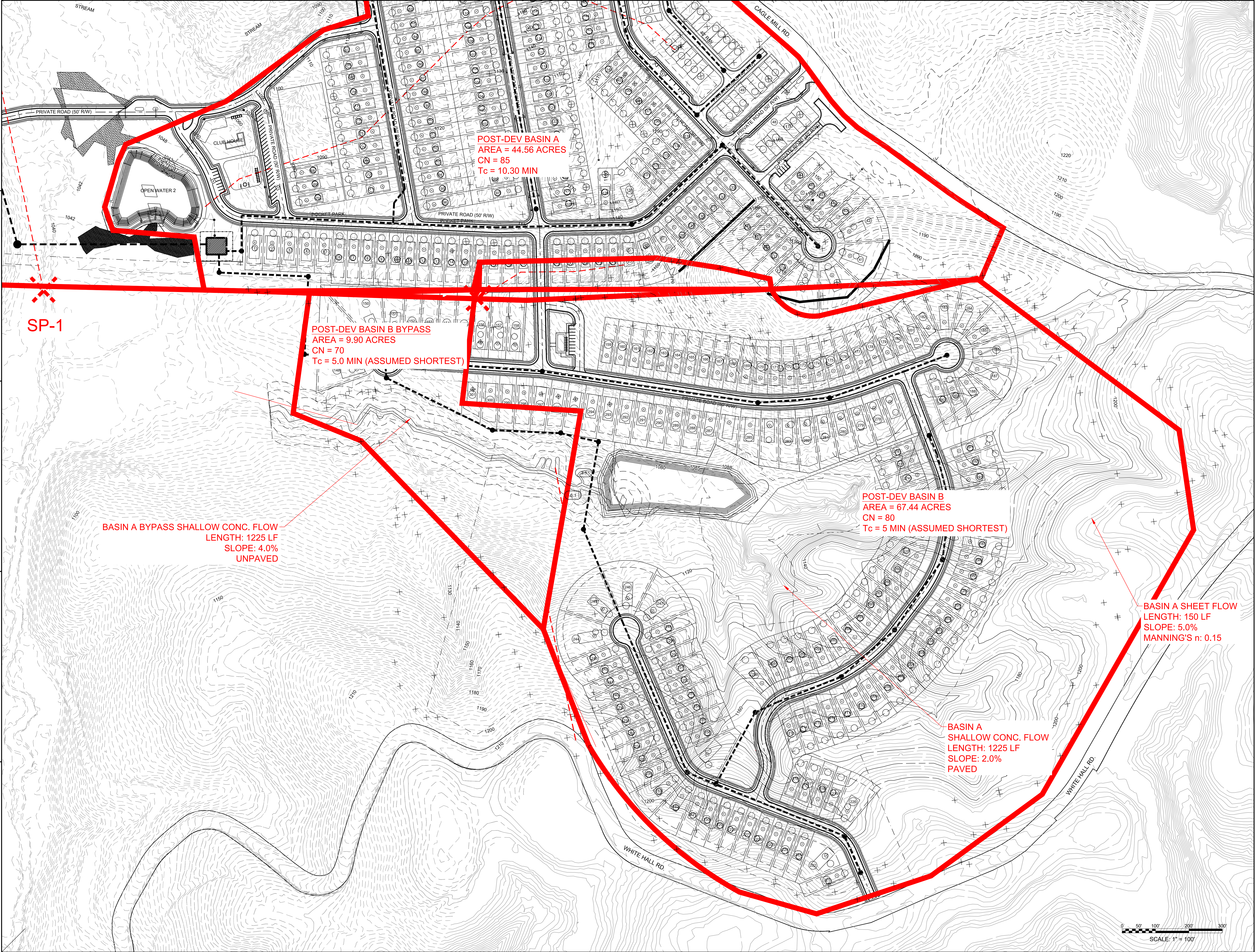
SHEET NUMBER  
**HYDR-2**

ORIGINAL SHEET SIZE:  
 30" X 42"



FILE PATH: X:\FY22\12200306.DISC003.01.CIVIL\STORMWATER\MANAGEMENT\HYDROLOGY\_V5\_MJ\_PLOTTED BY: BONNO, ANDRES DATE: 5/19/21

FILE PATH: X:\FY22\122003\06.DISC\03.01.CIVIL\STORMWATER\MANAGEMENT\HYDROLOGY\_V5\_MJU\_PLOTTED BY BONNO ANDRES DATE: 5/19/21



SP-1

BASIN A BYPASS SHALLOW CONC. FLOW  
LENGTH: 1225 LF  
SLOPE: 4.0%  
UNPAVED

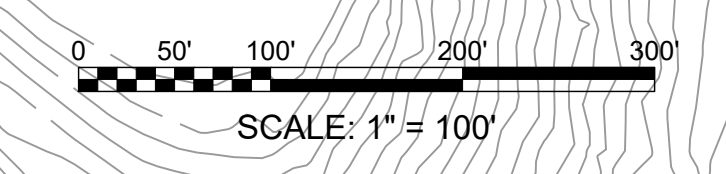
POST-DEV BASIN B BYPASS  
AREA = 9.90 ACRES  
CN = 70  
Tc = 5.0 MIN (ASSUMED SHORTEST)

POST-DEV BASIN A  
AREA = 44.56 ACRES  
CN = 85  
Tc = 10.30 MIN

POST-DEV BASIN B  
AREA = 67.44 ACRES  
CN = 80  
Tc = 5 MIN (ASSUMED SHORTEST)

BASIN A SHALLOW CONC. FLOW  
LENGTH: 1225 LF  
SLOPE: 2.0%  
PAVED

BASIN A SHEET FLOW  
LENGTH: 150 LF  
SLOPE: 5.0%  
MANNING'S n: 0.15



6525 The Corners Parkway  
Suite 216  
Peachtree Corners  
Georgia 30092

EOR/AOR SEAL  
**POND**  
3500 Parkway Lane  
Suite 500  
Peachtree Corners  
Georgia 30092  
CONSULTANT

CLIENT INFORMATION

PROJECT NAME  
**RESIDENCE AT  
CAGLE MILL**

DRAWING ISSUE	DATE	DESCRIPTION	MARK
DESIGNED BY:	KSHIEM/MWJ		
DRAWN BY:	WMJ		
CHECKED BY:	JBB		
SUBMITTED BY:	JBB		
DATE:	03/22/2024		
PROJECT #	1220263		
SHEET TITLE			

**POST DEVELOPED  
BASIN MAP**

SHEET NUMBER  
**HYDR-4**

ORIGINAL SHEET SIZE:  
30" X 42"

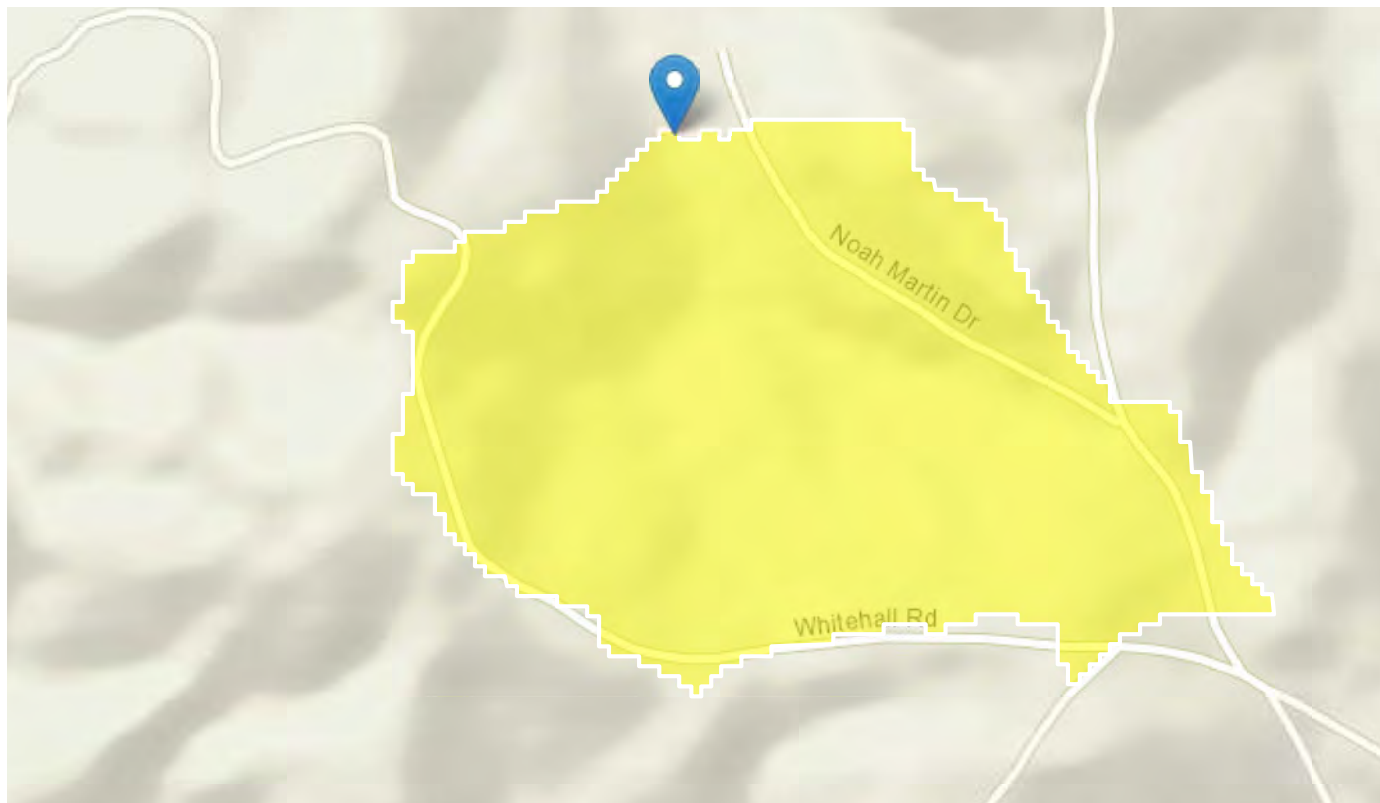
# Cagle Mill Phase 2- StreamStats Report

**Region ID:** GA

**Workspace ID:** GA20240228150937256000

**Clicked Point (Latitude, Longitude):** 34.36732, -83.72267

**Time:** 2024-02-28 10:09:59 -0500



 Collapse All

## ➤ Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	15.896	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	315	feet per mi
DRNAREA	Area that drains to a point on a stream	0.12	square miles
ELEV	Mean Basin Elevation	1180	feet

<b>Parameter Code</b>	<b>Parameter Description</b>	<b>Value</b>	<b>Unit</b>
ELEVMAX	Maximum basin elevation	1261	feet
GWHEAD	Mean basin elevation minus minimum basin elevation	106	feet
I24H100Y	Maximum 24-hour precipitation that occurs on average once in 100 years	7.76	inches
I24H10Y	Maximum 24-hour precipitation that occurs on average once in 10 years	5.38	inches
I24H25Y	Maximum 24-hour precipitation that occurs on average once in 25 years	6.3	inches
I24H50Y	Maximum 24-hour precipitation that occurs on average once in 50 years	7.02	inches
LC06AGRI	Percent agriculture computed as total of grass, pasture, and crops, NLCD classes 71, 81 and 82	1.153	percent
LC06DEV	Percentage of land-use from NLCD 2006 classes 21-24	12.536	percent
LC06FOREST	Percentage of forest from NLCD 2006 classes 41-43	85.253	percent
LC06IMP	Percentage of impervious area determined from NLCD 2006 impervious dataset	1.12	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	13.1	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	1.49	percent
MINBELEV	Minimum basin elevation	1074	feet
PCTREG1	Percentage of drainage area located in Region 1 - Piedmont / Ridge and Valley	100	percent
PCTREG2	Percentage of drainage area located in Region 2 - Blue Ridge	0	percent
PCTREG3	Percentage of drainage area located in Region 3 - Sandhills	0	percent
PCTREG4	Percentage of drainage area located in Region 4 - Coastal Plains	0	percent
PCTREG5	Percentage of drainage area located in Region 5 - Lower Tifton Uplands	0	percent



<b>Parameter Code</b>	<b>Parameter Description</b>	<b>Value</b>	<b>Unit</b>
PRECPRIS00	Basin average mean annual precipitation for 1971 to 2000 from PRISM	57.2	inches
RELIEF	Maximum - minimum elevation	187	feet
RRMEAN	Relief ratio defined as $(ELEV-MINBELEV)/(ELEVMAX-MINBELEV)$	0.569	dimensionless

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

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USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.19.4

StreamStats Services Version: 1.2.22

NSS Services Version: 2.2.1



# Custom Soil Resource Report Soil Map




Map Scale: 1:12,900 if printed on A landscape (11" x 8.5") sheet.

0 150 300 600 900 Meters  
0 500 1000 2000 3000 Feet


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 Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

**Special Point Features**






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


**Water Features**

 Streams and Canals

**Transportation**

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

**Background**

 Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Barrow, Hall, and Jackson Counties, Georgia  
 Survey Area Data: Version 18, Aug 30, 2023

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

Date(s) aerial images were photographed: Mar 19, 2022—Apr 20, 2022

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

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cc	Cartecay and Chewacla soils	18.0	2.5%
MdD	Madison sandy loam, 10 to 15 percent slopes	9.6	1.3%
MdE	Madison sandy loam, 15 to 25 percent slopes	232.6	32.5%
MIC2	Madison sandy clay loam, 6 to 10 percent slopes, moderately eroded	19.6	2.7%
MID2	Madison sandy clay loam, 10 to 15 percent slopes, moderately eroded	225.0	31.5%
MuF	Musella cobbly clay loam, 15 to 35 percent slopes	54.2	7.6%
PaE	Pacolet sandy loam, 15 to 25 percent slopes	25.7	3.6%
PTF	Pacolet-Tallapoosa association, steep	66.0	9.2%
To	Toccoa soils	63.6	8.9%
W	Water	0.8	0.1%
<b>Totals for Area of Interest</b>		<b>715.0</b>	<b>100.0%</b>

## Map Unit Descriptions

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

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

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

## Custom Soil Resource Report

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

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

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

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

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

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

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

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

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

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

## **Appendix D**

# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

## Hyd. No. 1

PRE-DEV BASIN A

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.150	0.011	0.011	
Flow length (ft)	= 150.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.20	0.00	0.00	
Land slope (%)	= 5.00	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 11.33</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 11.33</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 1600.00	0.00	0.00	
Watercourse slope (%)	= 2.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=2.28	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 11.69</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 11.69</b>
<b>Channel Flow</b>				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	({0})0.0	0.0	0.0	
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 0.00</b>
<b>Total Travel Time, Tc .....</b>				<b>23.00 min</b>



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

## Hyd. No. 2

PRE-DEV-BASIN B

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.20	0.00	0.00	
Land slope (%)	= 13.00	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 19.60</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 19.60</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 260.00	0.00	0.00	
Watercourse slope (%)	= 12.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=5.59	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 0.78</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 0.78</b>
<b>Channel Flow</b>				
X sectional flow area (sqft)	= 4.00	0.00	0.00	
Wetted perimeter (ft)	= 8.00	0.00	0.00	
Channel slope (%)	= 10.00	0.00	0.00	
Manning's n-value	= 0.025	0.015	0.015	
Velocity (ft/s)	=11.85	0.00	0.00	
Flow length (ft)	500.0	0.0	0.0	
<b>Travel Time (min)</b>	<b>= 0.70</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 0.70</b>
<b>Total Travel Time, Tc .....</b>				<b>21.10 min</b>

# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

## Hyd. No. 3

PRE-DEV-BASIN C

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
<b>Sheet Flow</b>							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.20		0.00		0.00		
Land slope (%)	= 10.00		0.00		0.00		
<b>Travel Time (min)</b>	<b>= 9.04</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>9.04</b>
<b>Shallow Concentrated Flow</b>							
Flow length (ft)	= 600.00		0.00		0.00		
Watercourse slope (%)	= 13.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=5.82		0.00		0.00		
<b>Travel Time (min)</b>	<b>= 1.72</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>1.72</b>
<b>Channel Flow</b>							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	{{0}}0.0		0.0		0.0		
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.00</b>
<b>Total Travel Time, Tc .....</b>							<b>10.80 min</b>

# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

## Hyd. No. 11

POST-DEV BASIN A

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
<b>Sheet Flow</b>							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 150.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.89		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
<b>Travel Time (min)</b>	<b>= 1.05</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>1.05</b>
<b>Shallow Concentrated Flow</b>							
Flow length (ft)	= 1600.00		0.00		0.00		
Watercourse slope (%)	= 2.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=2.87		0.00		0.00		
<b>Travel Time (min)</b>	<b>= 9.28</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>9.28</b>
<b>Channel Flow</b>							
X sectional flow area (sqft)	= 2.00		0.00		0.00		
Wetted perimeter (ft)	= 4.00		0.00		0.00		
Channel slope (%)	= 5.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=13.96		0.00		0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.00</b>
<b>Total Travel Time, Tc .....</b>							<b>10.30 min</b>

# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

## Hyd. No. 12

POST-DEV BASIN A (BYPASS)

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
<b>Sheet Flow</b>							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 150.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.89		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
<b>Travel Time (min)</b>	<b>= 8.52</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>8.52</b>
<b>Shallow Concentrated Flow</b>							
Flow length (ft)	= 1350.00		0.00		0.00		
Watercourse slope (%)	= 2.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.28		0.00		0.00		
<b>Travel Time (min)</b>	<b>= 9.86</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>9.86</b>
<b>Channel Flow</b>							
X sectional flow area (sqft)	= 2.00		0.00		0.00		
Wetted perimeter (ft)	= 4.00		0.00		0.00		
Channel slope (%)	= 10.00		0.00		0.00		
Manning's n-value	= 0.150		0.015		0.015		
Velocity (ft/s)	=1.97		0.00		0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.00</b>
<b>Total Travel Time, Tc .....</b>							<b>18.40 min</b>

# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

## Hyd. No. 14

POST-DEV BASIN C

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>	
<b>Sheet Flow</b>								
Manning's n-value	= 0.150		0.011		0.011			
Flow length (ft)	= 150.0		0.0		0.0			
Two-year 24-hr precip. (in)	= 3.89		0.00		0.00			
Land slope (%)	= 5.00		0.00		0.00			
<b>Travel Time (min)</b>	<b>= 8.52</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>8.52</b>	
<b>Shallow Concentrated Flow</b>								
Flow length (ft)	= 220.00		0.00		0.00			
Watercourse slope (%)	= 5.00		0.00		0.00			
Surface description	= Paved		Paved		Paved			
Average velocity (ft/s)	=4.55		0.00		0.00			
<b>Travel Time (min)</b>	<b>= 0.81</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.81</b>	
<b>Channel Flow</b>								
X sectional flow area (sqft)	= 0.00		0.00		0.00			
Wetted perimeter (ft)	= 0.00		0.00		0.00			
Channel slope (%)	= 0.00		0.00		0.00			
Manning's n-value	= 0.015		0.015		0.015			
Velocity (ft/s)	=0.00		0.00		0.00			
Flow length (ft)	({0})0.0		0.0		0.0			
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.00</b>	
<b>Total Travel Time, Tc .....</b>							<b>=</b>	<b>9.30 min</b>

## **Appendix E**

# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

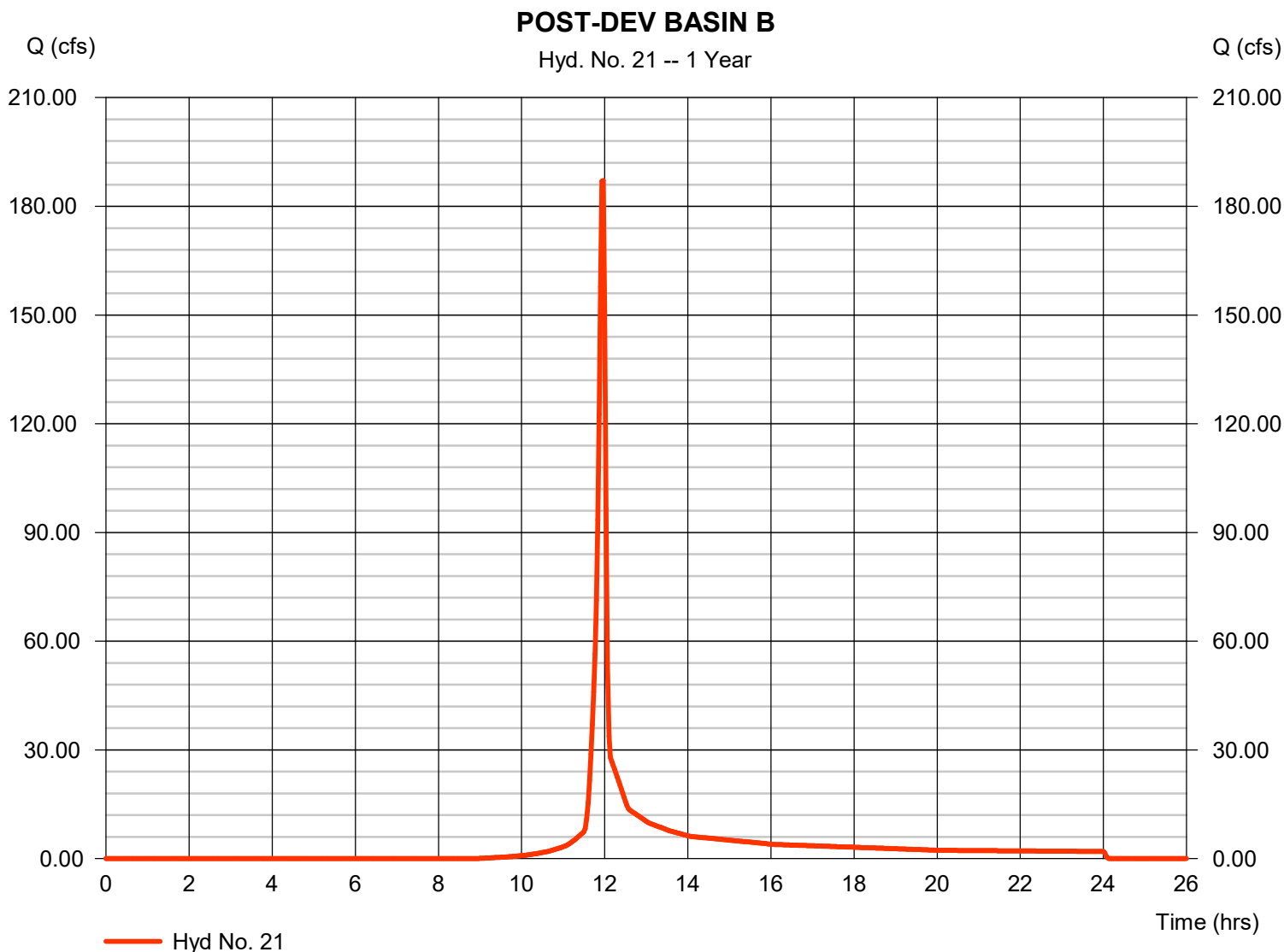
Wednesday, 02 / 28 / 2024

## Hyd. No. 21

### POST-DEV BASIN B

Hydrograph type	= SCS Runoff	Peak discharge	= 187.09 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 377,378 cuft
Drainage area	= 67.440 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.51 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(13.210 x 55) + (16.000 x 65) + (38.230 x 95)] / 67.440



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 22

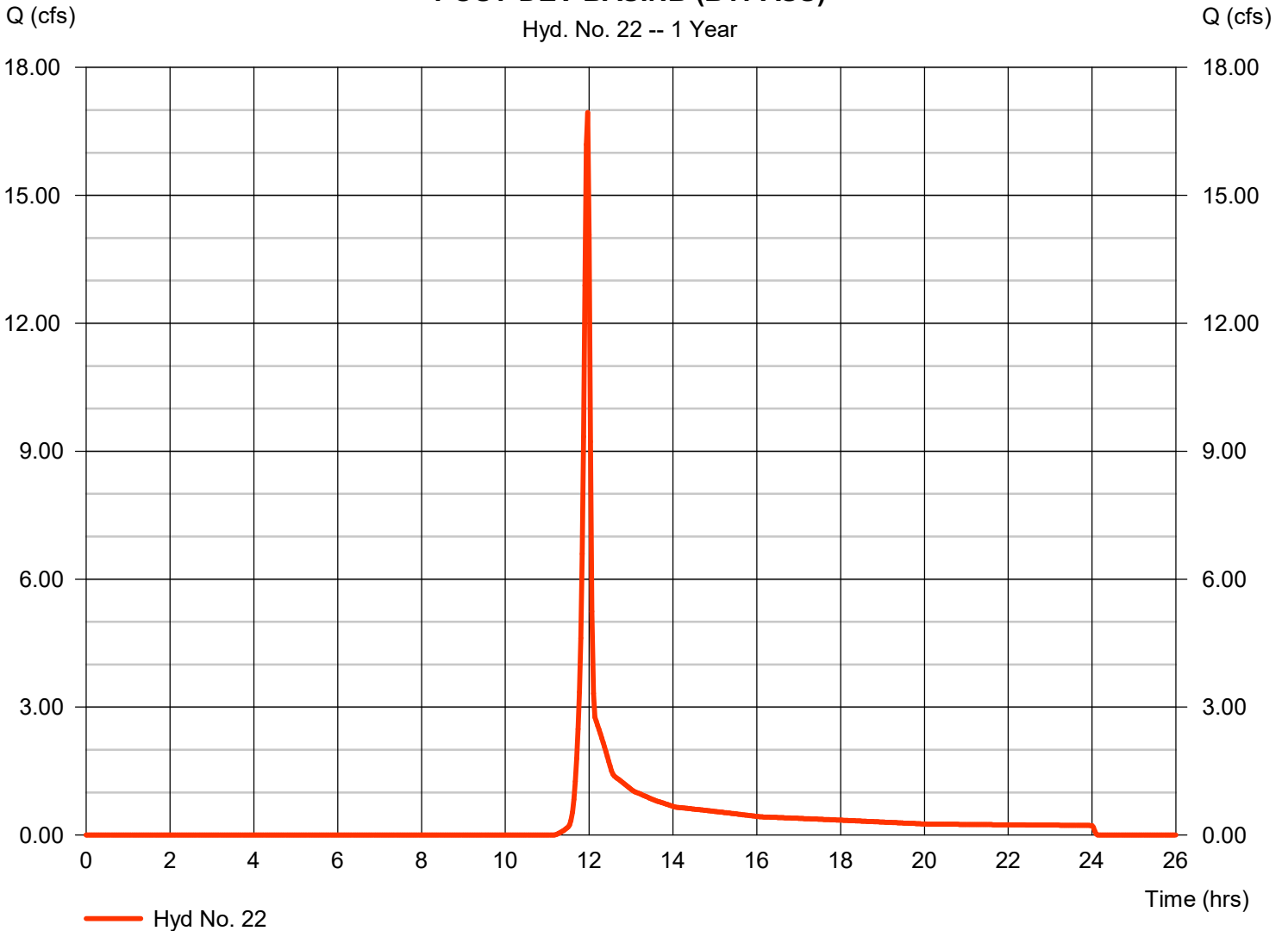
### POST-DEV BASINB (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 16.94 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 34,172 cuft
Drainage area	= 9.900 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.51 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(3.750 x 95) + (6.150 x 55)] / 9.900

