Glade Spring Crossing Subdivision Rezoning Submission

Floodplain Calculations

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

Date: November 10, 2022

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

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

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Introduction and Summary

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

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

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

Existing Site Conditions

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

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

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

Proposed Development

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

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

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

Methodology for Calculations

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

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

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

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

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

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

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

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

Results and Conclusions

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

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

Documentation of analyzed flows:

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

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

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

100 Year Floodplain Elevations:

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

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

APPENDIX

SECTION A: FEMA Mapping

National Flood Hazard Layer FIRMette

FEMA

80°26'40"W 37°14'34"N

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

1:6,000

10

80°26'2"W 37°14'6"N

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

Legend

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

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

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

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

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

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

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

N

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

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

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

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

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

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

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

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

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

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

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

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

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

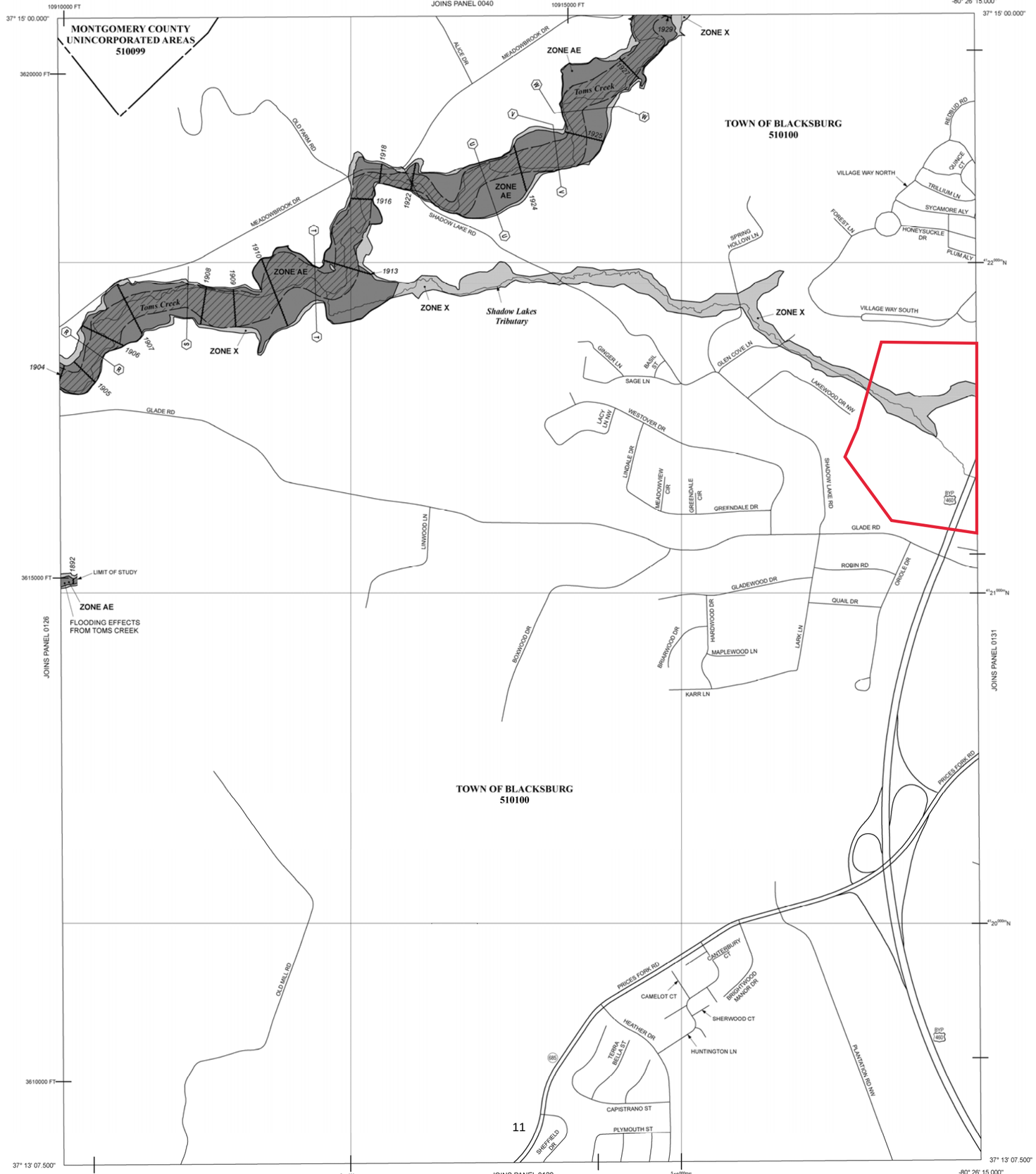
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report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