### POST-DEV BASINB (BYPASS)

Hyd. No. 22 -- 1 Year





# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 23

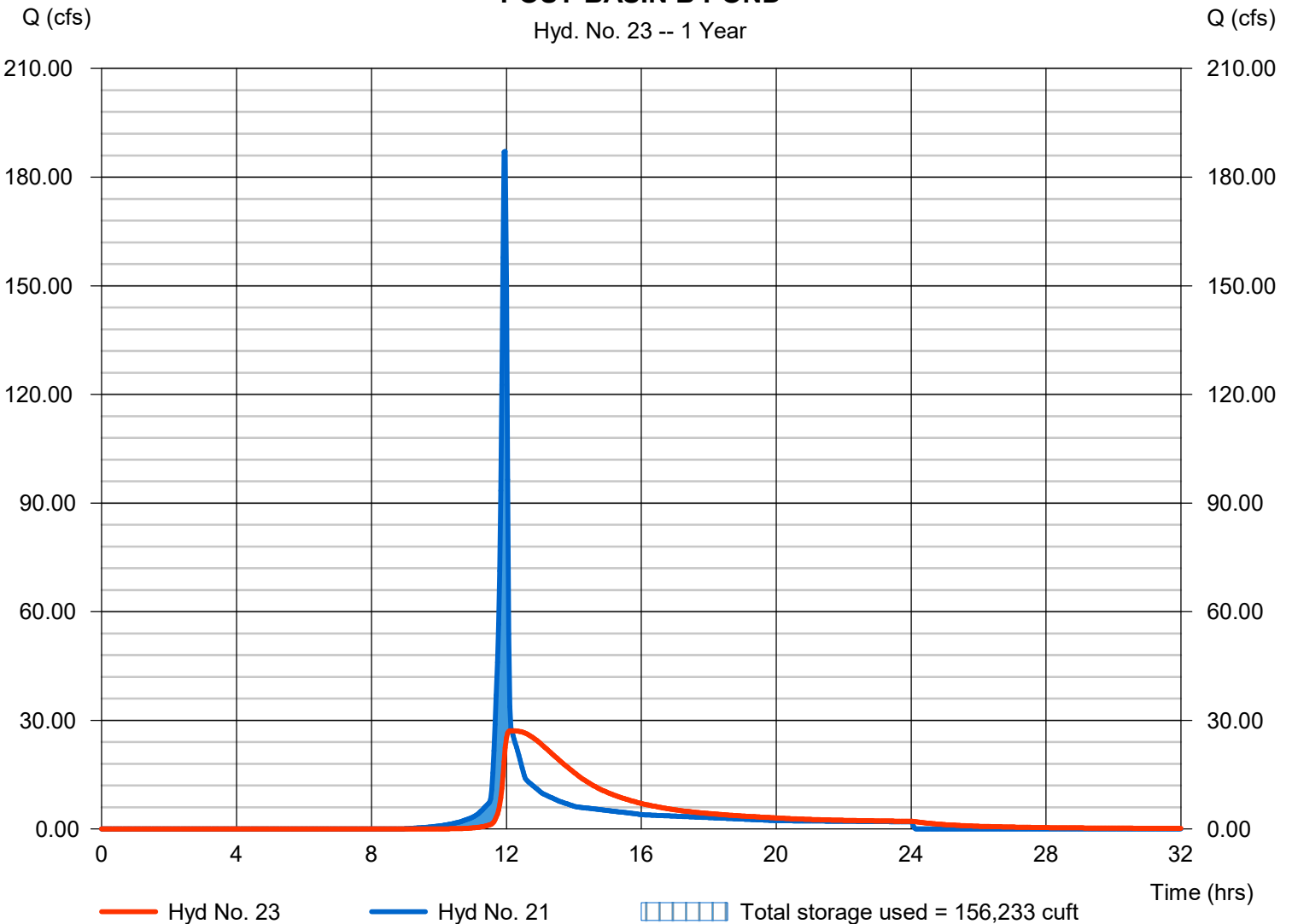
### POST-BASIN B POND

Hydrograph type	= Reservoir	Peak discharge	= 27.08 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 377,329 cuft
Inflow hyd. No.	= 21 - POST-DEV BASIN B	Max. Elevation	= 1083.43 ft
Reservoir name	= WET POND 2	Max. Storage	= 156,233 cuft

Storage Indication method used.

### POST-BASIN B POND

Hyd. No. 23 -- 1 Year



## Pond No. 4 - WET POND 2

### Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1080.00 ft

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1080.00	40,453	0	0
1.00	1081.00	43,362	41,895	41,895
2.00	1082.00	46,333	44,835	86,730
3.00	1083.00	49,368	47,838	134,567
4.00	1084.00	52,465	50,904	185,471
5.00	1085.00	55,624	54,031	239,502
6.00	1086.00	62,132	58,842	298,345
7.00	1087.00	68,890	65,475	363,820
8.00	1088.00	75,899	72,359	436,179
9.00	1089.00	83,159	79,494	515,672

### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 42.00	0.00	0.00	0.00
Span (in)	= 42.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1080.00	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	Inactive	0.00	35.00
Crest El. (ft)	= 1087.00	1083.50	0.00	1088.50
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	Ciplti
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	Civ A cfs	Civ B cfs	Civ 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	1080.00	0.00	---	---	---	0.00	0.00	---	0.00	---	---	0.000
1.00	41,895	1081.00	6.26 oc	---	---	---	0.00	0.00	---	0.00	---	---	6.256
2.00	86,730	1082.00	16.11 oc	---	---	---	0.00	0.00	---	0.00	---	---	16.11
3.00	134,567	1083.00	24.98 oc	---	---	---	0.00	0.00	---	0.00	---	---	24.98
4.00	185,471	1084.00	50.79 oc	---	---	---	0.00	0.00	---	0.00	---	---	50.79
5.00	239,502	1085.00	79.15 oc	---	---	---	0.00	0.00	---	0.00	---	---	79.15
6.00	298,345	1086.00	95.49 ic	---	---	---	0.00	0.00	---	0.00	---	---	95.49
7.00	363,820	1087.00	106.13 ic	---	---	---	0.00	0.00	---	0.00	---	---	106.13
8.00	436,179	1088.00	115.80 ic	---	---	---	0.00	0.00	---	0.00	---	---	115.80
9.00	515,672	1089.00	124.72 ic	---	---	---	0.00	0.00	---	41.21	---	---	165.93

# Hydrograph Report

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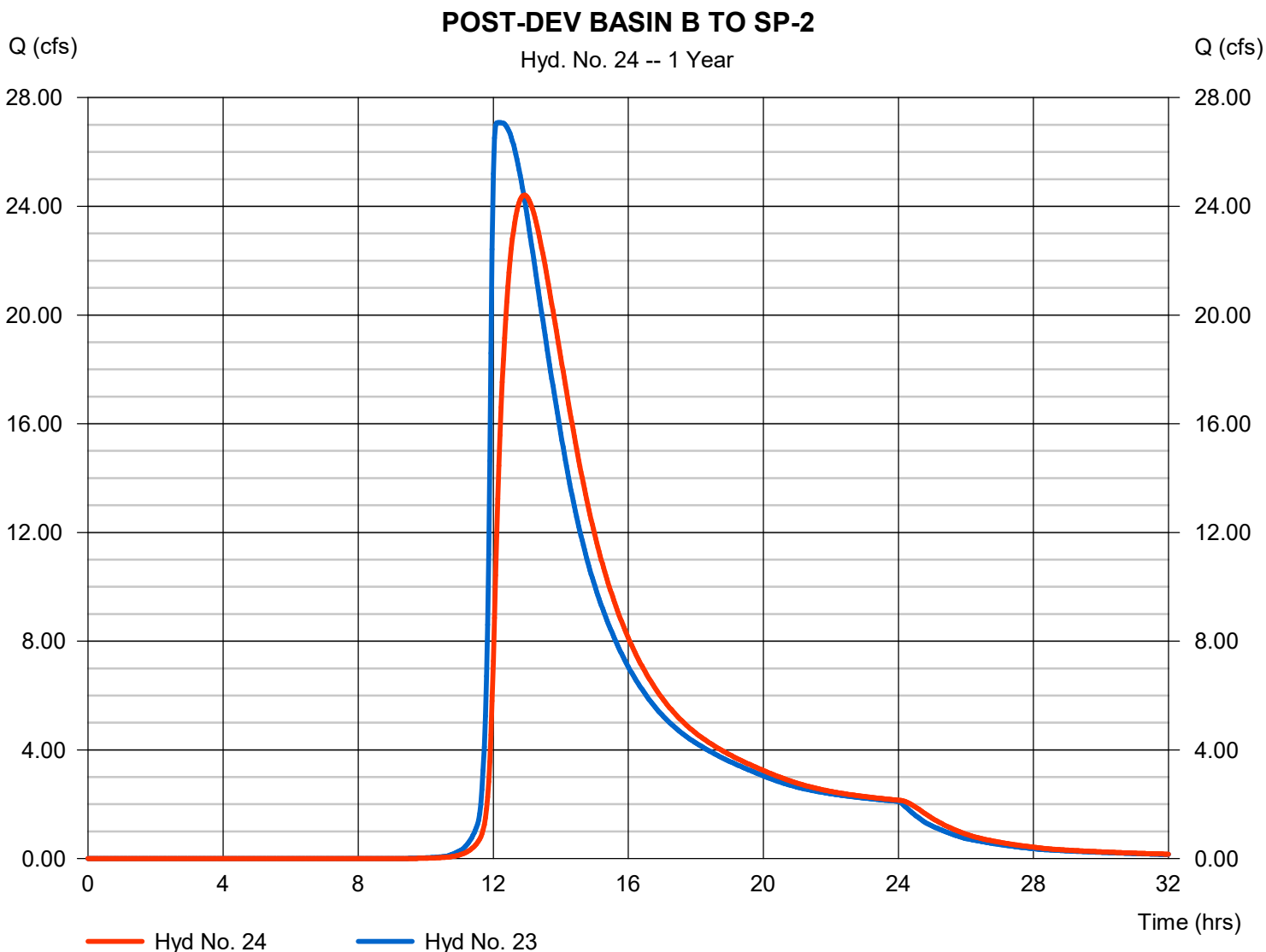
Wednesday, 02 / 28 / 2024

## Hyd. No. 24

### POST-DEV BASIN B TO SP-2

Hydrograph type	= Reach	Peak discharge	= 24.41 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.93 hrs
Time interval	= 2 min	Hyd. volume	= 376,886 cuft
Inflow hyd. No.	= 23 - POST-BASIN B POND	Section type	= Trapezoidal
Reach length	= 1295.0 ft	Channel slope	= 4.0 %
Manning's n	= 0.150	Bottom width	= 18.0 ft
Side slope	= 10.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.289	Rating curve m	= 1.281
Ave. velocity	= 0.78 ft/s	Routing coeff.	= 0.0887

Modified Att-Kin routing method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

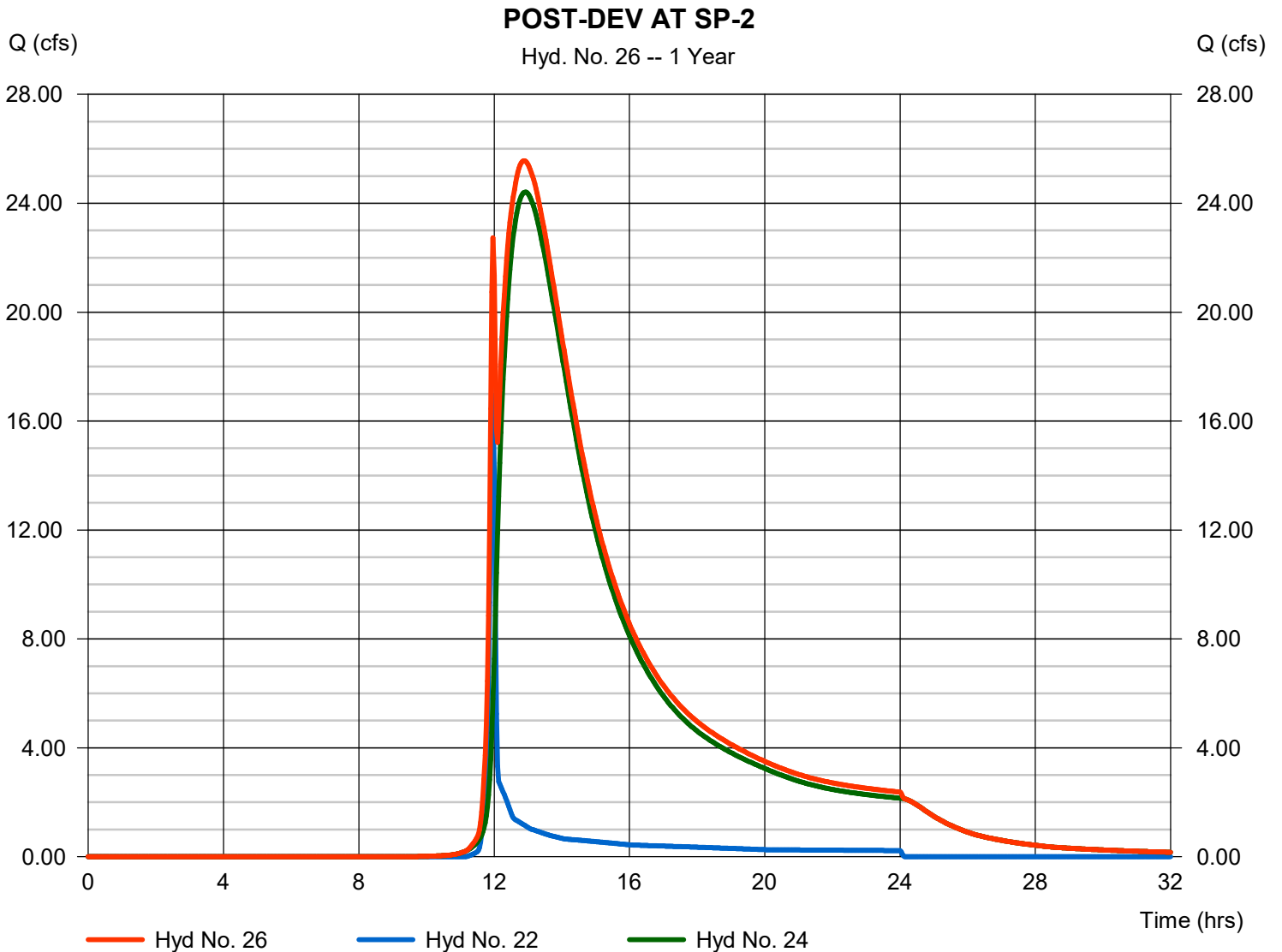
Wednesday, 02 / 28 / 2024

## Hyd. No. 26

POST-DEV AT SP-2

Hydrograph type = Combine  
Storm frequency = 1 yrs  
Time interval = 2 min  
Inflow hyds. = 22, 24

Peak discharge = 25.56 cfs  
Time to peak = 12.90 hrs  
Hyd. volume = 411,058 cuft  
Contrib. drain. area = 9.900 ac



# Hydrograph Report

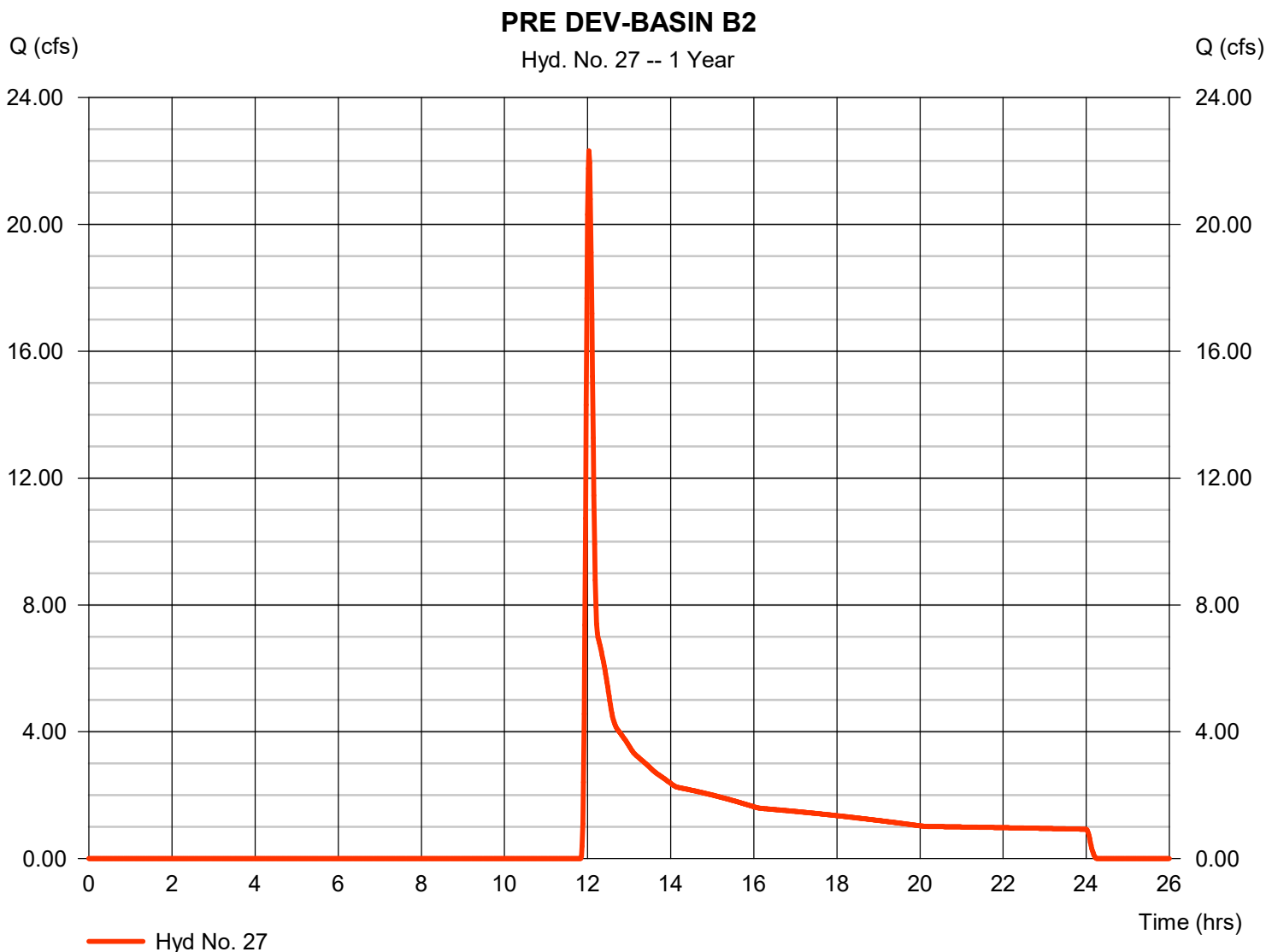
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 27

### PRE DEV-BASIN B2

Hydrograph type	= SCS Runoff	Peak discharge	= 22.32 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 88,707 cuft
Drainage area	= 70.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.51 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 21

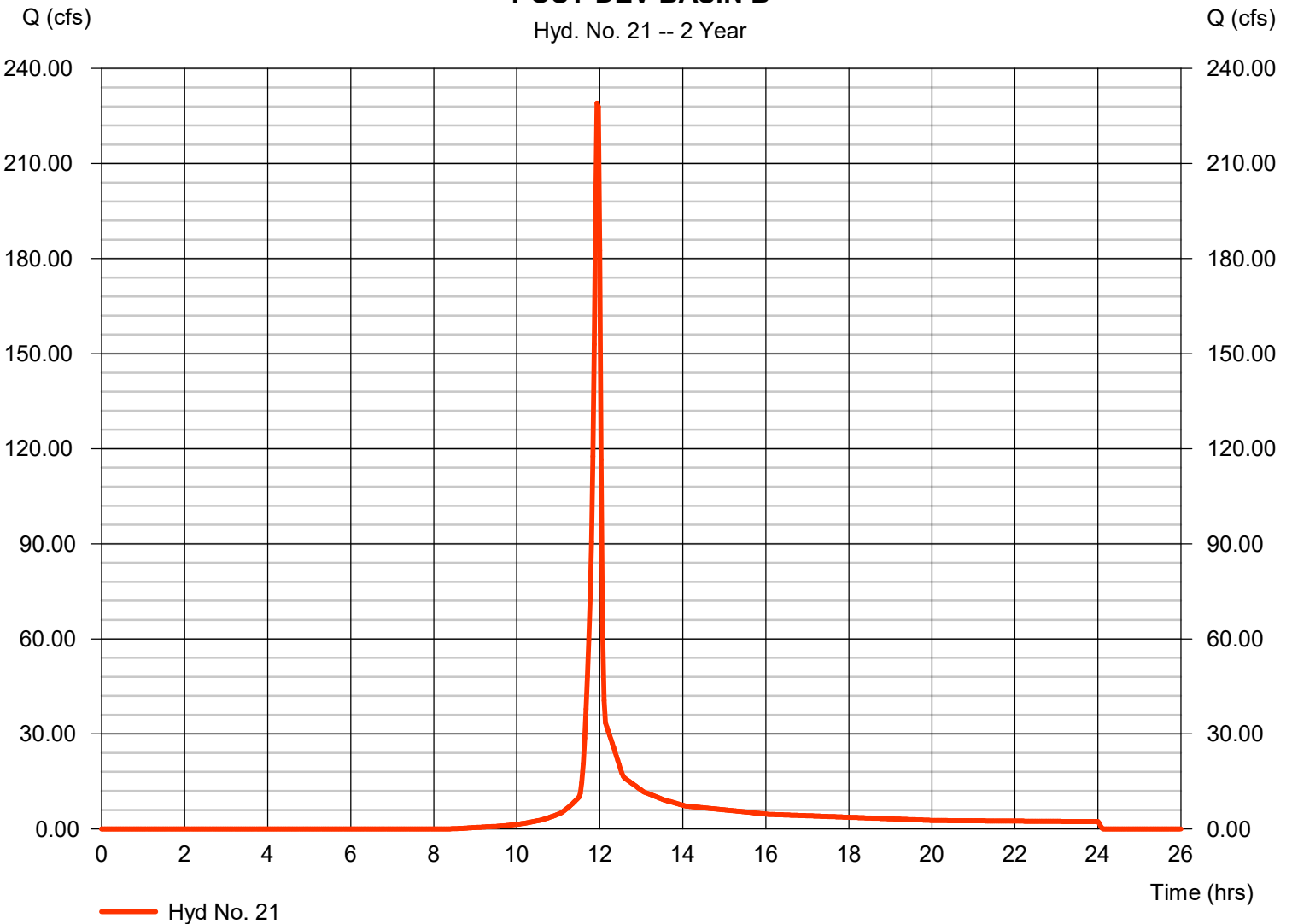
### POST-DEV BASIN B

Hydrograph type	= SCS Runoff	Peak discharge	= 229.10 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 462,892 cuft
Drainage area	= 67.440 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.97 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(13.210 x 55) + (16.000 x 65) + (38.230 x 95)] / 67.440

### POST-DEV BASIN B

Hyd. No. 21 -- 2 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

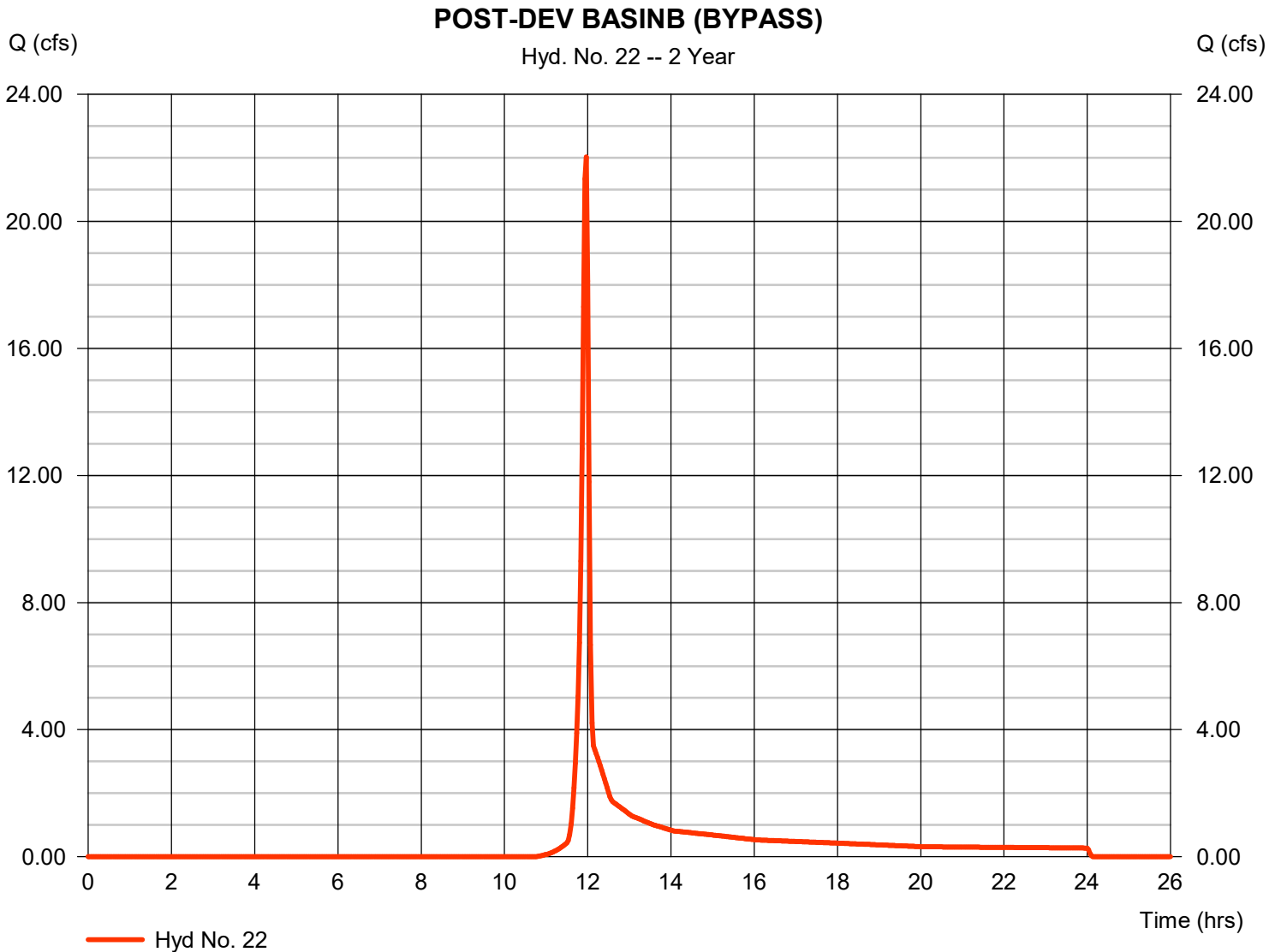
Wednesday, 02 / 28 / 2024

## Hyd. No. 22

### POST-DEV BASINB (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 22.03 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 44,125 cuft
Drainage area	= 9.900 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.97 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(3.750 x 95) + (6.150 x 55)] / 9.900



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 23

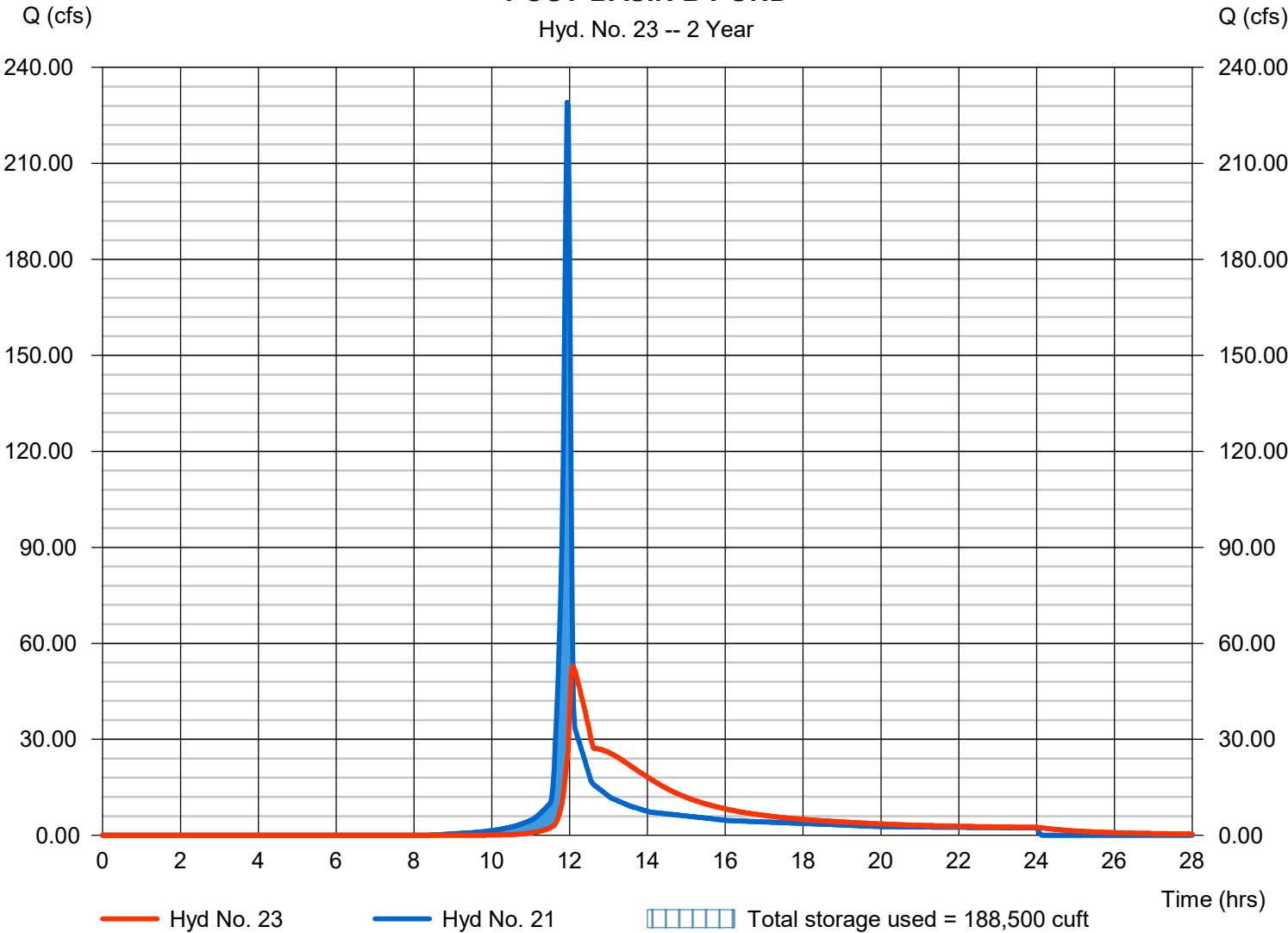
### POST-BASIN B POND

Hydrograph type	= Reservoir	Peak discharge	= 52.76 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 462,843 cuft
Inflow hyd. No.	= 21 - POST-DEV BASIN B	Max. Elevation	= 1084.06 ft
Reservoir name	= WET POND 2	Max. Storage	= 188,500 cuft

Storage Indication method used.

### POST-BASIN B POND

Hyd. No. 23 -- 2 Year





# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

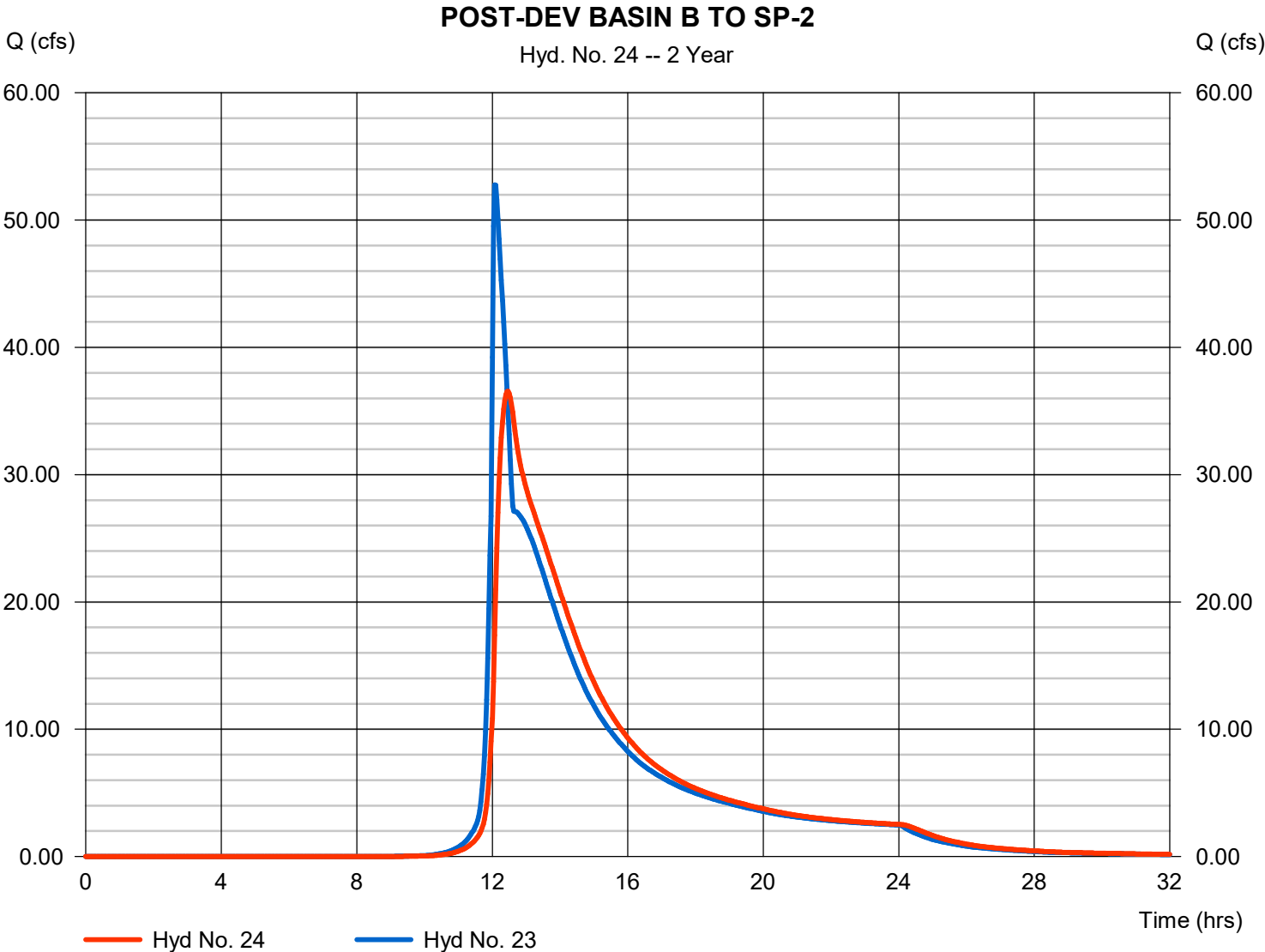
Wednesday, 02 / 28 / 2024

## Hyd. No. 24

### POST-DEV BASIN B TO SP-2

Hydrograph type	= Reach	Peak discharge	= 36.54 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.47 hrs
Time interval	= 2 min	Hyd. volume	= 462,400 cuft
Inflow hyd. No.	= 23 - POST-BASIN B POND	Section type	= Trapezoidal
Reach length	= 1295.0 ft	Channel slope	= 4.0 %
Manning's n	= 0.150	Bottom width	= 18.0 ft
Side slope	= 10.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.289	Rating curve m	= 1.281
Ave. velocity	= 0.90 ft/s	Routing coeff.	= 0.1019

Modified Att-Kin routing method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

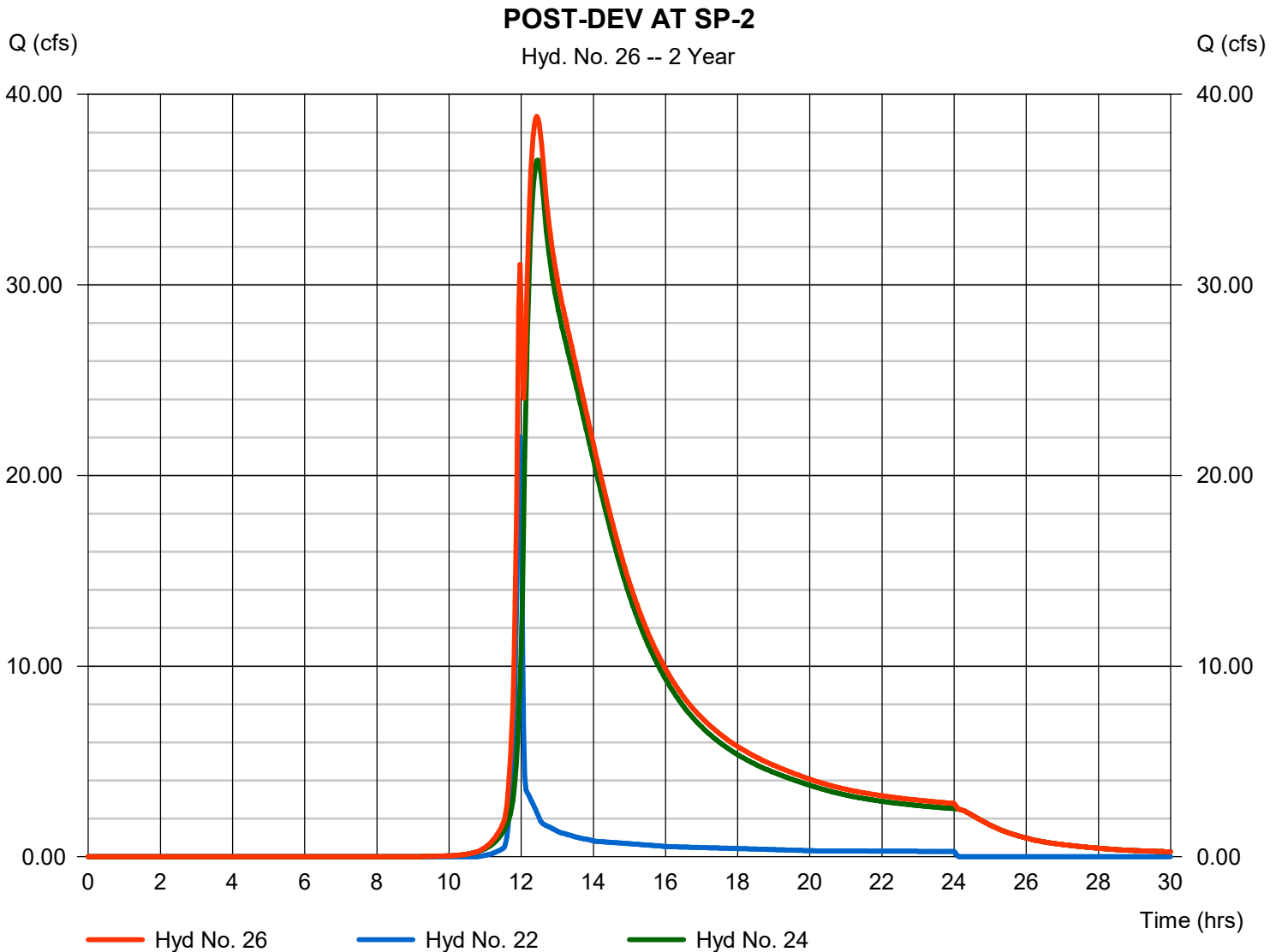
Wednesday, 02 / 28 / 2024

## Hyd. No. 26

POST-DEV AT SP-2

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 2 min  
Inflow hyds. = 22, 24

Peak discharge = 38.84 cfs  
Time to peak = 12.43 hrs  
Hyd. volume = 506,525 cuft  
Contrib. drain. area = 9.900 ac



# Hydrograph Report

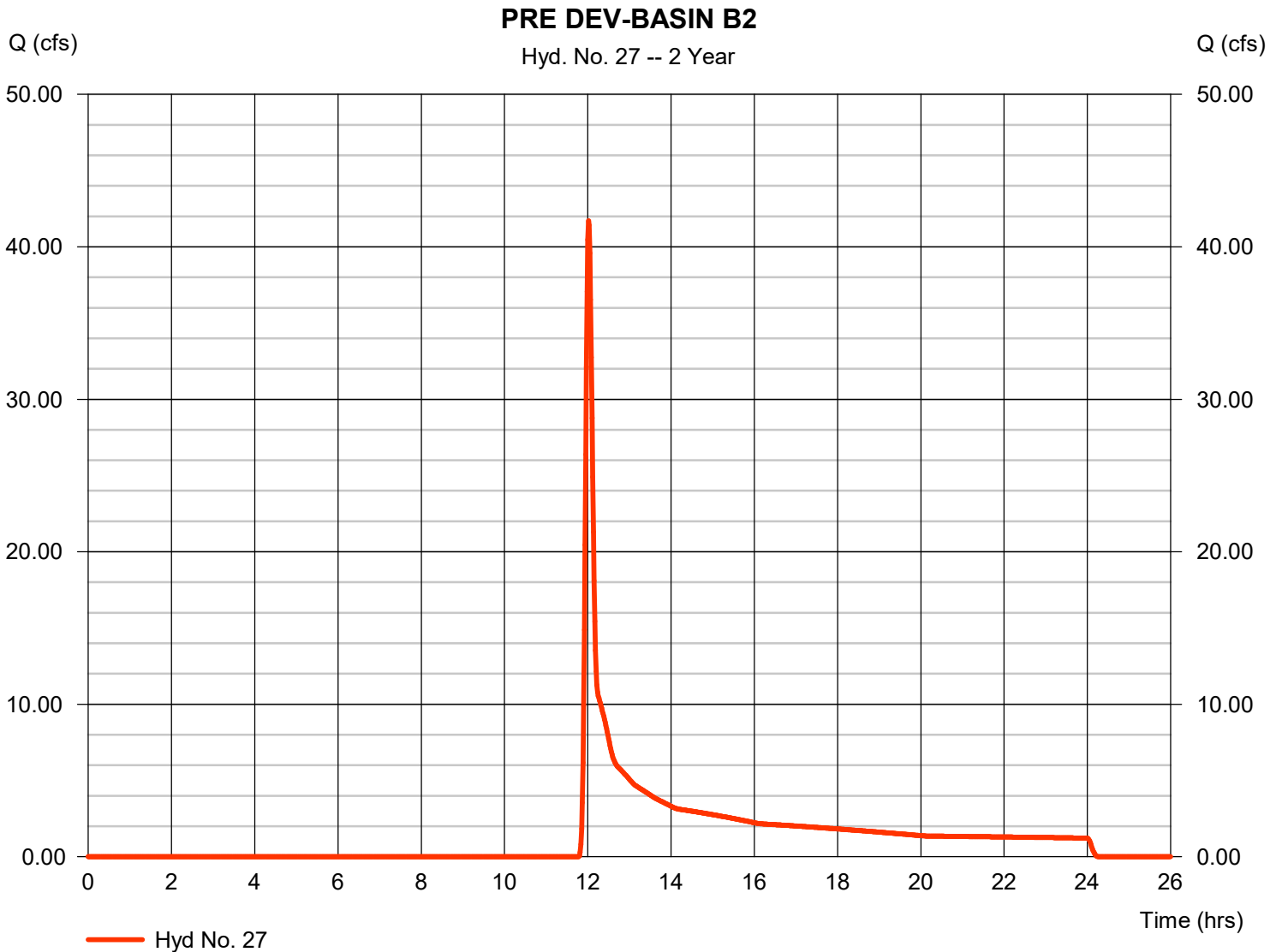
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 27

### PRE DEV-BASIN B2

Hydrograph type	= SCS Runoff	Peak discharge	= 41.71 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 131,594 cuft
Drainage area	= 70.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.97 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 21

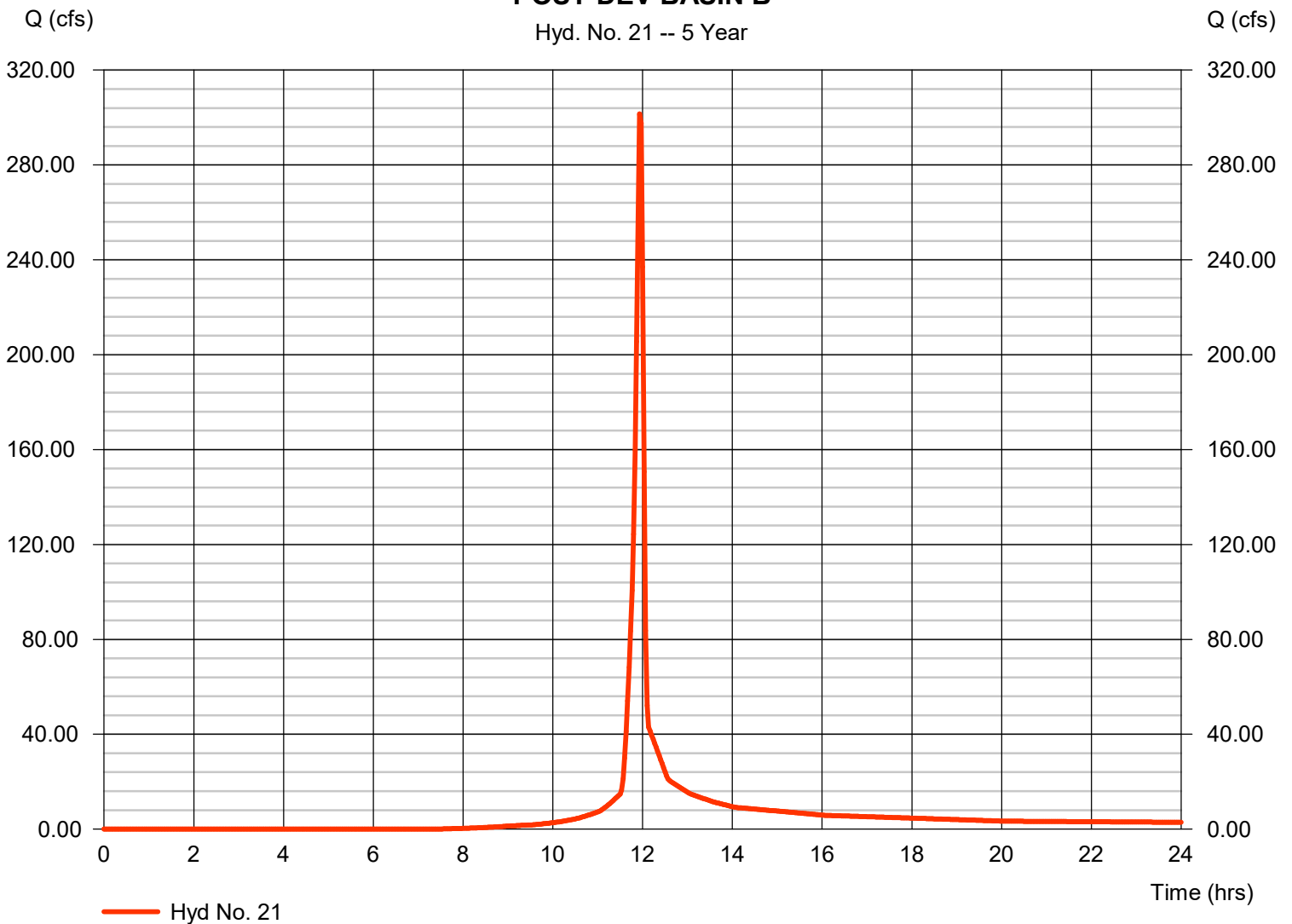
### POST-DEV BASIN B

Hydrograph type	= SCS Runoff	Peak discharge	= 301.57 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 612,163 cuft
Drainage area	= 67.440 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.74 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(13.210 x 55) + (16.000 x 65) + (38.230 x 95)] / 67.440

### POST-DEV BASIN B

Hyd. No. 21 -- 5 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 22

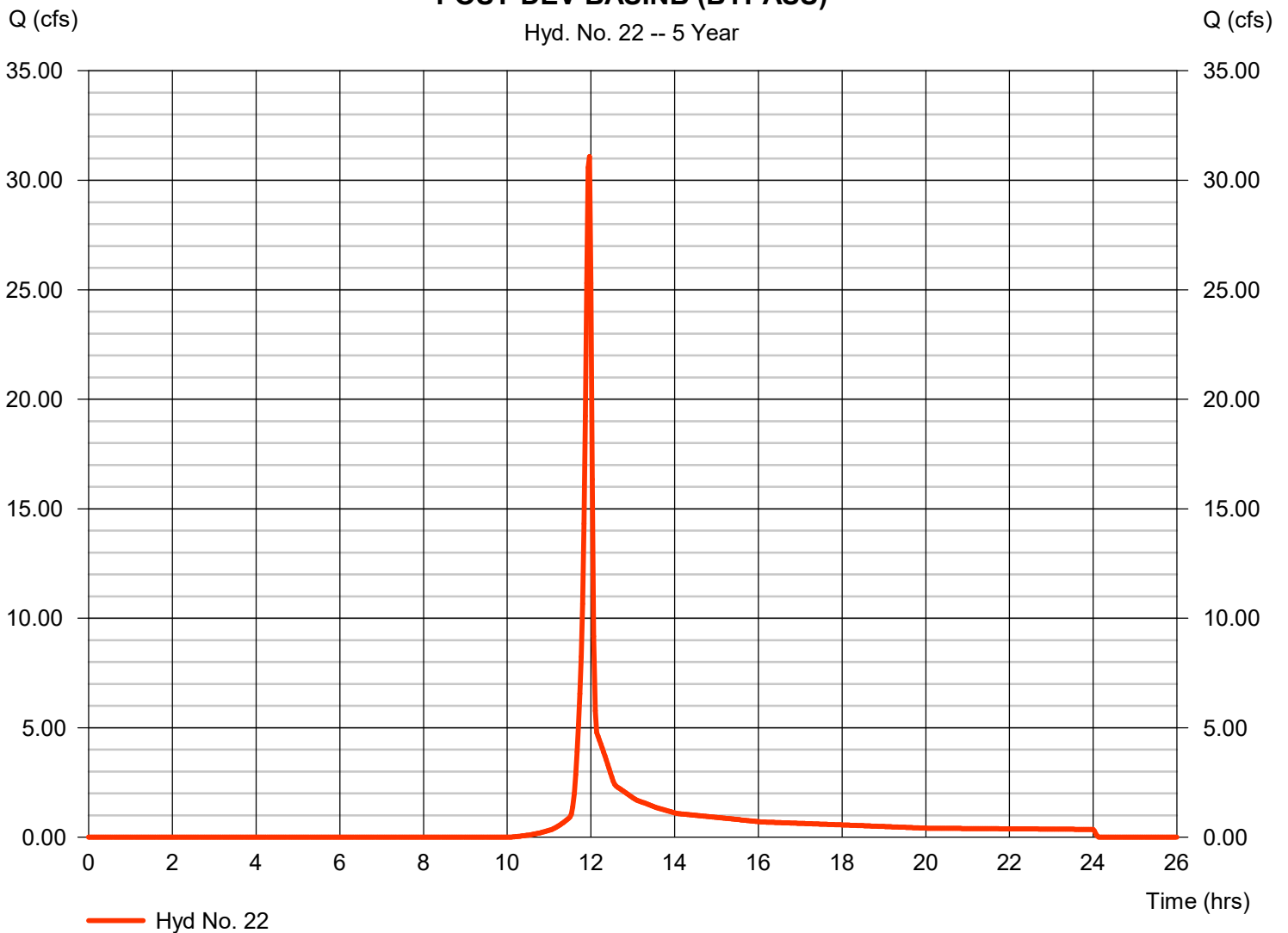
### POST-DEV BASINB (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 31.08 cfs
Storm frequency	= 5 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 62,183 cuft
Drainage area	= 9.900 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.74 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(3.750 x 95) + (6.150 x 55)] / 9.900

### POST-DEV BASINB (BYPASS)

Hyd. No. 22 -- 5 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

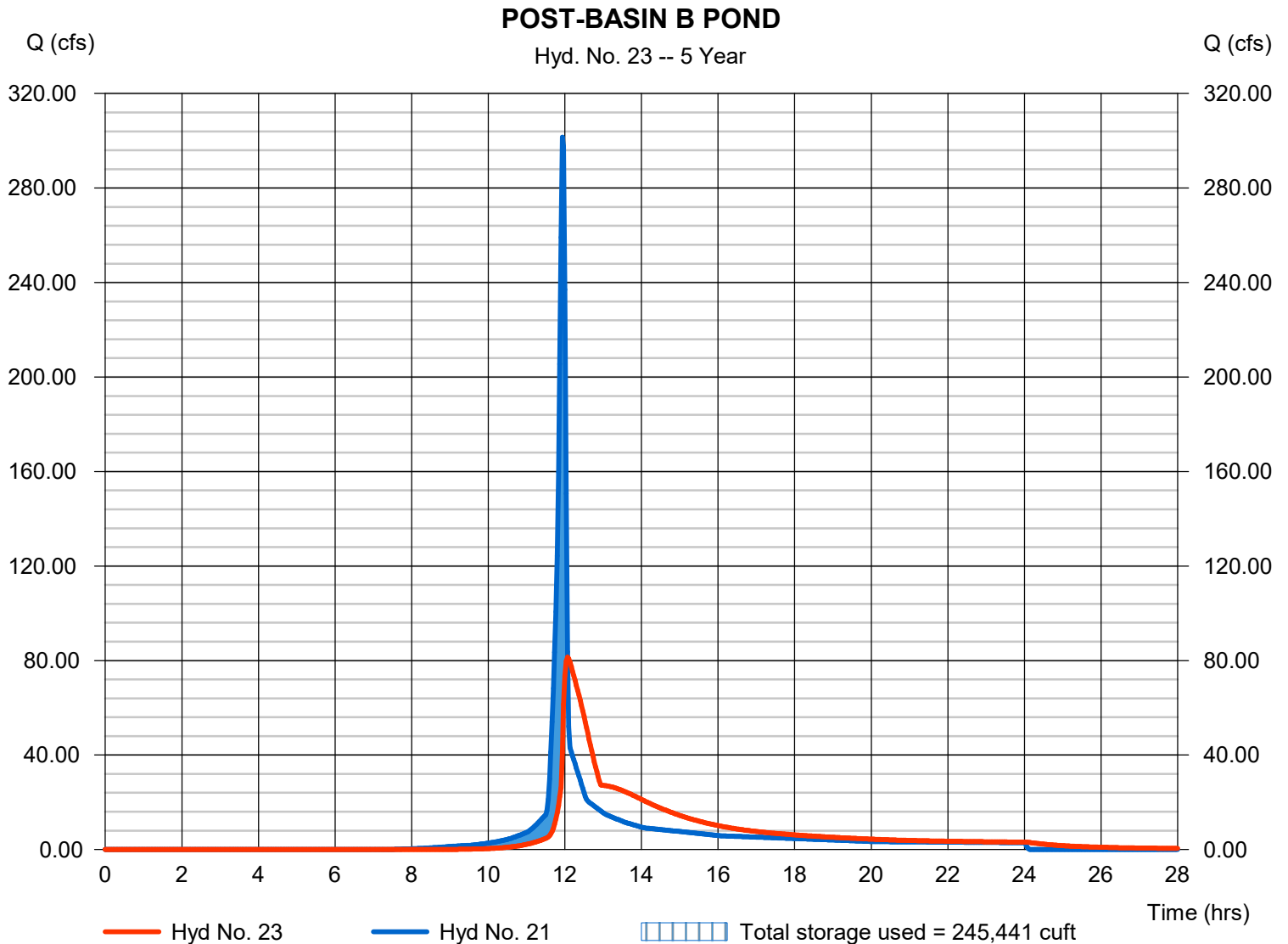
Wednesday, 02 / 28 / 2024

## Hyd. No. 23

### POST-BASIN B POND

Hydrograph type	= Reservoir	Peak discharge	= 81.47 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 612,112 cuft
Inflow hyd. No.	= 21 - POST-DEV BASIN B	Max. Elevation	= 1085.10 ft
Reservoir name	= WET POND 2	Max. Storage	= 245,441 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

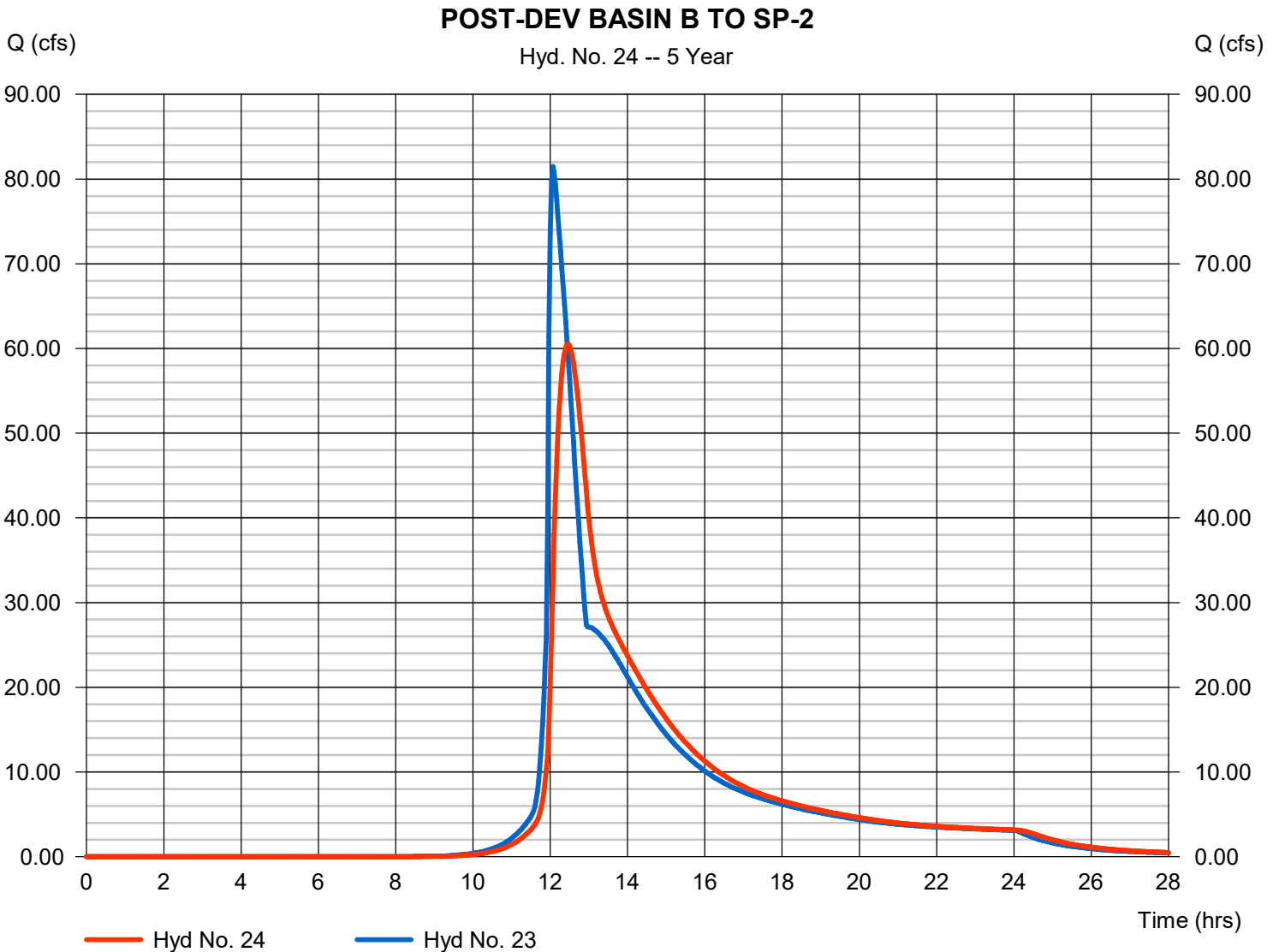
Wednesday, 02 / 28 / 2024

## Hyd. No. 24

### POST-DEV BASIN B TO SP-2

Hydrograph type	= Reach	Peak discharge	= 60.51 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.47 hrs
Time interval	= 2 min	Hyd. volume	= 611,670 cuft
Inflow hyd. No.	= 23 - POST-BASIN B POND	Section type	= Trapezoidal
Reach length	= 1295.0 ft	Channel slope	= 4.0 %
Manning's n	= 0.150	Bottom width	= 18.0 ft
Side slope	= 10.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.289	Rating curve m	= 1.281
Ave. velocity	= 1.00 ft/s	Routing coeff.	= 0.1115

Modified Att-Kin routing method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

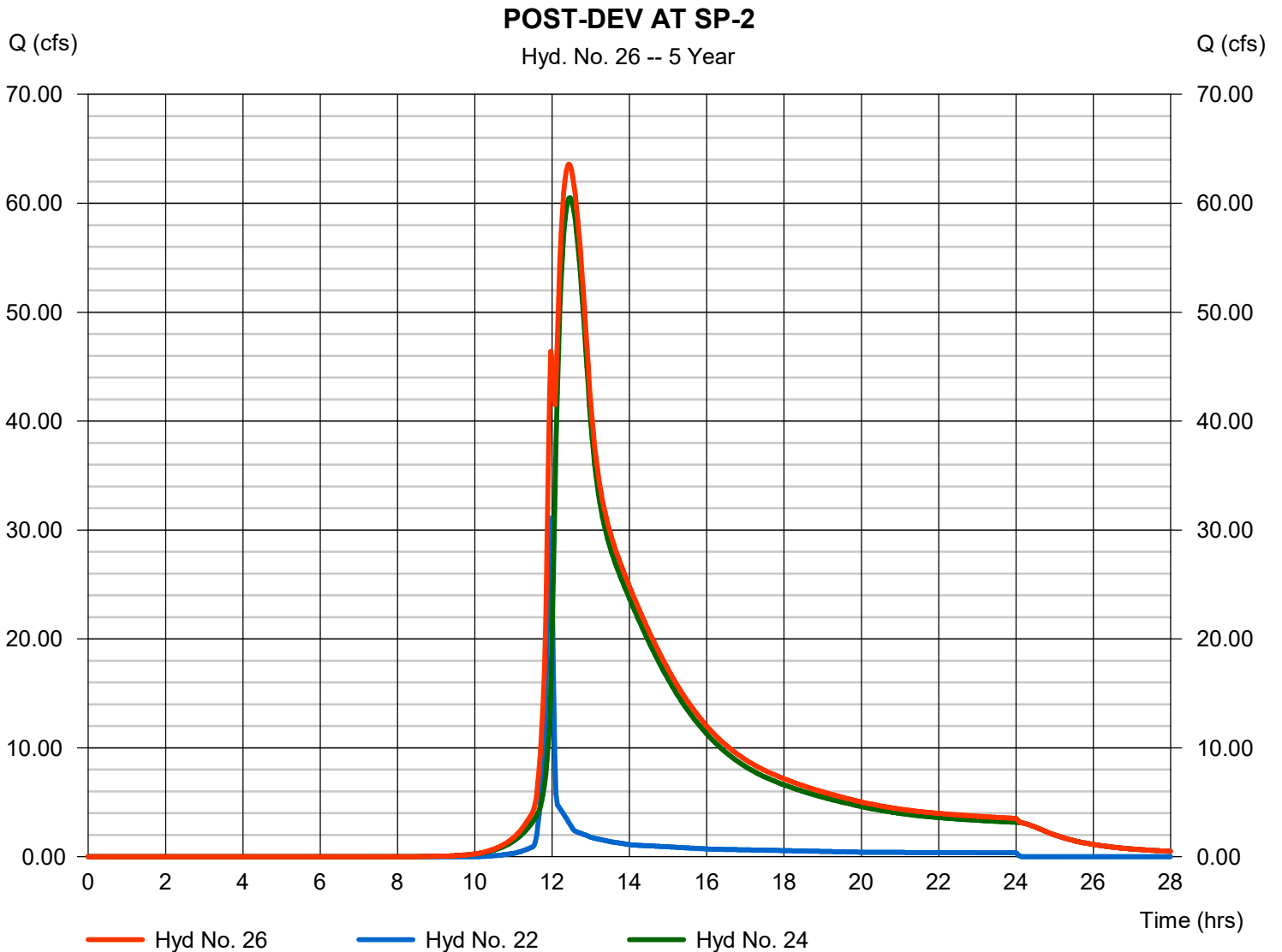
Wednesday, 02 / 28 / 2024

## Hyd. No. 26

POST-DEV AT SP-2

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Time interval = 2 min  
Inflow hyds. = 22, 24

Peak discharge = 63.59 cfs  
Time to peak = 12.43 hrs  
Hyd. volume = 673,852 cuft  
Contrib. drain. area = 9.900 ac



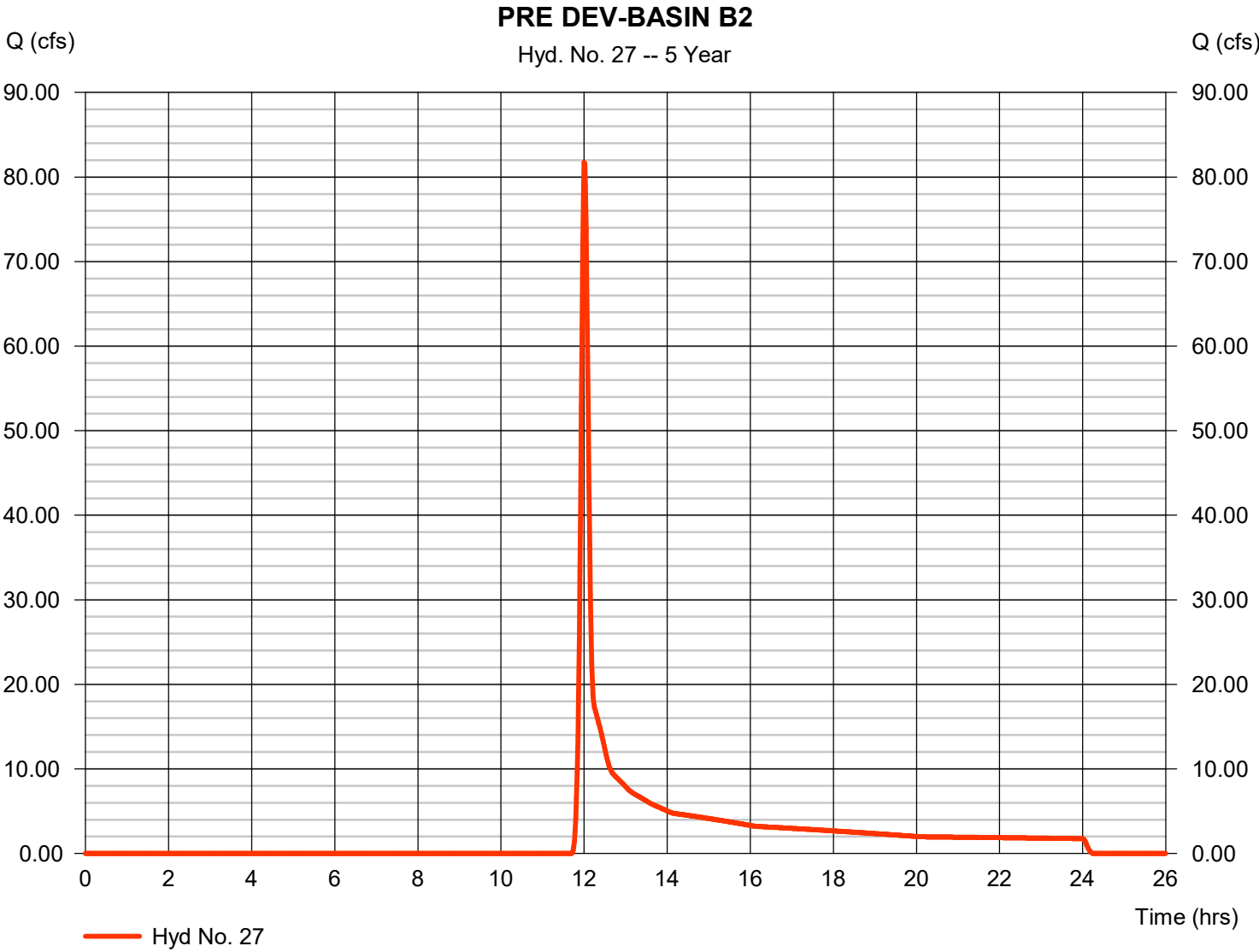


# Hydrograph Report

## Hyd. No. 27

### PRE DEV-BASIN B2

Hydrograph type	= SCS Runoff	Peak discharge	= 81.73 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 216,884 cuft
Drainage area	= 70.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.74 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

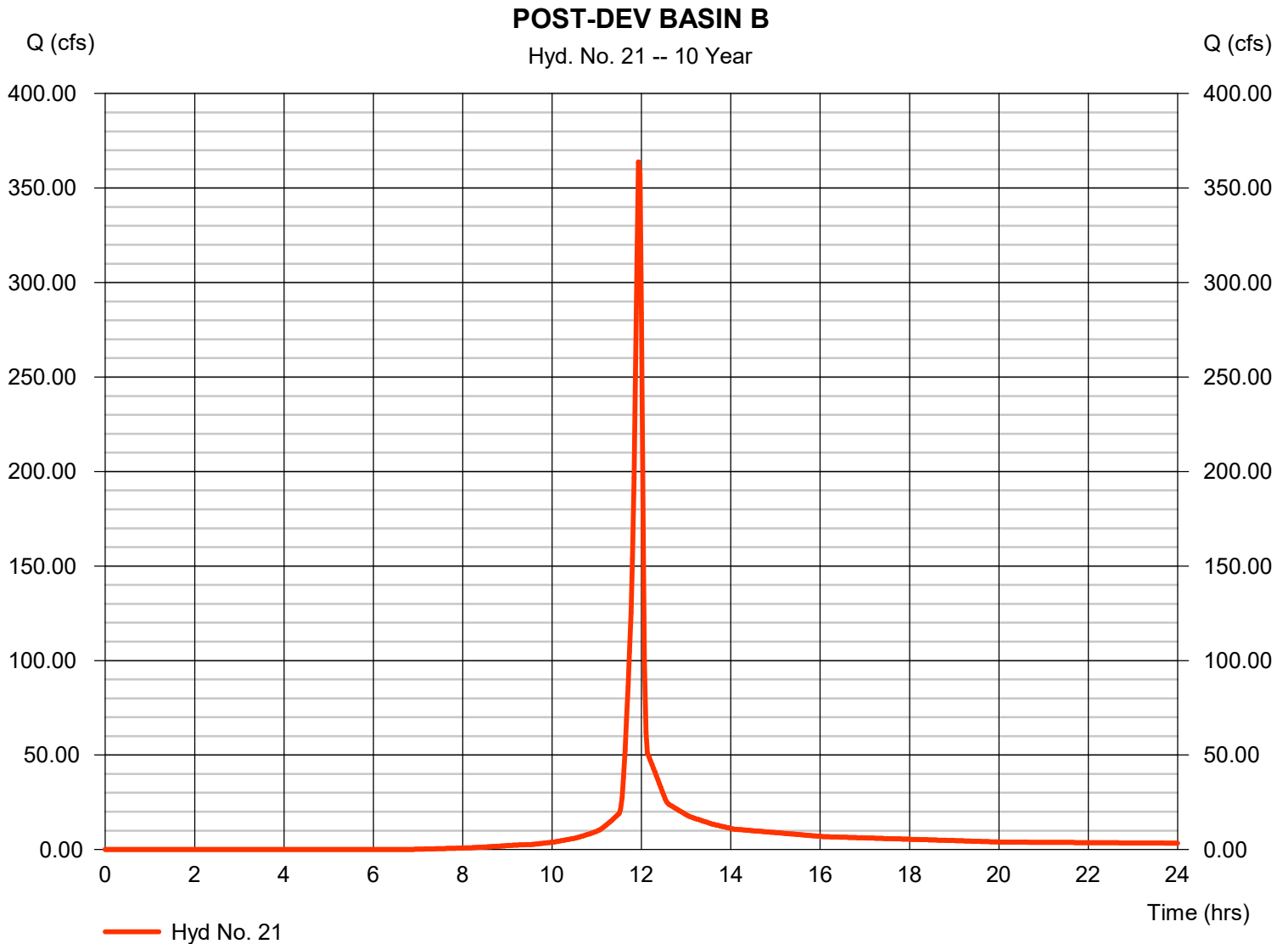
Wednesday, 02 / 28 / 2024

## Hyd. No. 21

### POST-DEV BASIN B

Hydrograph type	= SCS Runoff	Peak discharge	= 363.85 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 742,624 cuft
Drainage area	= 67.440 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(13.210 x 55) + (16.000 x 65) + (38.230 x 95)] / 67.440



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

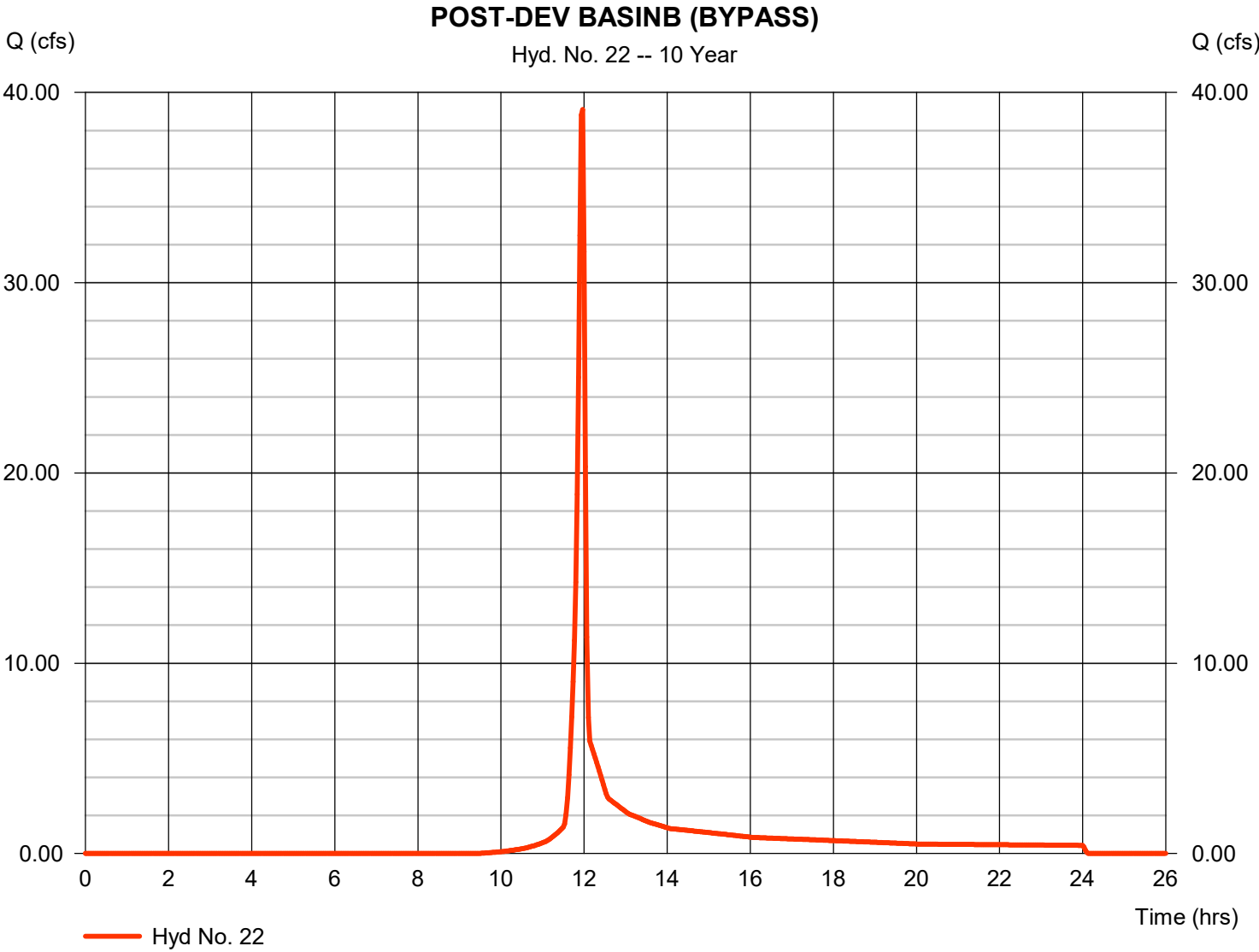
Wednesday, 02 / 28 / 2024

## Hyd. No. 22

### POST-DEV BASINB (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 39.11 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 78,498 cuft
Drainage area	= 9.900 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(3.750 x 95) + (6.150 x 55)] / 9.900



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 23

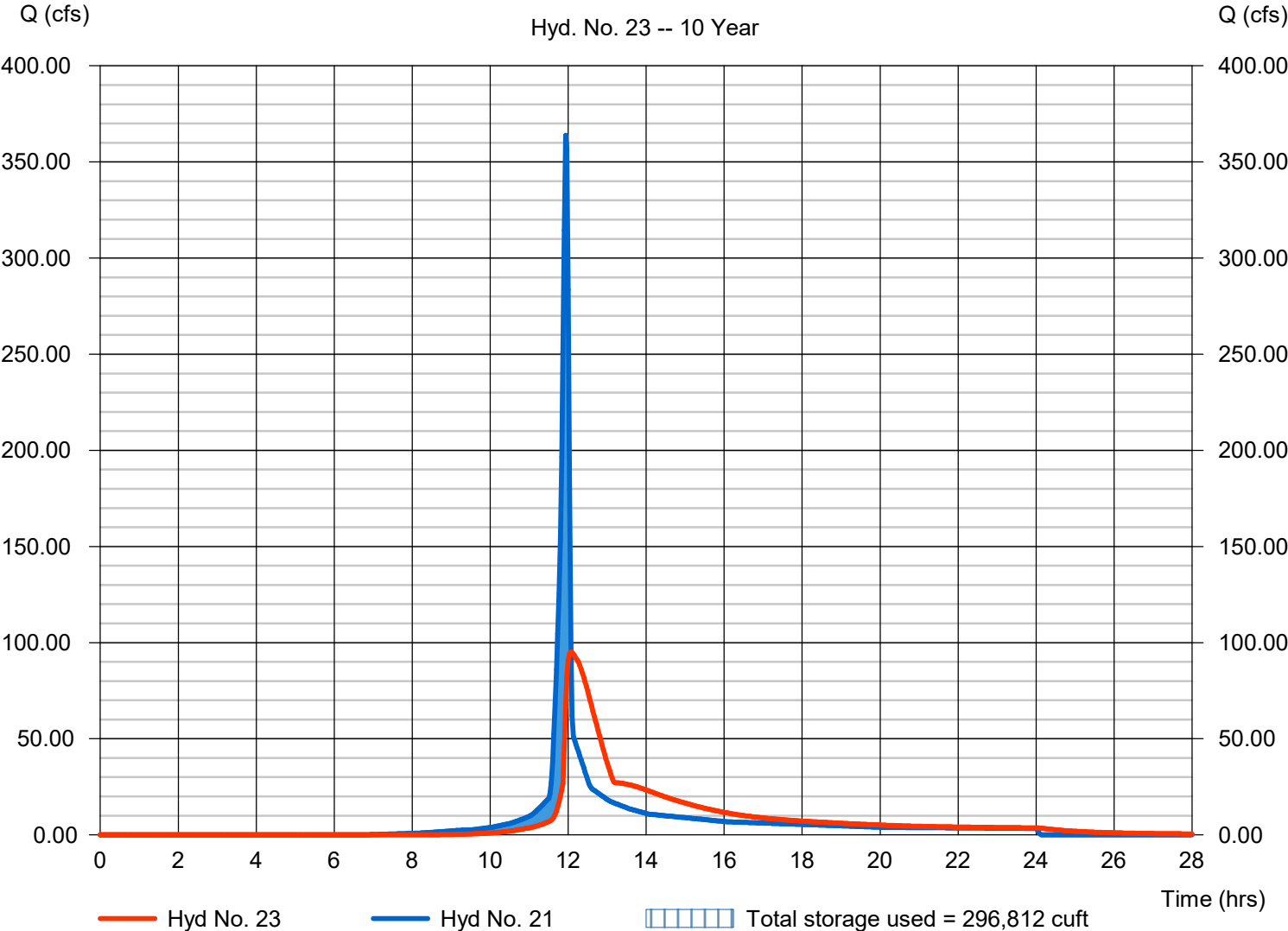
### POST-BASIN B POND

Hydrograph type	= Reservoir	Peak discharge	= 95.20 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 742,573 cuft
Inflow hyd. No.	= 21 - POST-DEV BASIN B	Max. Elevation	= 1085.97 ft
Reservoir name	= WET POND 2	Max. Storage	= 296,812 cuft

Storage Indication method used.

### POST-BASIN B POND

Hyd. No. 23 -- 10 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 24

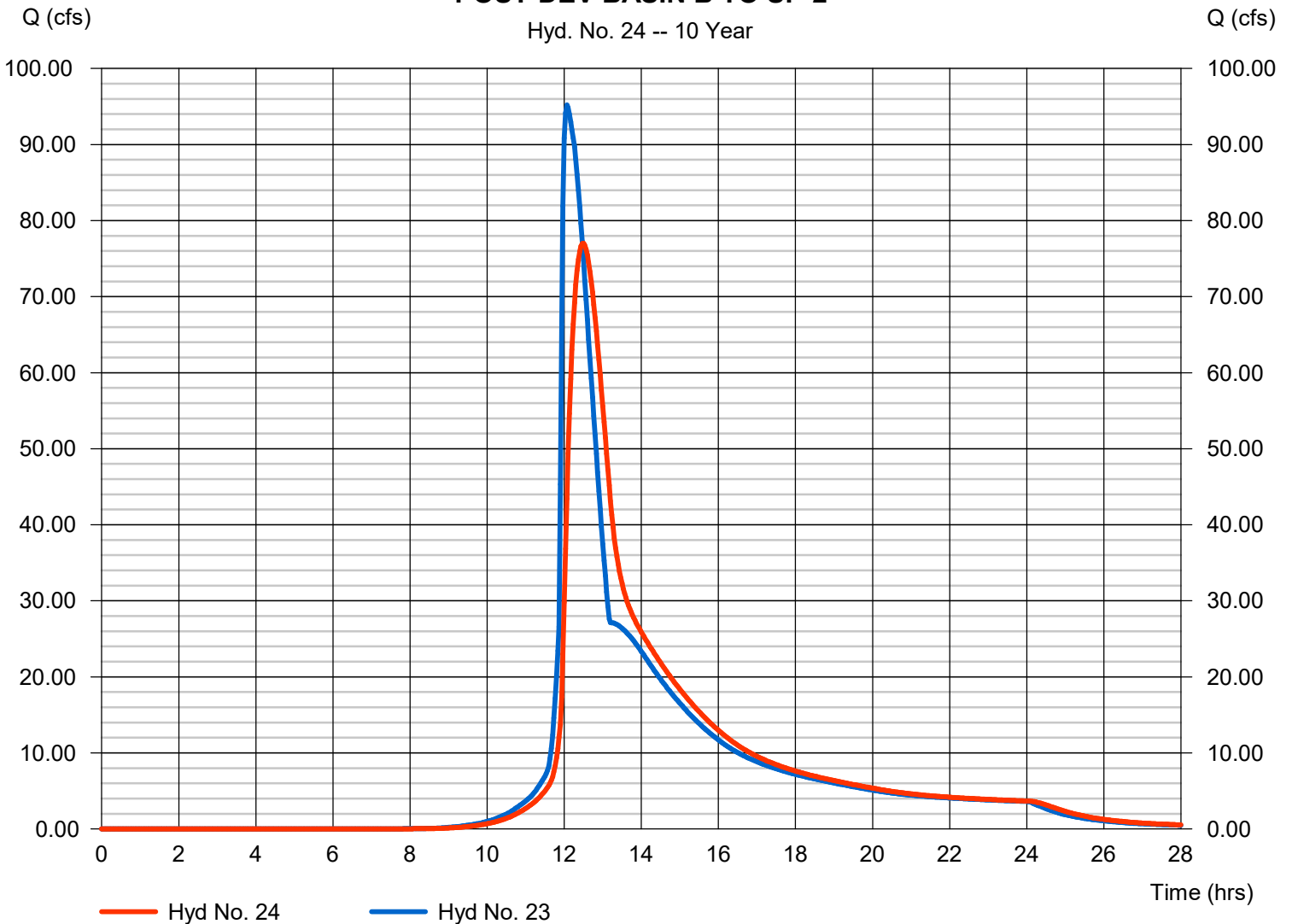
### POST-DEV BASIN B TO SP-2

Hydrograph type	= Reach	Peak discharge	= 77.02 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.50 hrs
Time interval	= 2 min	Hyd. volume	= 742,131 cuft
Inflow hyd. No.	= 23 - POST-BASIN B POND	Section type	= Trapezoidal
Reach length	= 1295.0 ft	Channel slope	= 4.0 %
Manning's n	= 0.150	Bottom width	= 18.0 ft
Side slope	= 10.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.289	Rating curve m	= 1.281
Ave. velocity	= 1.03 ft/s	Routing coeff.	= 0.1152

Modified Att-Kin routing method used.

### POST-DEV BASIN B TO SP-2

Hyd. No. 24 -- 10 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

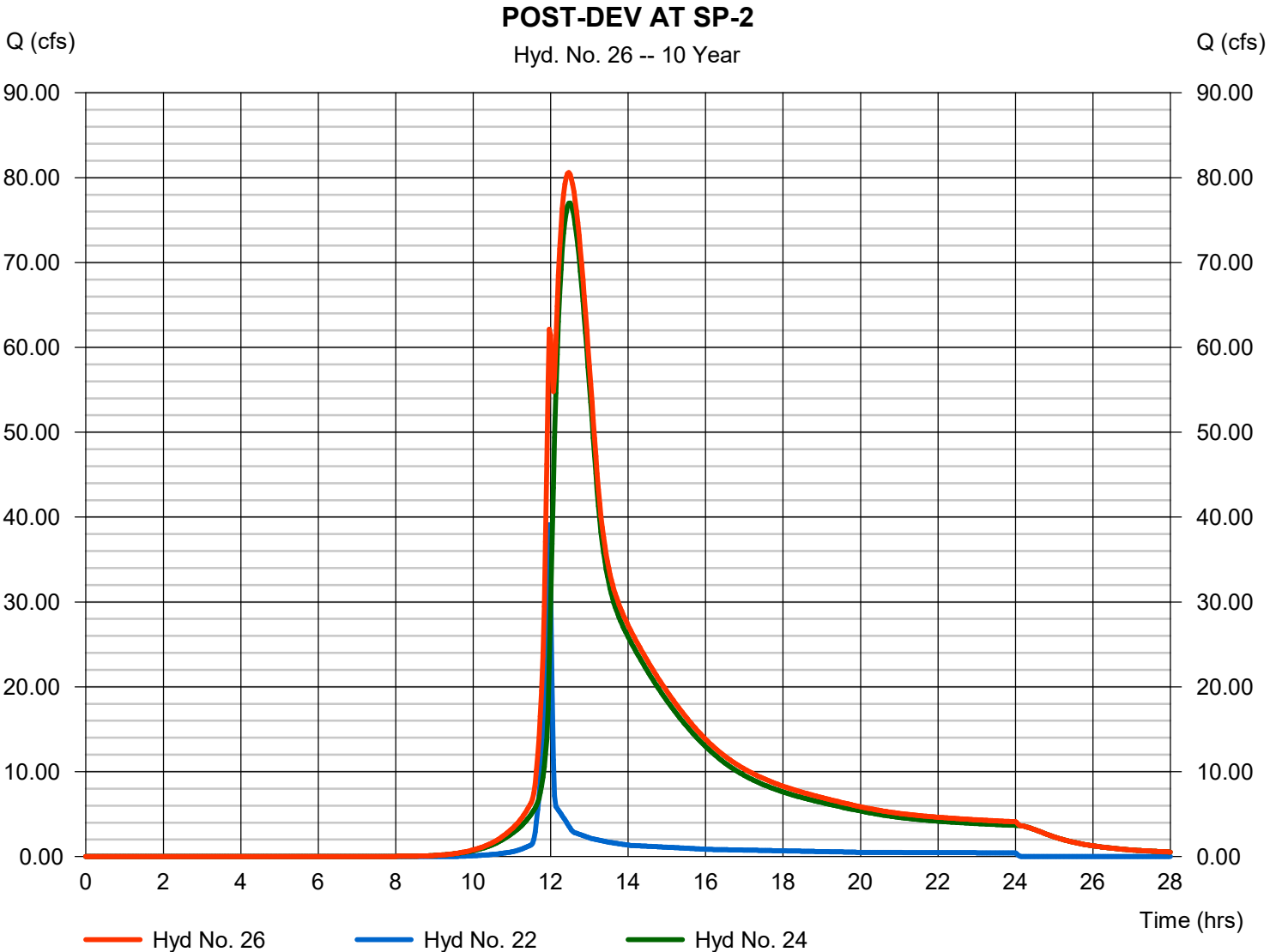
Wednesday, 02 / 28 / 2024

## Hyd. No. 26

POST-DEV AT SP-2

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 2 min  
Inflow hyds. = 22, 24

Peak discharge = 80.59 cfs  
Time to peak = 12.47 hrs  
Hyd. volume = 820,629 cuft  
Contrib. drain. area = 9.900 ac

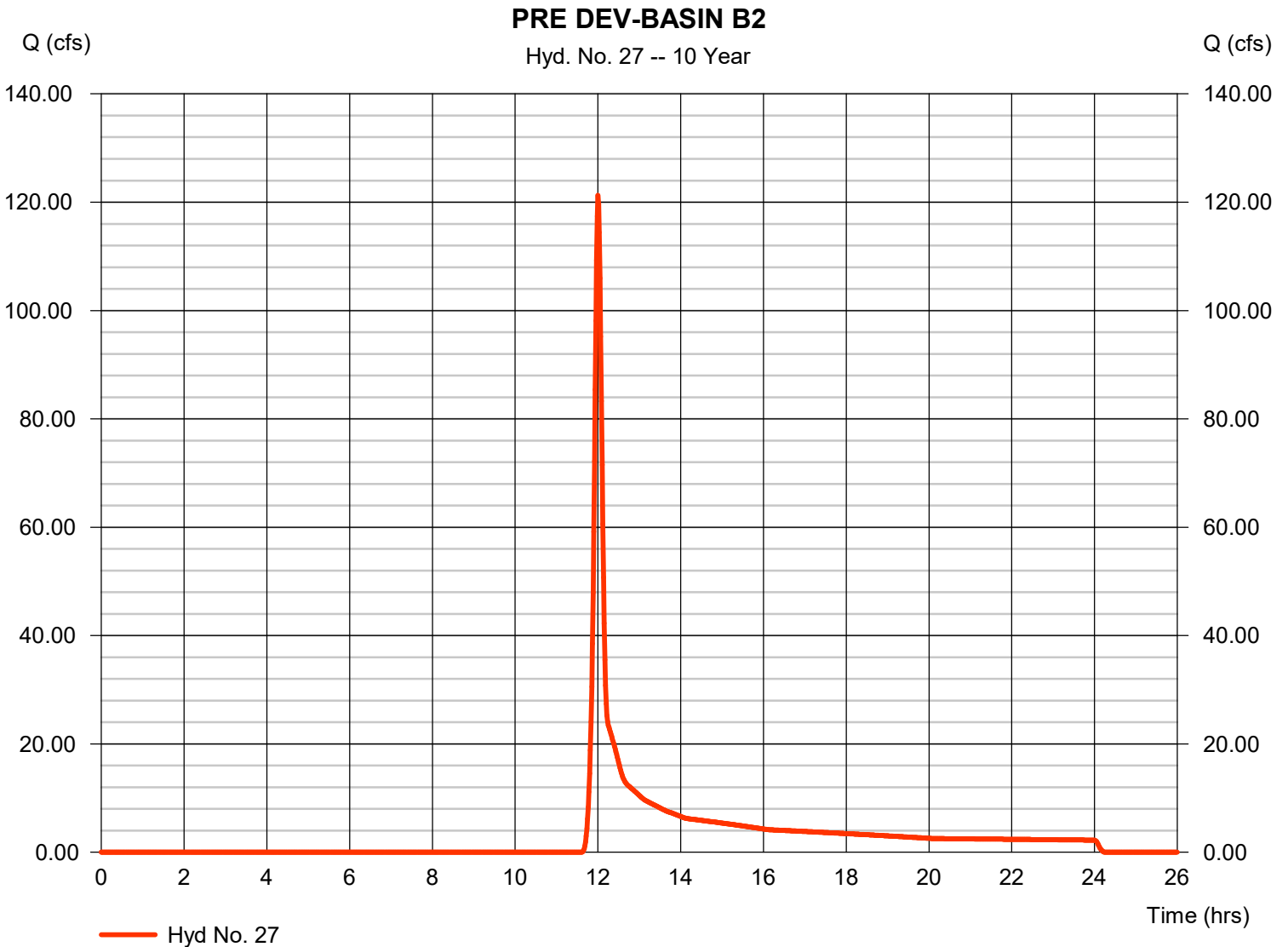


# Hydrograph Report

## Hyd. No. 27

### PRE DEV-BASIN B2

Hydrograph type	= SCS Runoff	Peak discharge	= 121.27 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 299,959 cuft
Drainage area	= 70.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.39 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 21

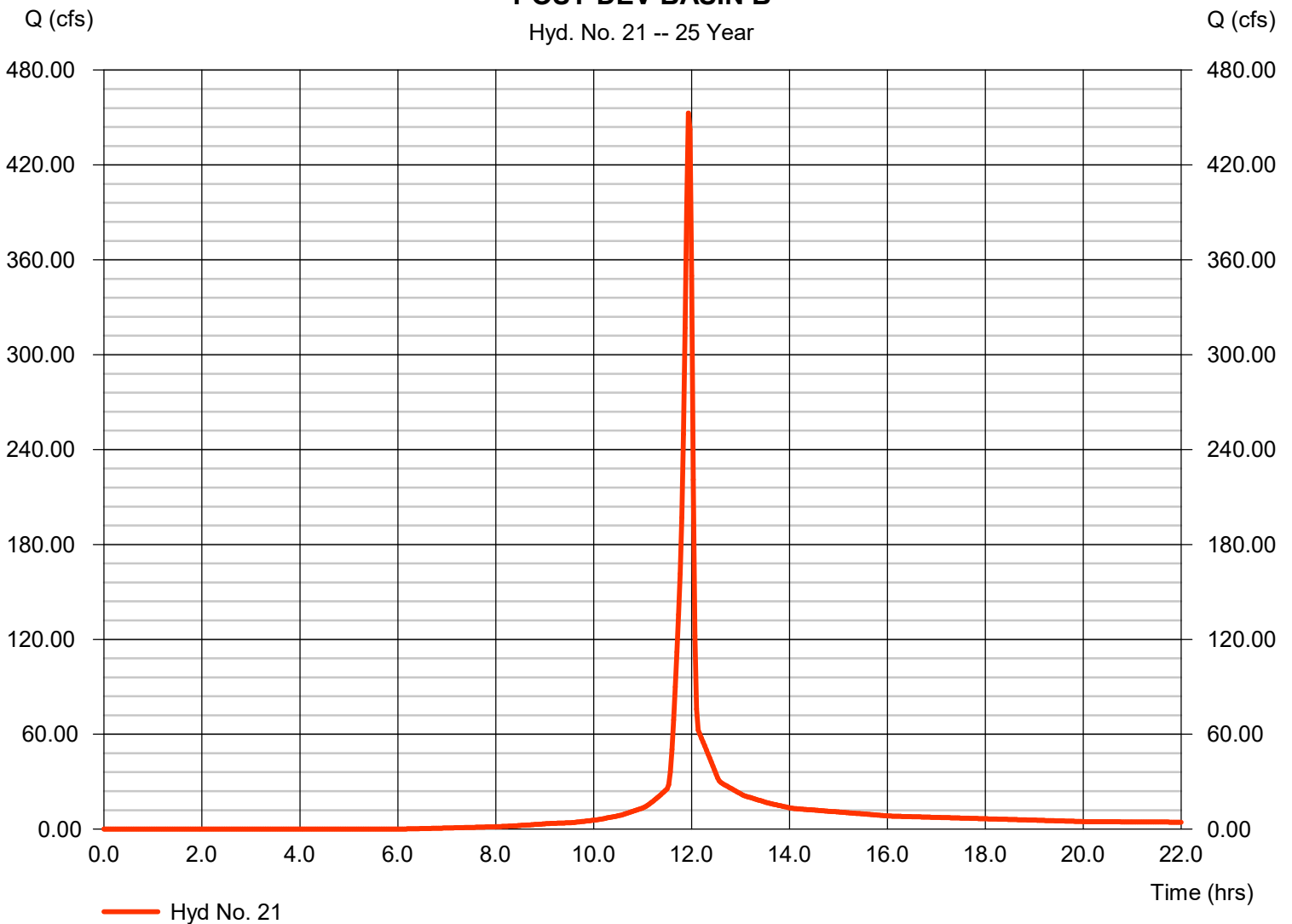
### POST-DEV BASIN B

Hydrograph type	= SCS Runoff	Peak discharge	= 452.89 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 932,281 cuft
Drainage area	= 67.440 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.31 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(13.210 x 55) + (16.000 x 65) + (38.230 x 95)] / 67.440

### POST-DEV BASIN B

Hyd. No. 21 -- 25 Year





# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

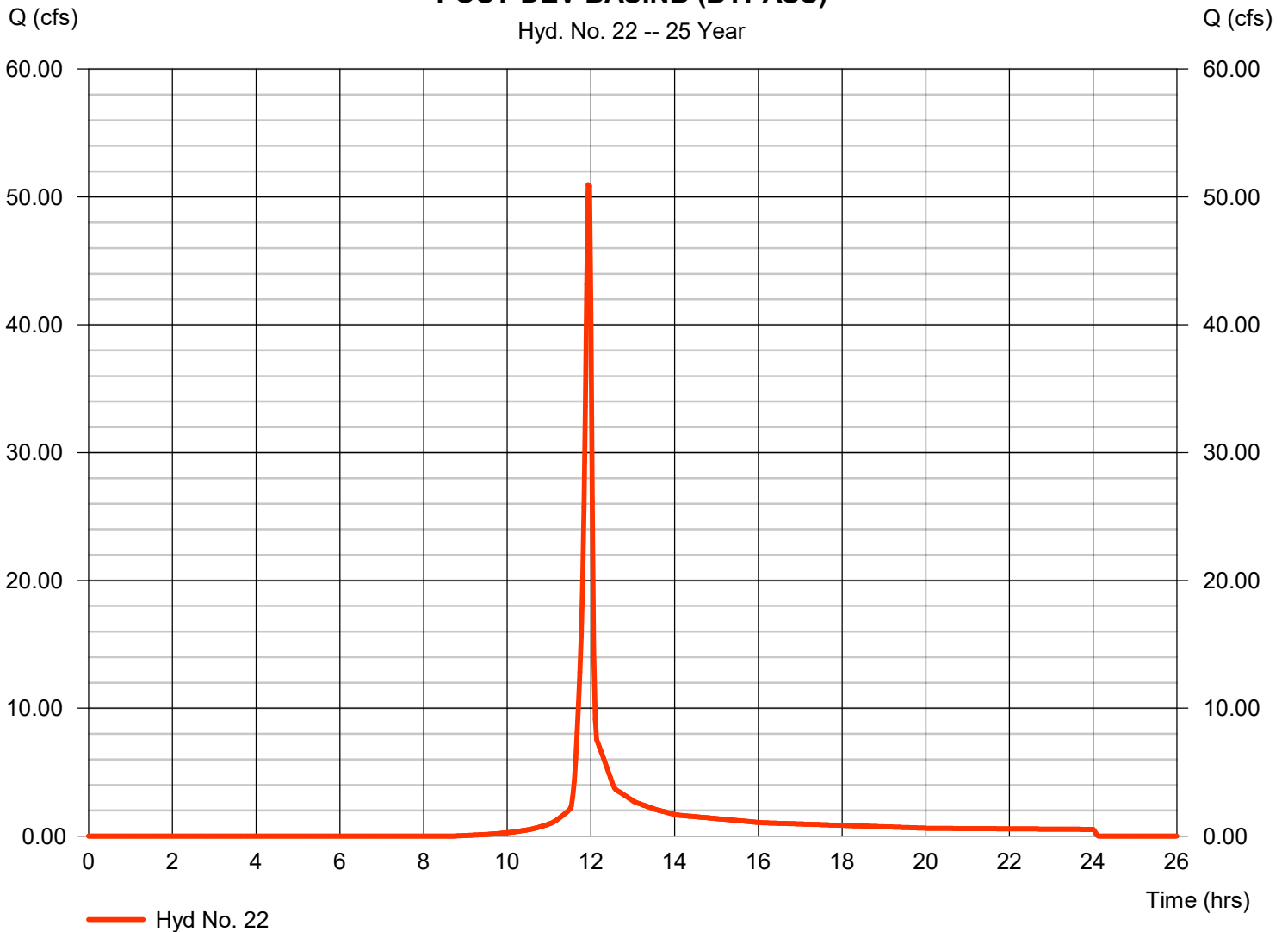
## Hyd. No. 22

### POST-DEV BASINB (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 50.95 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 102,865 cuft
Drainage area	= 9.900 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.31 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(3.750 x 95) + (6.150 x 55)] / 9.900

### POST-DEV BASINB (BYPASS)



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

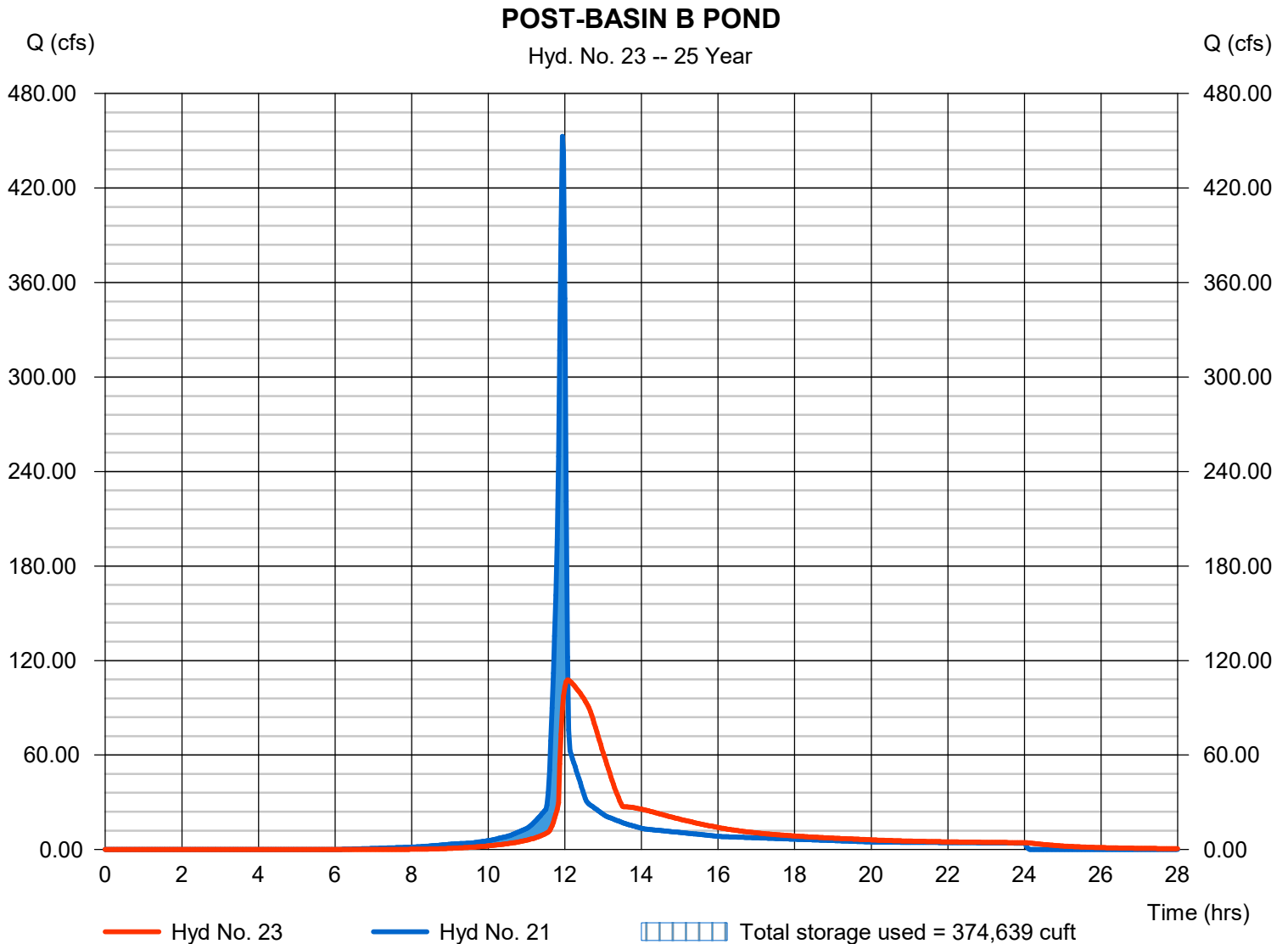
Wednesday, 02 / 28 / 2024

## Hyd. No. 23

### POST-BASIN B POND

Hydrograph type	= Reservoir	Peak discharge	= 107.63 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 932,231 cuft
Inflow hyd. No.	= 21 - POST-DEV BASIN B	Max. Elevation	= 1087.15 ft
Reservoir name	= WET POND 2	Max. Storage	= 374,639 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

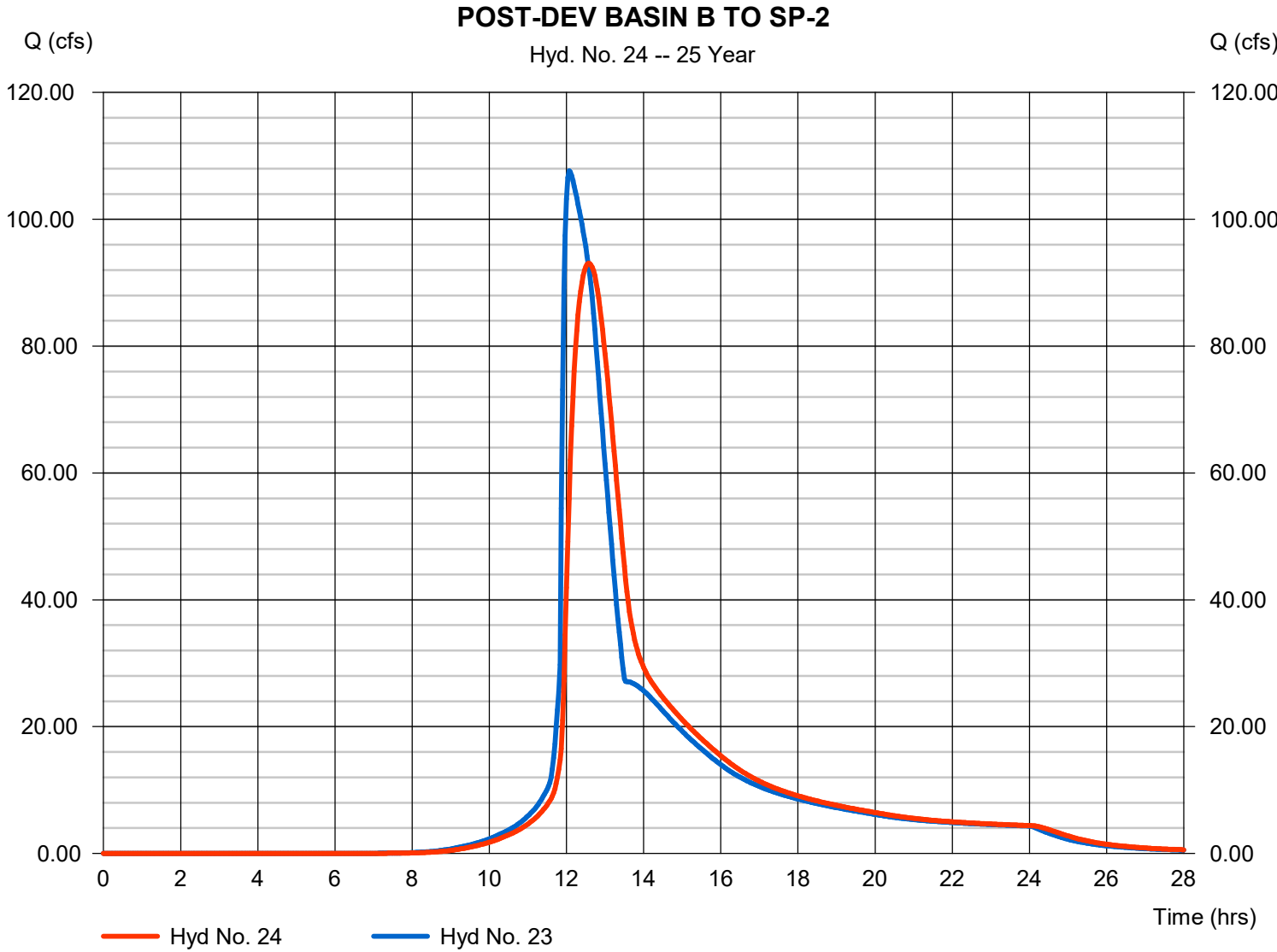
Wednesday, 02 / 28 / 2024

## Hyd. No. 24

### POST-DEV BASIN B TO SP-2

Hydrograph type	= Reach	Peak discharge	= 93.06 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.57 hrs
Time interval	= 2 min	Hyd. volume	= 931,788 cuft
Inflow hyd. No.	= 23 - POST-BASIN B POND	Section type	= Trapezoidal
Reach length	= 1295.0 ft	Channel slope	= 4.0 %
Manning's n	= 0.150	Bottom width	= 18.0 ft
Side slope	= 10.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.289	Rating curve m	= 1.281
Ave. velocity	= 1.06 ft/s	Routing coeff.	= 0.1181

Modified Att-Kin routing method used.



# Hydrograph Report

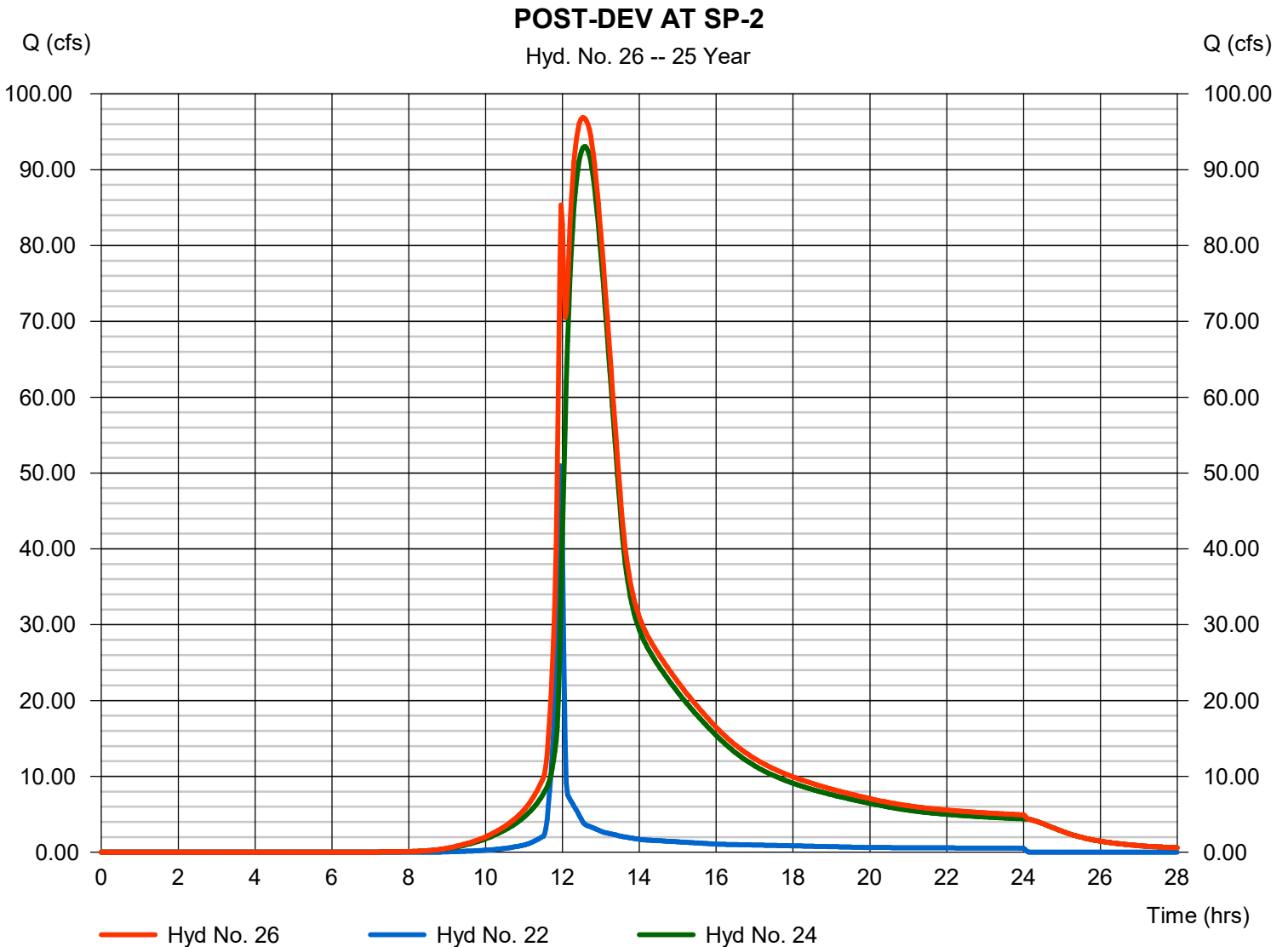
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 26

POST-DEV AT SP-2

Hydrograph type	= Combine	Peak discharge	= 96.88 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 1,034,651 cuft
Inflow hyds.	= 22, 24	Contrib. drain. area	= 9.900 ac

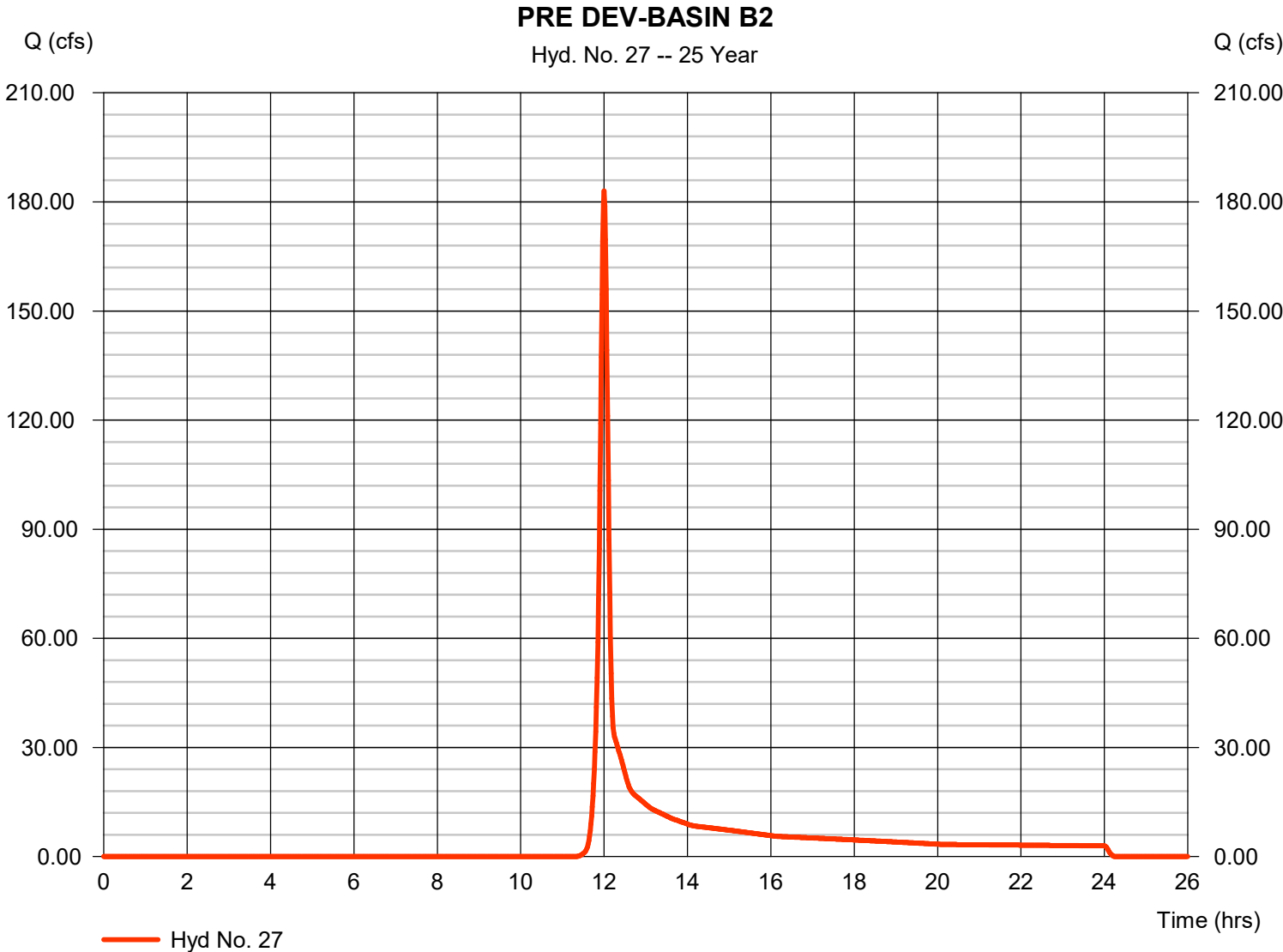


# Hydrograph Report

## Hyd. No. 27

### PRE DEV-BASIN B2

Hydrograph type	= SCS Runoff	Peak discharge	= 183.04 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 431,745 cuft
Drainage area	= 70.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.31 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

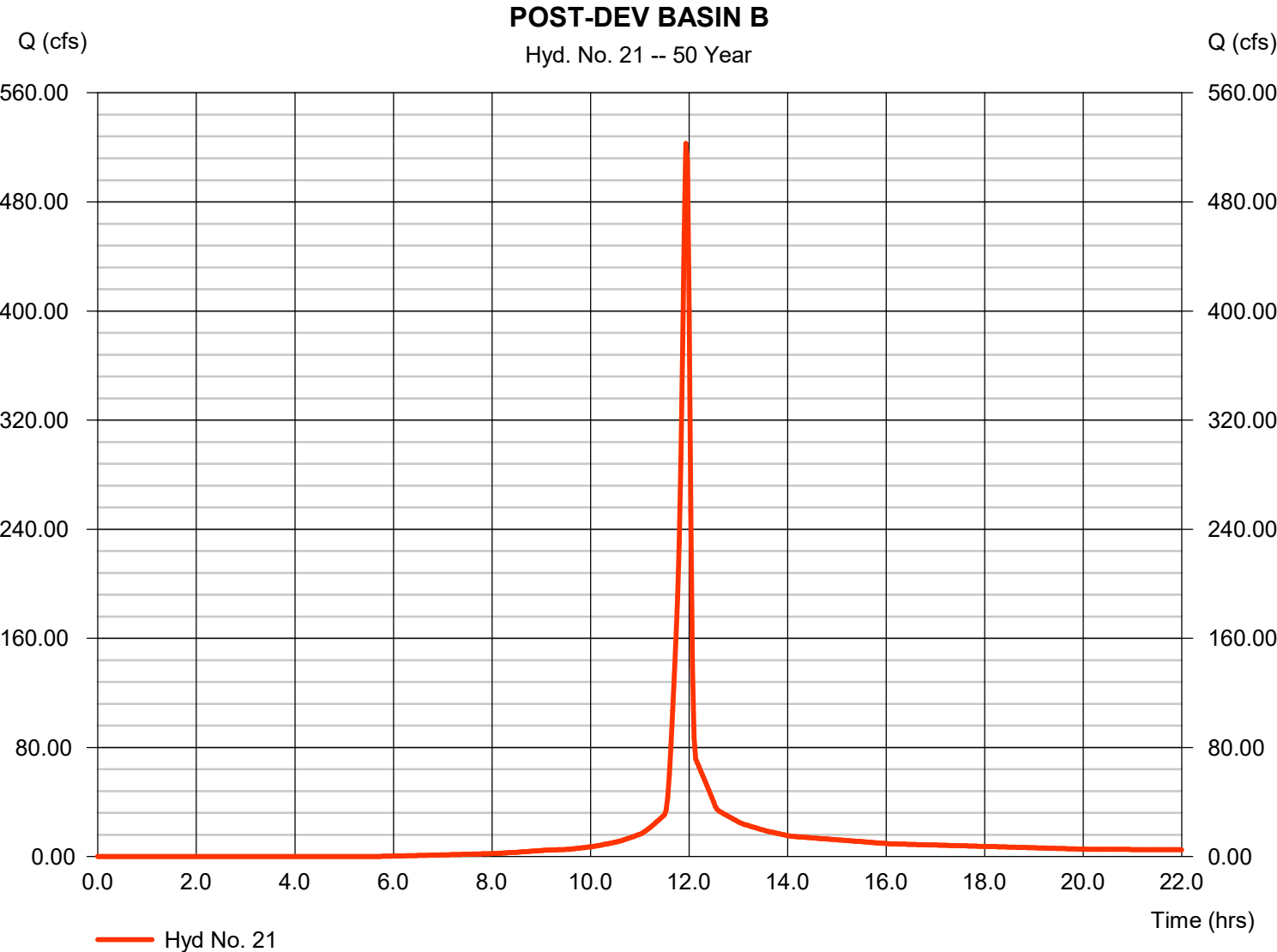
Wednesday, 02 / 28 / 2024

## Hyd. No. 21

### POST-DEV BASIN B

Hydrograph type	= SCS Runoff	Peak discharge	= 522.92 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 1,083,763 cuft
Drainage area	= 67.440 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.03 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(13.210 x 55) + (16.000 x 65) + (38.230 x 95)] / 67.440



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

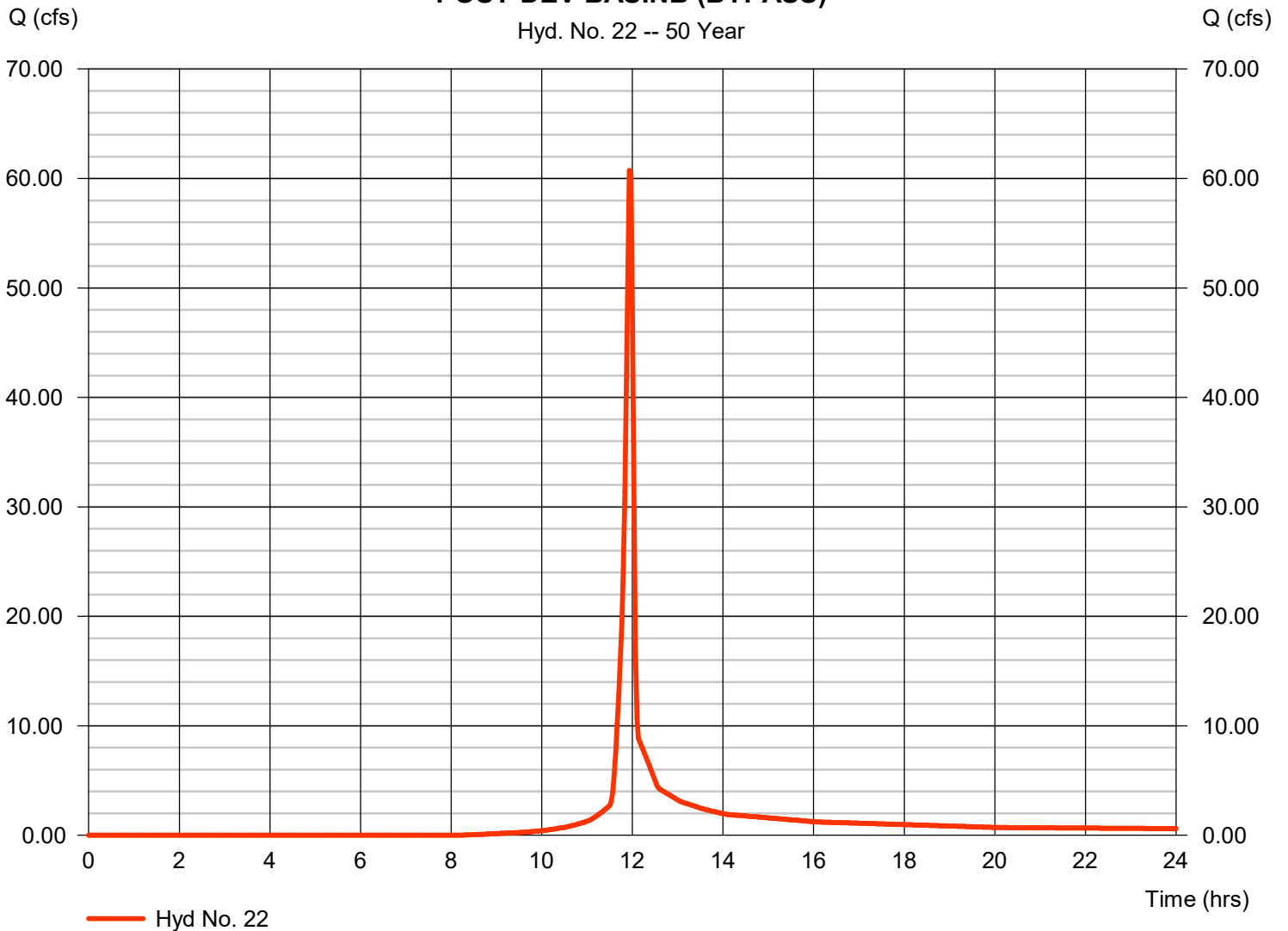
## Hyd. No. 22

### POST-DEV BASINB (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 60.72 cfs
Storm frequency	= 50 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 122,748 cuft
Drainage area	= 9.900 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.03 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(3.750 x 95) + (6.150 x 55)] / 9.900

### POST-DEV BASINB (BYPASS)



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

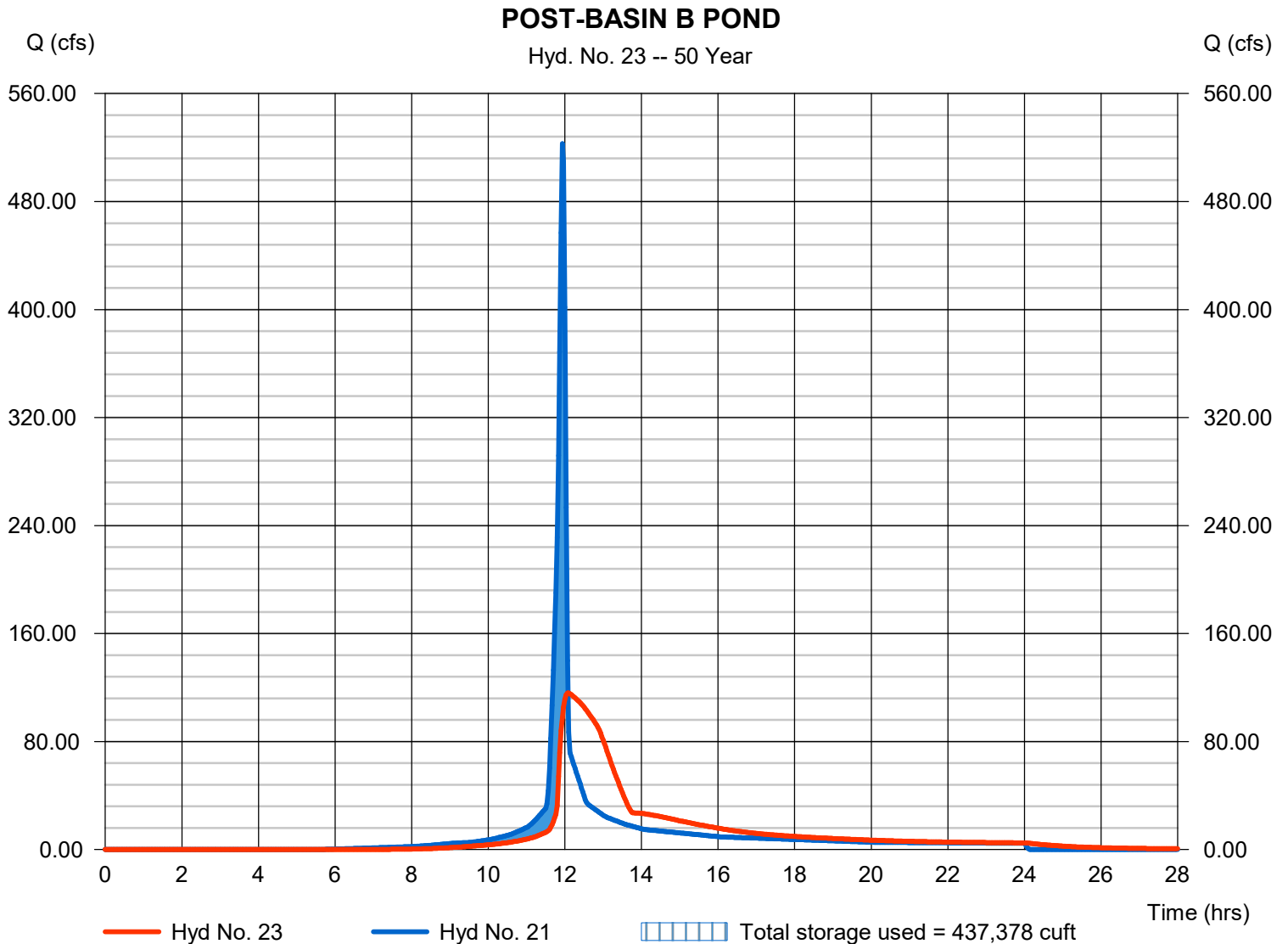
Wednesday, 02 / 28 / 2024

## Hyd. No. 23

### POST-BASIN B POND

Hydrograph type	= Reservoir	Peak discharge	= 115.94 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,083,709 cuft
Inflow hyd. No.	= 21 - POST-DEV BASIN B	Max. Elevation	= 1088.02 ft
Reservoir name	= WET POND 2	Max. Storage	= 437,378 cuft

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 24

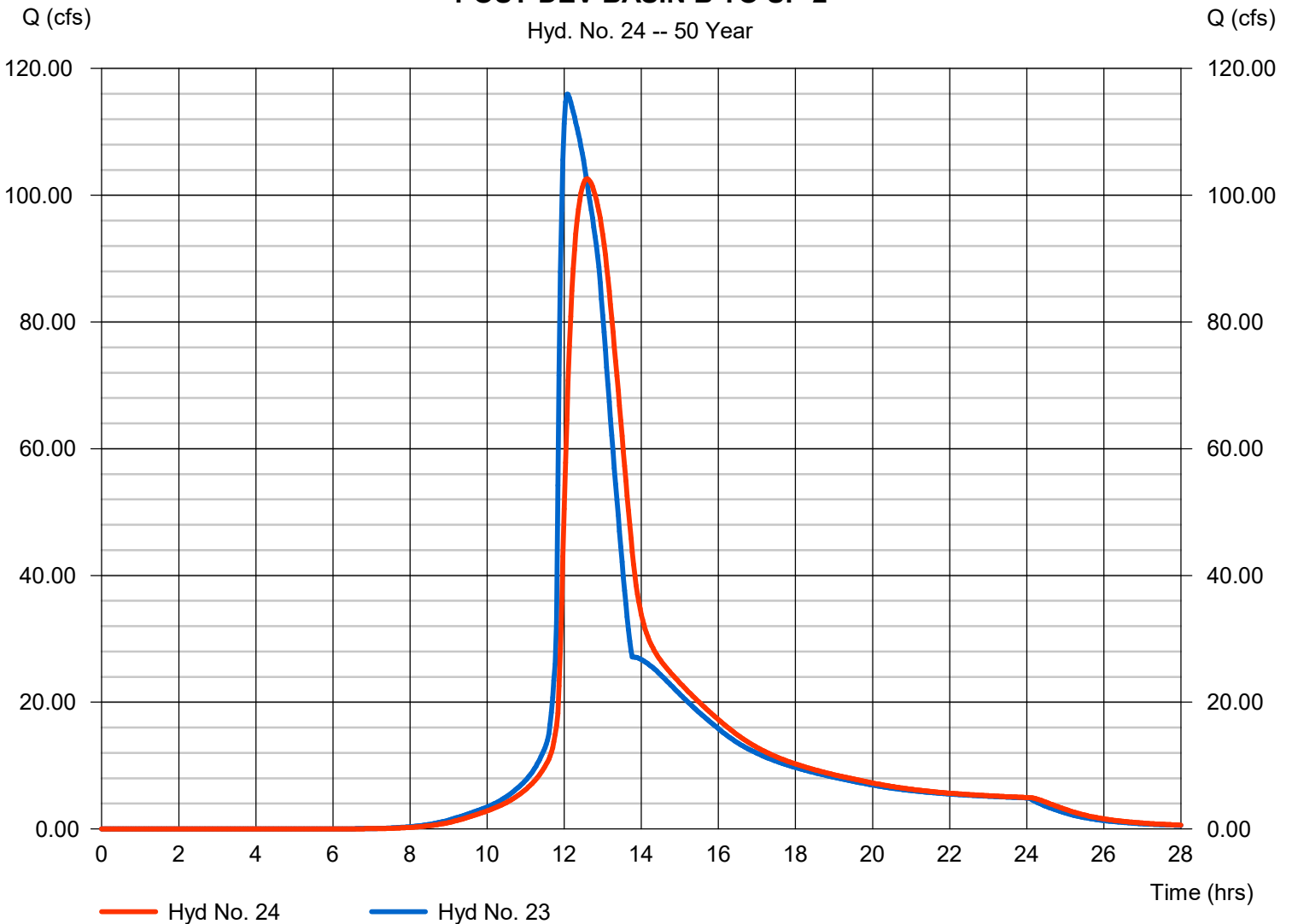
### POST-DEV BASIN B TO SP-2

Hydrograph type	= Reach	Peak discharge	= 102.60 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 1,083,271 cuft
Inflow hyd. No.	= 23 - POST-BASIN B POND	Section type	= Trapezoidal
Reach length	= 1295.0 ft	Channel slope	= 4.0 %
Manning's n	= 0.150	Bottom width	= 18.0 ft
Side slope	= 10.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.289	Rating curve m	= 1.281
Ave. velocity	= 1.08 ft/s	Routing coeff.	= 0.1199

Modified Att-Kin routing method used.

### POST-DEV BASIN B TO SP-2

Hyd. No. 24 -- 50 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

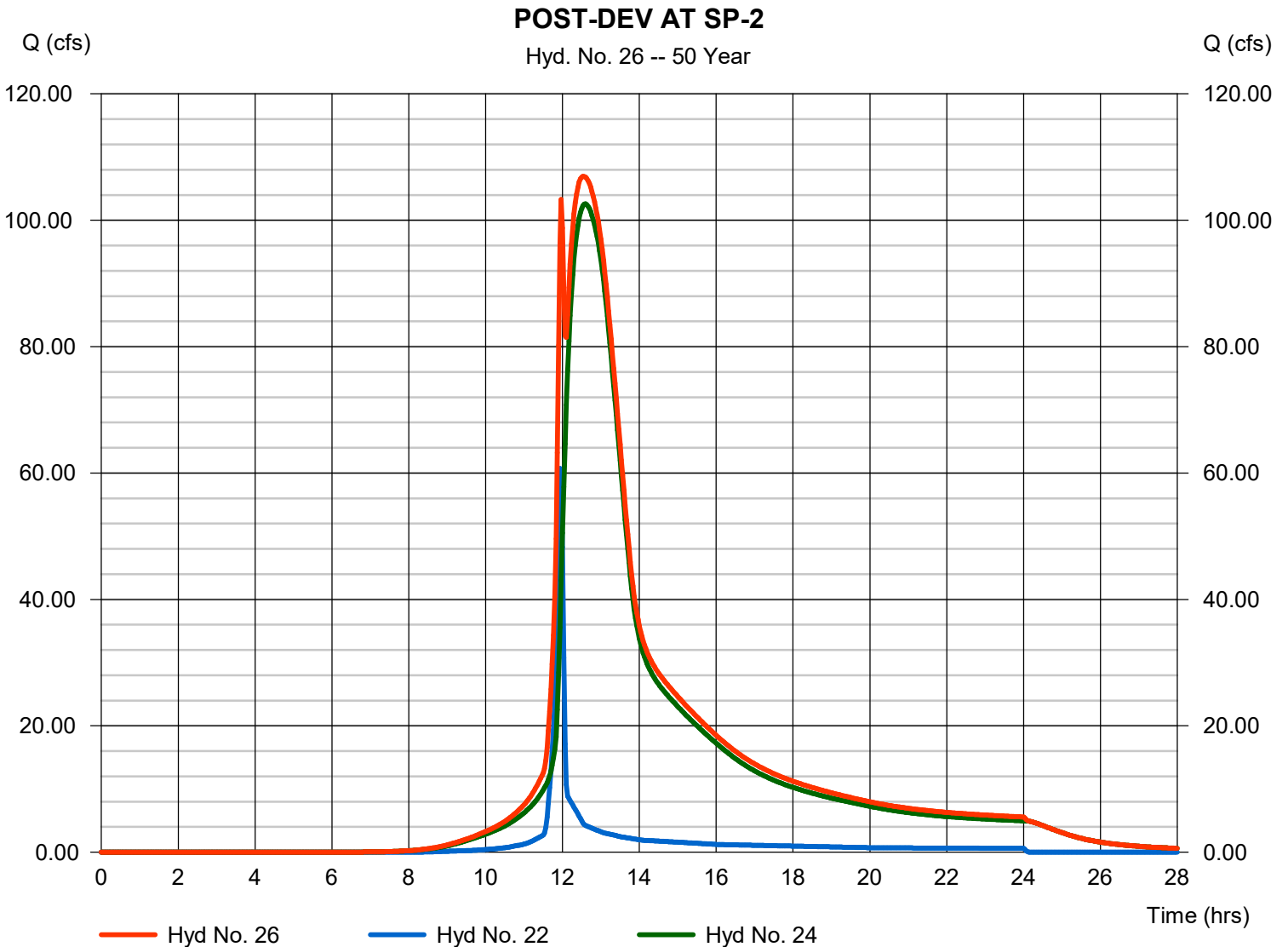
Wednesday, 02 / 28 / 2024

## Hyd. No. 26

POST-DEV AT SP-2

Hydrograph type = Combine  
Storm frequency = 50 yrs  
Time interval = 2 min  
Inflow hyds. = 22, 24

Peak discharge = 106.94 cfs  
Time to peak = 12.53 hrs  
Hyd. volume = 1,206,018 cuft  
Contrib. drain. area = 9.900 ac



# Hydrograph Report

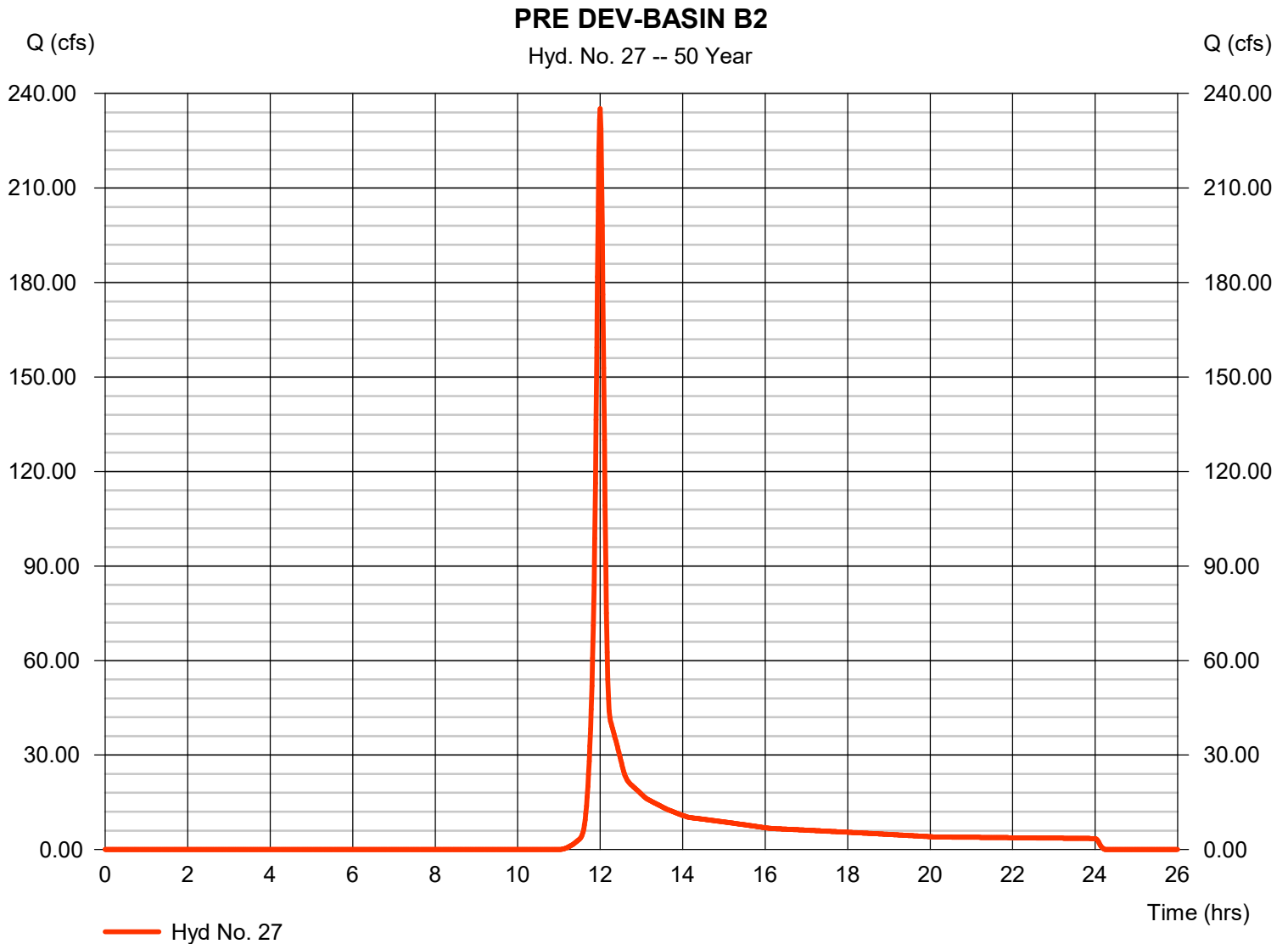
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 27

### PRE DEV-BASIN B2

Hydrograph type	= SCS Runoff	Peak discharge	= 235.24 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 544,520 cuft
Drainage area	= 70.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.03 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 21

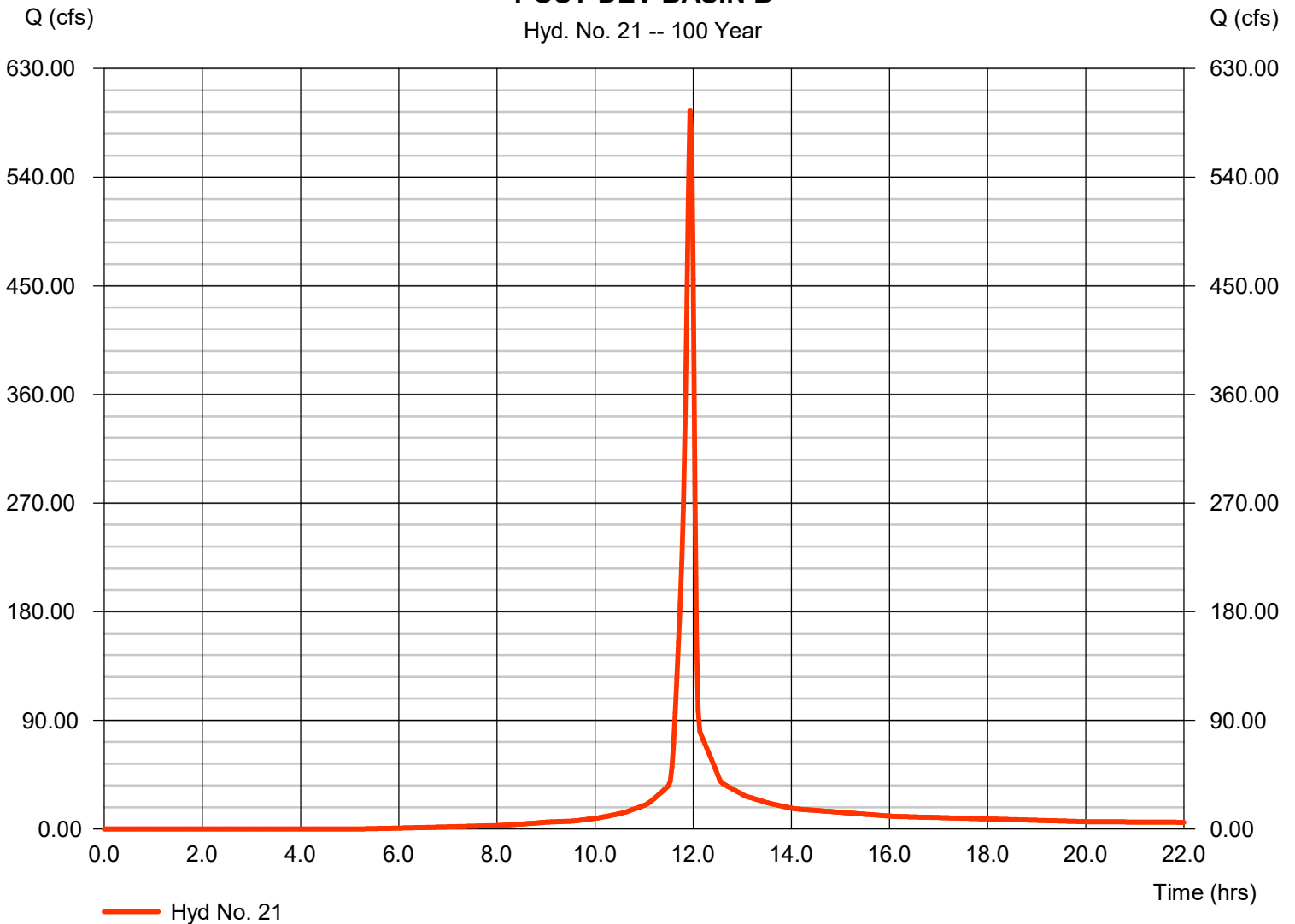
### POST-DEV BASIN B

Hydrograph type	= SCS Runoff	Peak discharge	= 595.01 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 1,241,564 cuft
Drainage area	= 67.440 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.77 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(13.210 x 55) + (16.000 x 65) + (38.230 x 95)] / 67.440

### POST-DEV BASIN B

Hyd. No. 21 -- 100 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 22

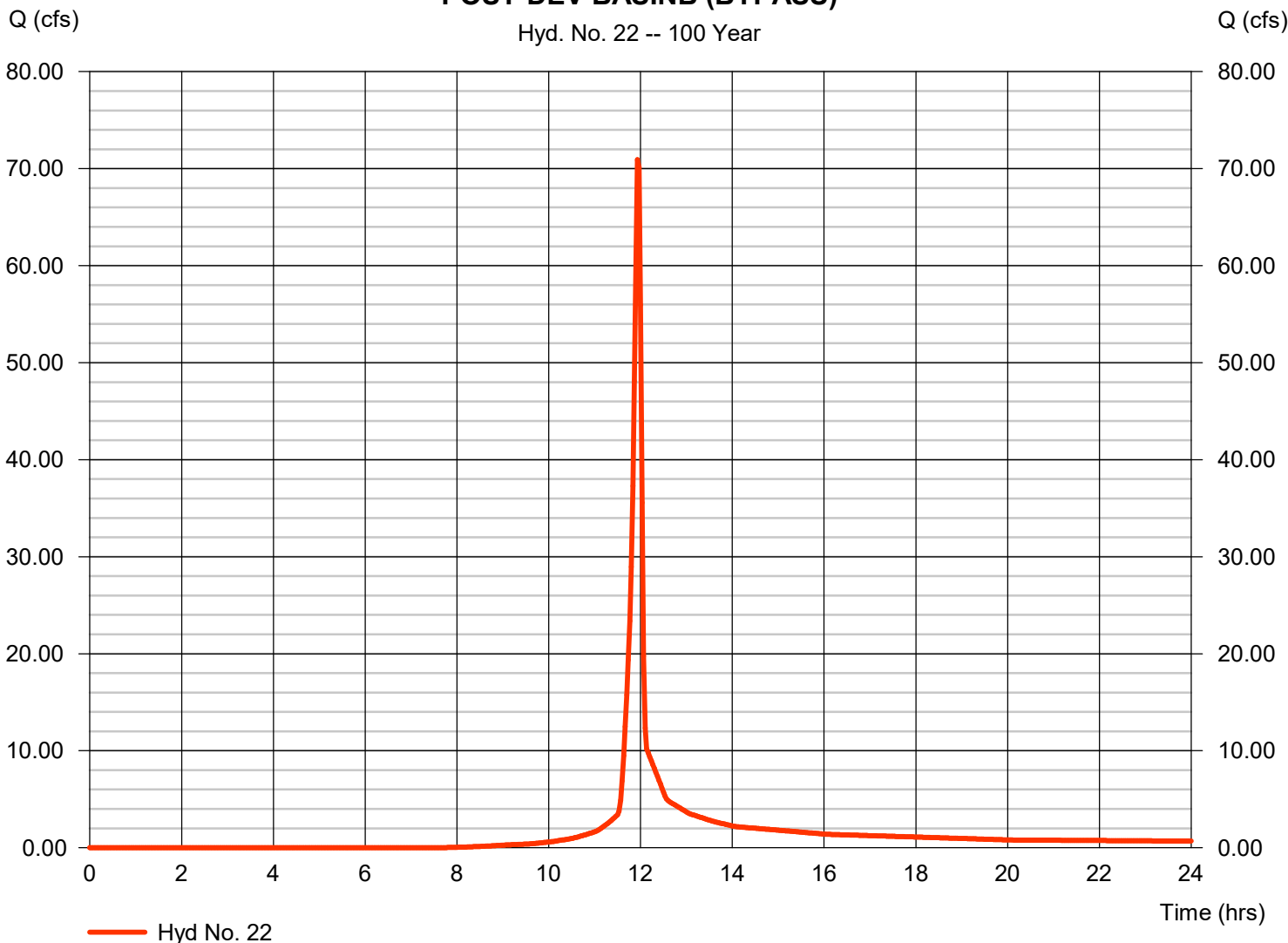
### POST-DEV BASINB (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 70.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 143,769 cuft
Drainage area	= 9.900 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.77 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(3.750 x 95) + (6.150 x 55)] / 9.900

### POST-DEV BASINB (BYPASS)

Hyd. No. 22 -- 100 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 23

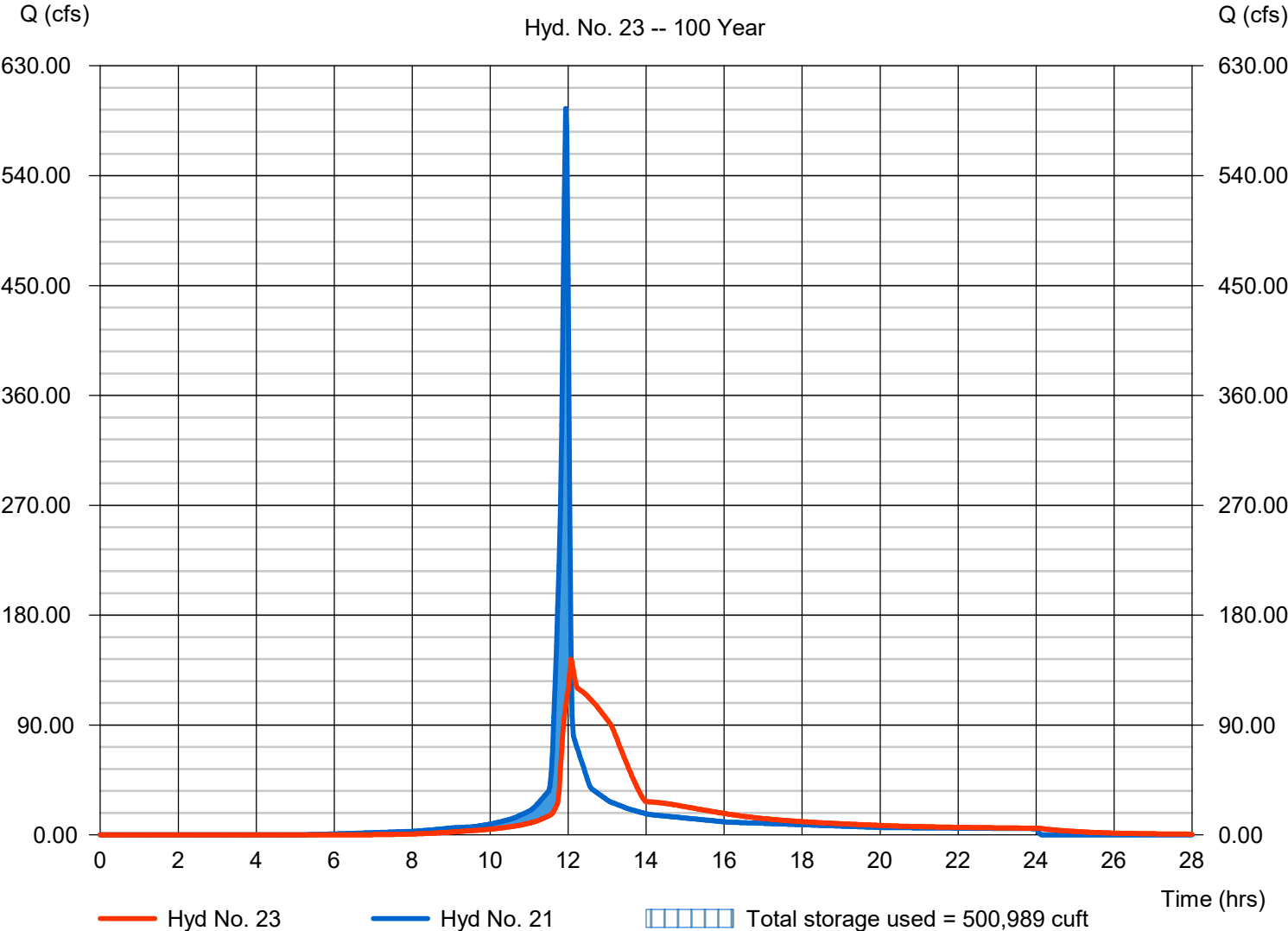
### POST-BASIN B POND

Hydrograph type	= Reservoir	Peak discharge	= 143.86 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,241,510 cuft
Inflow hyd. No.	= 21 - POST-DEV BASIN B	Max. Elevation	= 1088.82 ft
Reservoir name	= WET POND 2	Max. Storage	= 500,989 cuft

Storage Indication method used.

### POST-BASIN B POND

Hyd. No. 23 -- 100 Year



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 24

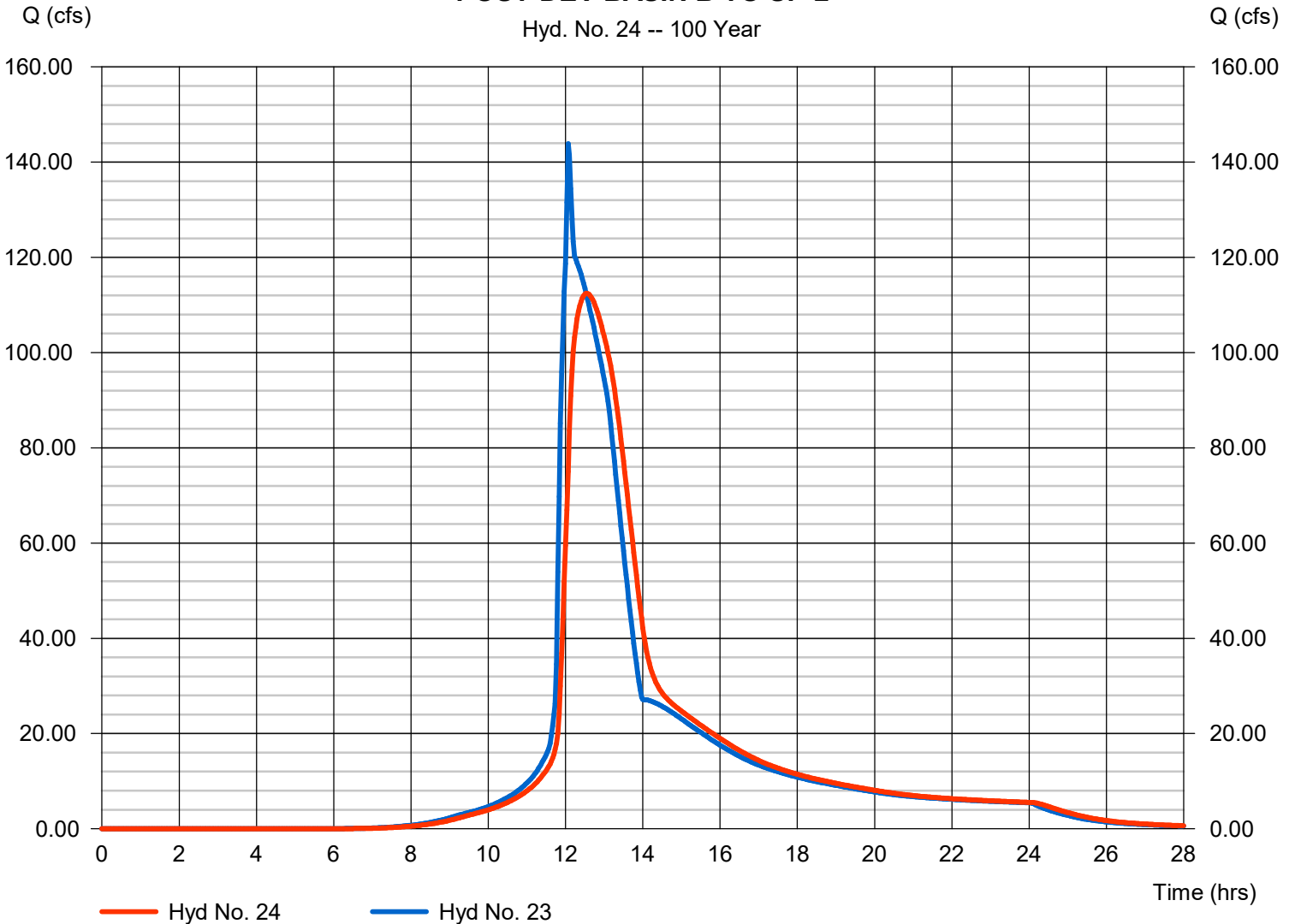
### POST-DEV BASIN B TO SP-2

Hydrograph type	= Reach	Peak discharge	= 112.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 1,241,072 cuft
Inflow hyd. No.	= 23 - POST-BASIN B POND	Section type	= Trapezoidal
Reach length	= 1295.0 ft	Channel slope	= 4.0 %
Manning's n	= 0.150	Bottom width	= 18.0 ft
Side slope	= 10.0:1	Max. depth	= 2.0 ft
Rating curve x	= 0.289	Rating curve m	= 1.281
Ave. velocity	= 1.13 ft/s	Routing coeff.	= 0.1254

Modified Att-Kin routing method used.

### POST-DEV BASIN B TO SP-2

Hyd. No. 24 -- 100 Year



# Hydrograph Report

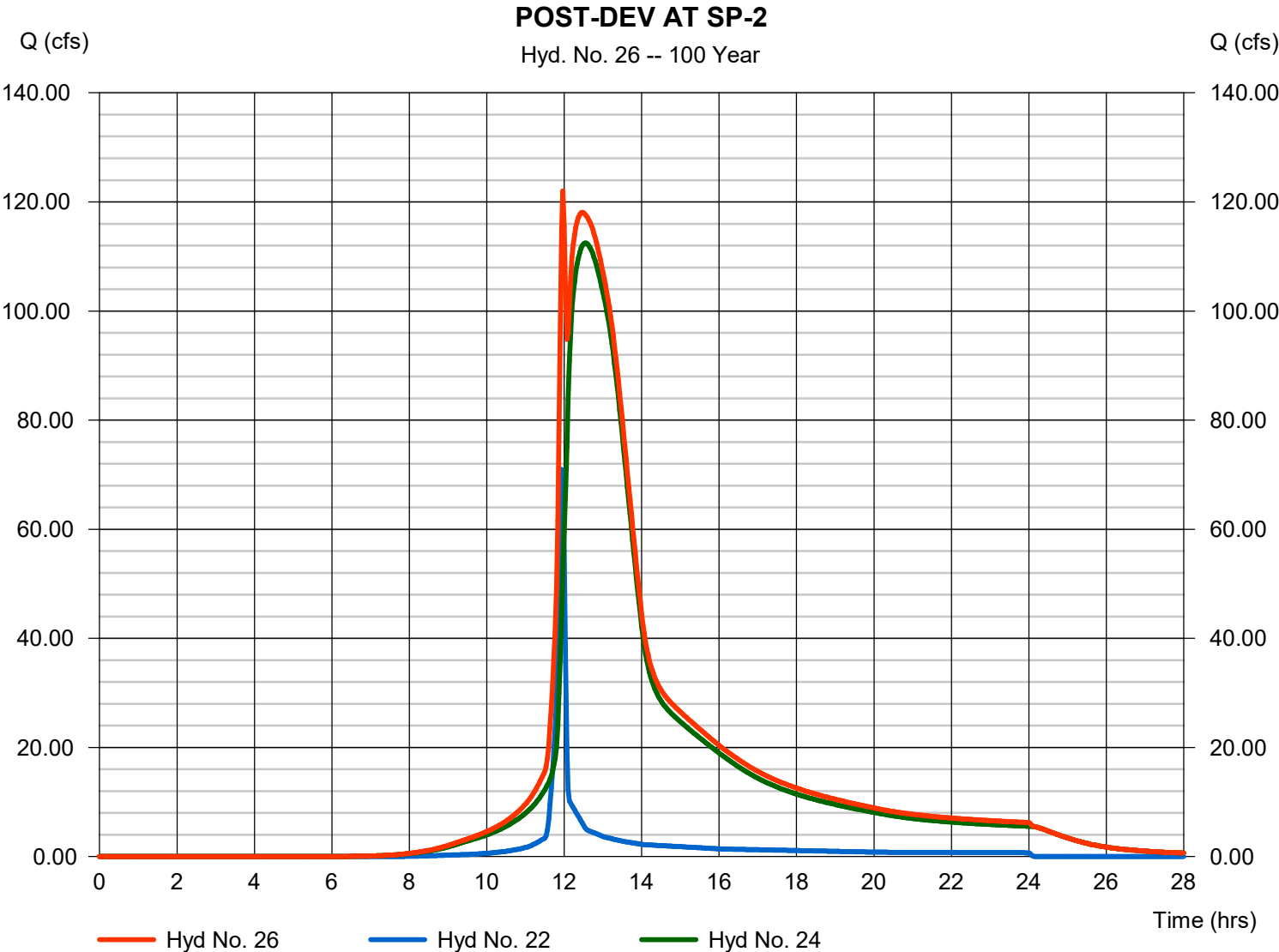
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Wednesday, 02 / 28 / 2024

## Hyd. No. 26

POST-DEV AT SP-2

Hydrograph type	= Combine	Peak discharge	= 122.02 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 1,384,841 cuft
Inflow hyds.	= 22, 24	Contrib. drain. area	= 9.900 ac



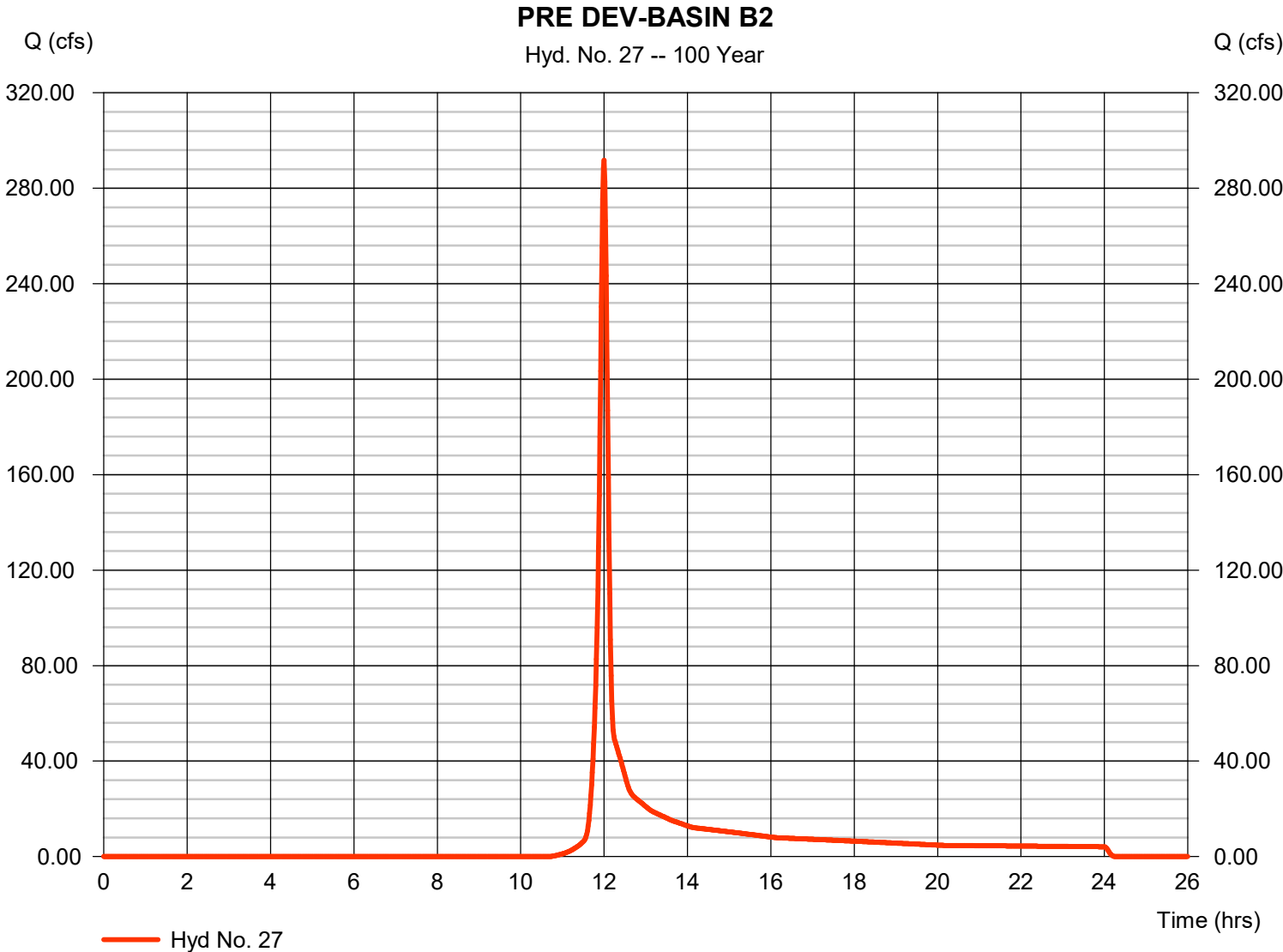


# Hydrograph Report

## Hyd. No. 27

### PRE DEV-BASIN B2

Hydrograph type	= SCS Runoff	Peak discharge	= 291.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 667,784 cuft
Drainage area	= 70.000 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.77 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



## **Appendix F**

# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool

### Version 2.2

#### General Information

Name of Developer:	Audubon Development	Date Submitted:	
Development Name:	Cagle Mill	Permit Number:	
Site Location / Address:	4745 Cagle Mill Rd	Developer Contact:	
	Lula, GA 30554	Phone Number:	
Development Type:		Name of Engineer(s):	
		Maintenance Responsibility:	

#### Site Summary

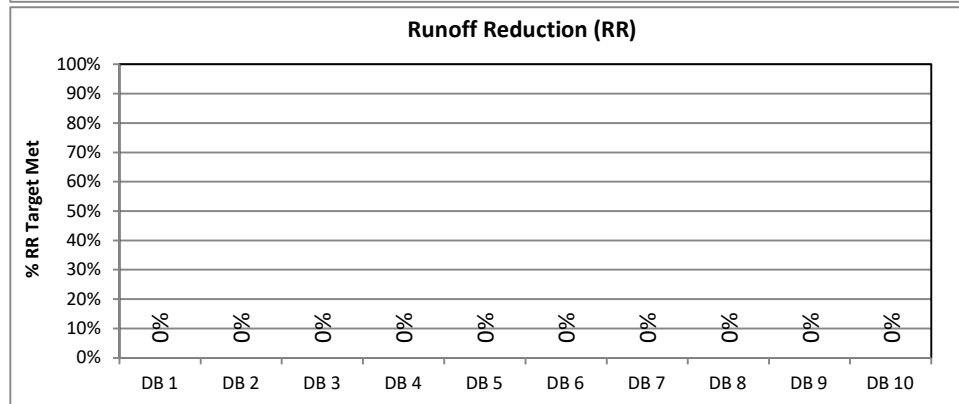
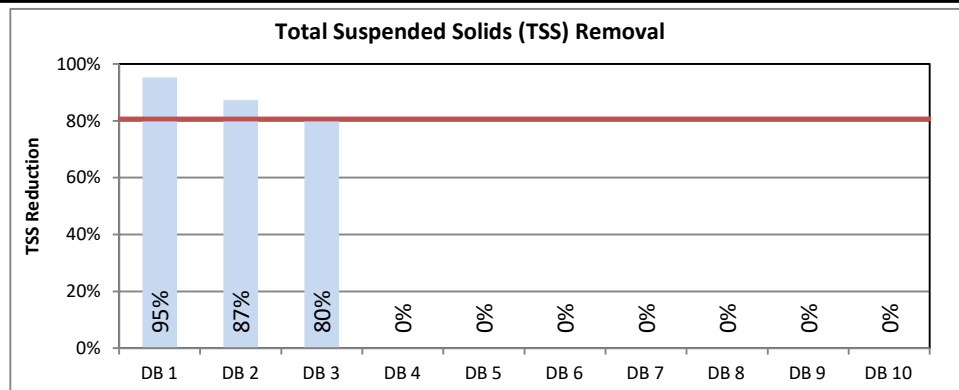
Total Pre-Development Area (ac): **129.38**  
 Total Post-Development Area (ac): **140.62**  
 Total Treated Area (ac): **137.31**  
 Total Untreated Area (ac): **3.31**

		I (ac)	P (ac)	CA (ac)
A	DB 1	31.06	39.30	0.00
B	DB 2	38.23	29.21	0.00
C	DB 3	1.52	1.30	0.00
	Drainage Basin 4	DB 4	0.00	0.00
	Drainage Basin 5	DB 5	0.00	0.00
	Drainage Basin 6	DB 6	0.00	0.00
	Drainage Basin 7	DB 7	0.00	0.00
	Drainage Basin 8	DB 8	0.00	0.00
	Drainage Basin 9	DB 9	0.00	0.00
	Drainage Basin 10	DB 10	0.00	0.00
<b>TOTAL</b>		<b>70.81</b>	<b>69.81</b>	<b>0.00</b>

I = Impervious Area, P = Pervious Area, CA = Conservation Area

Target Runoff Reduction Volume Achieved? **No**  
 Target TSS Removal Achieved? **Yes**

Total Target Runoff Reduction Volume (cf) 256,859  
 Runoff Reduction Volume Achieved (cf) 0  
 Total Target Water Quality Volume (cf) 308,231  
 % TSS Removal Achieved 90%



#### Official Use Only

Tracking #: \_\_\_\_\_  
 Reviewed By: \_\_\_\_\_  
 Date Approved: \_\_\_\_\_

Conditions of Approval: \_\_\_\_\_

# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool, v2.2

Development Name: **Cagle Mill**  
 Drainage Basin Name: **A**

data input cells  
 calculation cells  
 constant values

### Site Data

#### Indicate Pre-Development Land Cover and Runoff Curve Numbers in the Site's Disturbed Area

Cover Type	HSG* A (acres)	CN	HSG B (acres)	CN	HSG C (acres)	CN	HSG D (acres)	CN	Total	% Cover
Woods - Good Condition		30	53.31	55		70		77	53.31	100%
Impervious		98	0.00	98		98		98	0.00	0%
Open space - Good condition (grass cover > 75%)		39	0.00	61		74		80	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Local Jurisdiction Input									0.00	0%
Other									0.00	0%
<b>Total</b>	0.00		53.31		0.00		0.00		53.31	100%

\*HSG = hydrologic soil group

Impervious (ac) 0.00  
 Weighted CN 55  
 Potential Max Soil Retention, S<sub>pre</sub> (in) 8.18

#### Indicate Post-Development Land Cover and Runoff Curve Numbers in the Site's Disturbed Area

Cover Type	HSG A (acres)	CN	HSG B (acres)	CN	HSG C (acres)	CN	HSG D (acres)	CN	Total	% Cover
Impervious		98	24.56	98		98		98	24.56	35%
Open space - Good condition (grass cover > 75%)		39	20.00	61		74		80	20.00	28%
Woods - Good Condition		30	19.30	55		70		77	19.30	27%
Impervious		98	6.50	98		98		98	6.50	9%
Open space - Good condition (grass cover > 75%)		39	0.00	61		74		80	0.00	0%
Local Jurisdiction Input									0.00	0%
Other									0.00	0%
<b>Total</b>	0.00		70.36		0.00		0.00		70.36	100%

Impervious (ac) 31.06  
 Rv 0.45  
 Weighted CN 76  
 Potential Max Soil Retention, S<sub>post</sub> (in) 3.21

### Conservation Area Credits

#### Scenario 1: Natural Conservation Area *\*See the GSMM Volume 2, Section 2.3.3.3 for more information.*

Check the box if a portion of the post-developed area is protected by a conservation easement or equivalent form of protection.

Area (ac) of development protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 1 box above is checked

#### Scenario 2: Site Reforestation/Revegetation *\*See the GSMM Volume 2, Section 4.22 for more information.*

Check the box if a portion of the post-developed area employs site reforestation/revegetation and is protected by a conservation easement or equivalent form of protection.

Area (ac) of development reforested/revegetated and protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 2 box above is checked

#### Scenario 3: Soil Restoration *\*See the GSMM Volume 2, Section 4.23 for more information.*

Check the box if a portion of the post-developed area employs soil restoration and is protected by a conservation easement or equivalent form of protection.

Area (ac) of development with restored soils and protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 3 box above is checked

#### Scenario 4: Site Reforestation/Revegetation & Soil Restoration

*\*See the GSMM Volume 2, Section 4.22 and 4.23 for more information.*

Check the box if the same portion of the post-developed area employs site reforestation/revegetation and soil restoration, and is protected by a conservation easement or equivalent form of protection.

Area (ac) with restored soils in a reforested & revegetated area and protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 4 box above is checked

**Total Conservation Area Credit (acres) 0.00**

# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool, v2.2

Development Name: **Cagle Mill**  
 Drainage Basin Name: **A**

data input cells  
 calculation cells  
 constant values

### Water Quality Goals

Target Runoff Reduction Storm (in) **1.00**

Total Site Area for Water Quality Volume (acres)	70.36
Target Runoff Reduction Volume (cf)	114,243
Target Water Quality Volume (cf)	137,092

### Select BMPs for Runoff Reduction and Water Quality

		Area Draining to Each BMP			Storage Volume Provided by BMP (cf)	RR Conveyance Volume Provided by BMP (cf)	Down-stream BMP	Runoff Reduction Calculations					WQ Calculations		
		On-site Pervious Area (acres)	On-site Impervious Area (acres)	Offsite Area (acres)				RR Volume from Direct Drainage (cf)	RR Volume from Upstream Practices (cf)	Total RR Volume Received by BMP (cf)	Runoff Reduction %	RR Achieved (cf)	Remaining RR Volume (cf)	WQ, from Direct Drainage (cf)	Effective TSS Removal %
BMP 1	Stormwater Pond	20.00	24.56		70,000		BMP 2	88,325	0	88,325	0%	0	88,325	105,990	80%
BMP 2	Stormwater Wetlands – Level 1		0.00			88,325		0	88,325	88,325	0%	0	88,325	0	80%
BMP 3	Bioretention Basin (w/o underdrain)		2.50					8,621	0	8,621	100%	0	8,621	10,346	100%
BMP 4	Bioretention Basin (w/o underdrain)		2.50					8,621	0	8,621	100%	0	8,621	10,346	100%
BMP 5	Regenerative Stormwater Conveyance	19.30	1.50					8,676	0	8,676	0%	0	8,676	10,411	80%
BMP 6	Select a BMP...		0.00					0	0	0	N/A	0	0	0	N/A
BMP 7	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 8	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 9	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 10	Select a BMP...							0	0	0	N/A	0	0	0	N/A
<b>TOTAL</b>		39.30	31.06	0.00				114,243				0		137,092	
<b>UNTREATED AREA (acres)</b>		0.00	0.00												

Target Runoff Reduction Volume (cf)	114,243
Target Achieved?	No
Remaining Runoff Reduction Volume (cf)	114,243

Target Water Quality Volume (cf)	137,092
% TSS Removal Achieved	95%
Target Achieved?	Yes!
Remaining TSS Removal %	0%

### Channel and Flood Protection Calculations

# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool, v2.2

Development Name:   
 Drainage Basin Name:

data input cells  
 calculation cells  
 constant values

	1-yr, 24-hr storm	2-yr, 24-hr storm	25-yr, 24-hr storm	100-yr, 24-hr storm
Target Rainfall Event (in)				

	1-yr, 24-hr storm	2-yr, 24-hr storm	25-yr, 24-hr storm	100-yr, 24-hr storm
Pre-Development Runoff Volume (in)	0.00	0.00	0.00	0.00
Post Development Runoff Volume (in) with no BMPs	0.00	0.00	0.00	0.00
Post-Development Runoff Volume (in) with BMPs	0.00	0.00	0.00	0.00
Adjusted CN	0	0	0	0

\*See Stormwater Management Standards to Determine Detention Requirements.

### Comments

# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool, v2.2

Development Name: **Cagle Mill**  
 Drainage Basin Name: **B**

data input cells  
 calculation cells  
 constant values

### Site Data

#### Indicate Pre-Development Land Cover and Runoff Curve Numbers in the Site's Disturbed Area

Cover Type	HSG* A (acres)	CN	HSG B (acres)	CN	HSG C (acres)	CN	HSG D (acres)	CN	Total	% Cover
Woods - Good Condition		30	70.00	55		70		77	70.00	100%
Select a land cover type...		0	0.00	0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Local Jurisdiction Input									0.00	0%
Other									0.00	0%
<b>Total</b>	0.00		70.00		0.00		0.00		70.00	100%

\*HSG = hydrologic soil group

Impervious (ac) 0.00  
 Weighted CN 55  
 Potential Max Soil Retention, S<sub>pre</sub> (in) 8.18

#### Indicate Post-Development Land Cover and Runoff Curve Numbers in the Site's Disturbed Area

Cover Type	HSG A (acres)	CN	HSG B (acres)	CN	HSG C (acres)	CN	HSG D (acres)	CN	Total	% Cover
Woods - Good Condition		30	13.21	55		70		77	13.21	20%
Open space - Good condition (grass cover > 75%)		39	16.00	61		74		80	16.00	24%
Impervious		98	38.23	98		98		98	38.23	57%
Select a land cover type...		0		0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Local Jurisdiction Input									0.00	0%
Other									0.00	0%
<b>Total</b>	0.00		67.44		0.00		0.00		67.44	100%

Impervious (ac) 38.23  
 Rv 0.56  
 Weighted CN 81  
 Potential Max Soil Retention, S<sub>post</sub> (in) 2.38

### Conservation Area Credits

#### Scenario 1: Natural Conservation Area *\*See the GSMM Volume 2, Section 2.3.3.3 for more information.*

Check the box if a portion of the post-developed area is protected by a conservation easement or equivalent form of protection.

Area (ac) of development protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 1 box above is checked

#### Scenario 2: Site Reforestation/Revegetation *\*See the GSMM Volume 2, Section 4.22 for more information.*

Check the box if a portion of the post-developed area employs site reforestation/revegetation and is protected by a conservation easement or equivalent form of protection.

Area (ac) of development reforested/revegetated and protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 2 box above is checked

#### Scenario 3: Soil Restoration *\*See the GSMM Volume 2, Section 4.23 for more information.*

Check the box if a portion of the post-developed area employs soil restoration and is protected by a conservation easement or equivalent form of protection.

Area (ac) of development with restored soils and protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 3 box above is checked

#### Scenario 4: Site Reforestation/Revegetation & Soil Restoration

*\*See the GSMM Volume 2, Section 4.22 and 4.23 for more information.*

Check the box if the same portion of the post-developed area employs site reforestation/revegetation and soil restoration, and is protected by a conservation easement or equivalent form of protection.

Area (ac) with restored soils in a reforested & revegetated area and protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 4 box above is checked

**Total Conservation Area Credit (acres) 0.00**

# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool, v2.2

Development Name: **Cagle Mill**  
 Drainage Basin Name: **B**

data input cells  
 calculation cells  
 constant values

### Water Quality Goals

Target Runoff Reduction Storm (in) **1.00**

Total Site Area for Water Quality Volume (acres)	67.44
Target Runoff Reduction Volume (cf)	137,138
Target Water Quality Volume (cf)	164,565

### Select BMPs for Runoff Reduction and Water Quality

		Area Draining to Each BMP			Storage Volume Provided by BMP (cf)	RR Conveyance Volume Provided by BMP (cf)	Down-stream BMP	Runoff Reduction Calculations					WQ Calculations		
		On-site Pervious Area (acres)	On-site Impervious Area (acres)	Offsite Area (acres)				RR Volume from Direct Drainage (cf)	RR Volume from Upstream Practices (cf)	Total RR Volume Received by BMP (cf)	Runoff Reduction %	RR Achieved (cf)	Remaining RR Volume (cf)	WQ, from Direct Drainage (cf)	Effective TSS Removal %
BMP 1	Stormwater Pond	16.00	38.23	13.21				134,740	0	134,740	0%	0	134,740	161,688	80%
BMP 2	Regenerative Stormwater Conveyance	6.15	3.75					14,048	0	14,048	0%	0	14,048	16,858	80%
BMP 3	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 4	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 5	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 6	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 7	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 8	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 9	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 10	Select a BMP...							0	0	0	N/A	0	0	0	N/A
<b>TOTAL</b>		22.15	41.98	13.21				148,788				0		178,546	
UNTREATED AREA (acres)		7.06	0.00												

Target Runoff Reduction Volume (cf)	137,138
Target Achieved?	No
Remaining Runoff Reduction Volume (cf)	137,138

Target Water Quality Volume (cf)	164,565
% TSS Removal Achieved	87%
Target Achieved?	Yes!
Remaining TSS Removal %	0%

### Channel and Flood Protection Calculations



# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool, v2.2

Development Name:   
 Drainage Basin Name:

data input cells  
 calculation cells  
 constant values

	1-yr, 24-hr storm	2-yr, 24-hr storm	25-yr, 24-hr storm	100-yr, 24-hr storm
Target Rainfall Event (in)				

	1-yr, 24-hr storm	2-yr, 24-hr storm	25-yr, 24-hr storm	100-yr, 24-hr storm
Pre-Development Runoff Volume (in)	0.00	0.00	0.00	0.00
Post Development Runoff Volume (in) with no BMPs	0.00	0.00	0.00	0.00
Post-Development Runoff Volume (in) with BMPs	0.00	0.00	0.00	0.00
Adjusted CN	0	0	0	0

\*See Stormwater Management Standards to Determine Detention Requirements.

### Comments

# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool, v2.2

Development Name: **Cagle Mill**  
 Drainage Basin Name: **C**

data input cells  
 calculation cells  
 constant values

### Site Data

Indicate Pre-Development Land Cover and Runoff Curve Numbers in the Site's Disturbed Area

Cover Type	HSG* A (acres)	CN	HSG B (acres)	CN	HSG C (acres)	CN	HSG D (acres)	CN	Total	% Cover
Woods - Good Condition		30	6.07	55		70		77	6.07	100%
Select a land cover type...		0		0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Local Jurisdiction Input									0.00	0%
Other									0.00	0%
<b>Total</b>	0.00		6.07		0.00		0.00		6.07	100%

\*HSG = hydrologic soil group

Impervious (ac) 0.00  
 Weighted CN 55  
 Potential Max Soil Retention, S<sub>pre</sub> (in) 8.18

Indicate Post-Development Land Cover and Runoff Curve Numbers in the Site's Disturbed Area

Cover Type	HSG A (acres)	CN	HSG B (acres)	CN	HSG C (acres)	CN	HSG D (acres)	CN	Total	% Cover
Impervious		98	1.52	98		98		98	1.52	54%
Open space - Fair condition (grass cover 50% to 75%)		49	1.30	69		79		84	1.30	46%
Select a land cover type...		0		0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Select a land cover type...		0		0		0		0	0.00	0%
Local Jurisdiction Input									0.00	0%
Other									0.00	0%
<b>Total</b>	0.00		2.82		0.00		0.00		2.82	100%

Impervious (ac) 1.52  
 Rv 0.54  
 Weighted CN 85  
 Potential Max Soil Retention, S<sub>post</sub> (in) 1.82

### Conservation Area Credits

**Scenario 1: Natural Conservation Area** \*See the GSMM Volume 2, Section 2.3.3.3 for more information.

Check the box if a portion of the post-developed area is protected by a conservation easement or equivalent form of protection.

Area (ac) of development protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 1 box above is checked

**Scenario 2: Site Reforestation/Revegetation** \*See the GSMM Volume 2, Section 4.22 for more information.

Check the box if a portion of the post-developed area employs site reforestation/revegetation and is protected by a conservation easement or equivalent form of protection.

Area (ac) of development reforested/revegetated and protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 2 box above is checked

**Scenario 3: Soil Restoration** \*See the GSMM Volume 2, Section 4.23 for more information.

Check the box if a portion of the post-developed area employs soil restoration and is protected by a conservation easement or equivalent form of protection.

Area (ac) of development with restored soils and protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 3 box above is checked

**Scenario 4: Site Reforestation/Revegetation & Soil Restoration**

\*See the GSMM Volume 2, Section 4.22 and 4.23 for more information.

Check the box if the same portion of the post-developed area employs site reforestation/revegetation and soil restoration, and is protected by a conservation easement or equivalent form of protection.

Area (ac) with restored soils in a reforested & revegetated area and protected by a conservation easement or equivalent form of protection. Note: The green cell will unlock if the Scenario 4 box above is checked

**Total Conservation Area Credit (acres) 0.00**

# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool, v2.2

Development Name:   
 Drainage Basin Name:

data input cells  
 calculation cells  
 constant values

### Water Quality Goals

Target Runoff Reduction Storm (in)

Total Site Area for Water Quality Volume (acres)	2.82
Target Runoff Reduction Volume (cf)	5,478
Target Water Quality Volume (cf)	6,573

### Select BMPs for Runoff Reduction and Water Quality

		Area Draining to Each BMP			Storage Volume Provided by BMP (cf)	RR Conveyance Volume Provided by BMP (cf)	Down-stream BMP	Runoff Reduction Calculations					WQ Calculations		
		On-site Pervious Area (acres)	On-site Impervious Area (acres)	Offsite Area (acres)				RR Volume from Direct Drainage (cf)	RR Volume from Upstream Practices (cf)	Total RR Volume Received by BMP (cf)	Runoff Reduction %	RR Achieved (cf)	Remaining RR Volume (cf)	WQ, from Direct Drainage (cf)	Effective TSS Removal %
BMP 1	Stormwater Wetlands – Level 1	1.30	1.52			5,478		5,478	0	5,478	0%	0	5,478	6,573	80%
BMP 2	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 3	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 4	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 5	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 6	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 7	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 8	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 9	Select a BMP...							0	0	0	N/A	0	0	0	N/A
BMP 10	Select a BMP...							0	0	0	N/A	0	0	0	N/A
<b>TOTAL</b>		1.30	1.52	0.00				5,478				0		6,573	
UNTREATED AREA (acres)		0.00	0.00												

Target Runoff Reduction Volume (cf)	5,478
Target Achieved?	No
Remaining Runoff Reduction Volume (cf)	5,478

Target Water Quality Volume (cf)	6,573
% TSS Removal Achieved	80%
Target Achieved?	Yes!
Remaining TSS Removal %	0%

### Channel and Flood Protection Calculations

# Georgia Stormwater Management Manual

## Stormwater Quality Site Development Review Tool, v2.2

Development Name:   
 Drainage Basin Name:

data input cells  
 calculation cells  
 constant values

	1-yr, 24-hr storm	2-yr, 24-hr storm	25-yr, 24-hr storm	100-yr, 24-hr storm
Target Rainfall Event (in)				

	1-yr, 24-hr storm	2-yr, 24-hr storm	25-yr, 24-hr storm	100-yr, 24-hr storm
Pre-Development Runoff Volume (in)	0.00	0.00	0.00	0.00
Post Development Runoff Volume (in) with no BMPs	0.00	0.00	0.00	0.00
Post-Development Runoff Volume (in) with BMPs	0.00	0.00	0.00	0.00
Adjusted CN	0	0	0	0

\*See Stormwater Management Standards to Determine Detention Requirements.

### Comments