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

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

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

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



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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

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

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

* Referenced to the North American Vertical Datum of 1988

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

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP

SEPTEMBER 25, 2009

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

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

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

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

NFIP

PANEL 0127C

FIRM
FLOOD INSURANCE RATE MAP

MONTGOMERY COUNTY, VIRGINIA
AND INCORPORATED AREAS

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

CONTAINS:

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

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

MAP NUMBER
51121C0127C

EFFECTIVE DATE

NOTES TO USERS

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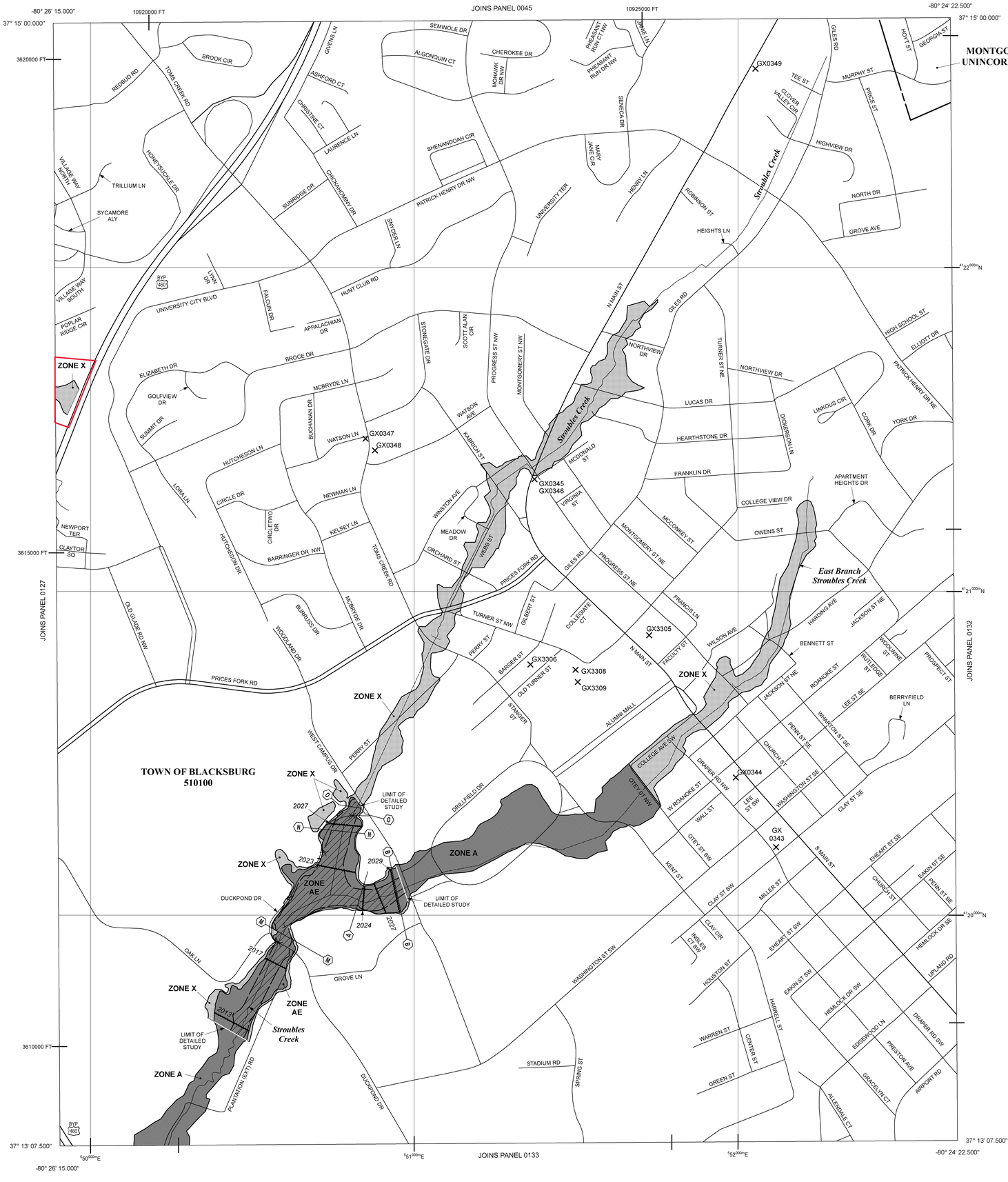

LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

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

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

* Referenced to the North American Vertical Datum of 1988

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

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

SEPTEMBER 25, 2009

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

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

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

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

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0131C

FIRM
FLOOD INSURANCE RATE MAP

MONTGOMERY COUNTY, VIRGINIA
AND INCORPORATED AREAS

PANEL 131 OF 345

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

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

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

MAP NUMBER
51121C0131C

EFFECTIVE DATE
SEPTEMBER 25, 2009

Federal Emergency Management Agency

SECTION B: Site Mapping

SECTION B: Site Mapping

B1. Floodplain and Creek Valley Overlay Results

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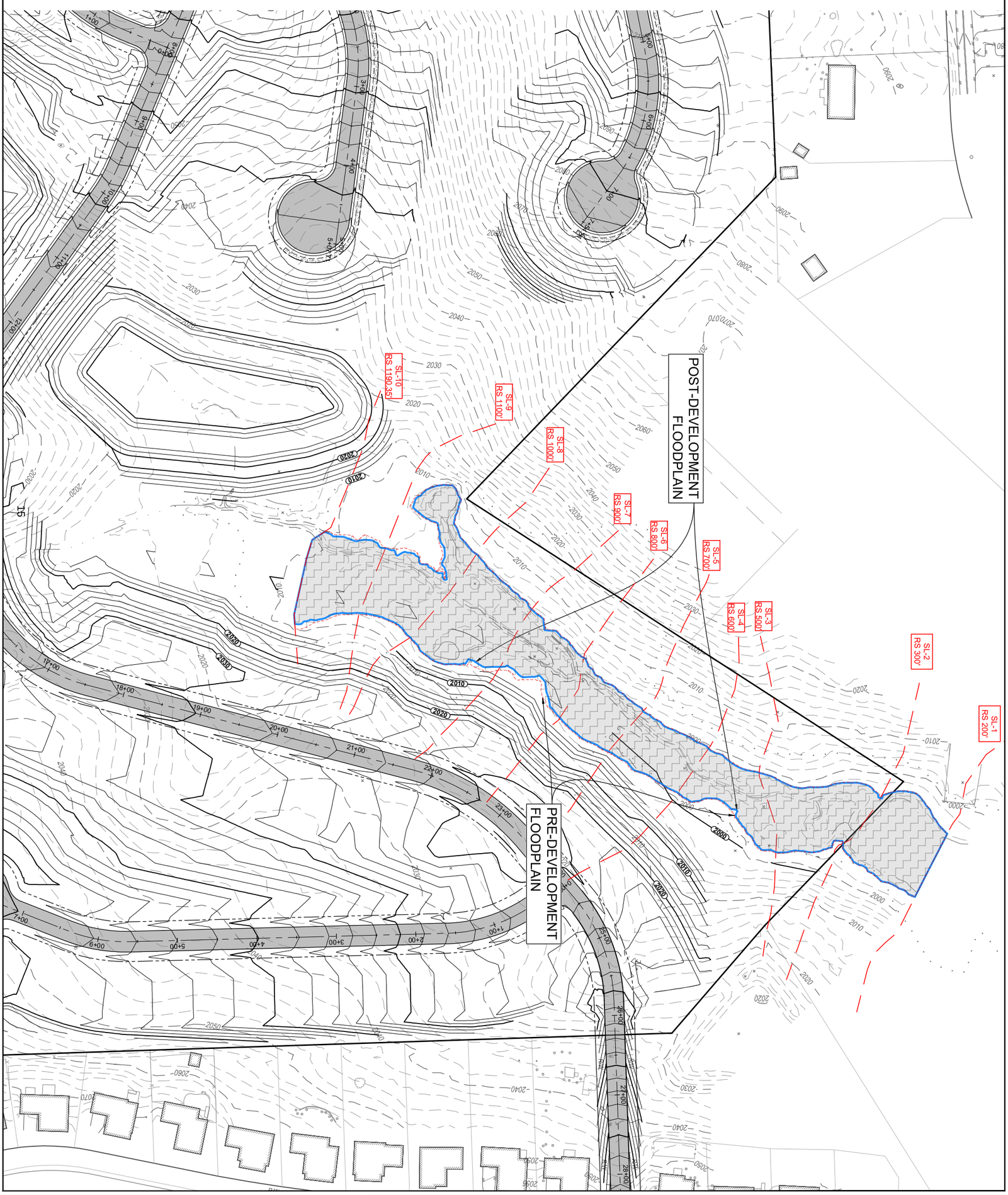

PROPOSED DEVELOPMENT OF

GLADE SPRING CROSSING

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

TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

FLOODPLAIN EXHIBIT

Drawn By: MSF
Checked By: ---
Date: 10/31/2022
Scale: AS SHOWN
Sheet No. 1 of 1
2

COMMONWEALTH OF VIRGINIA
PAUL BROWN
Lic. No. 036148
PROFESSIONAL ENGINEER
11/10/2022

No.	Revision Issue	Date

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

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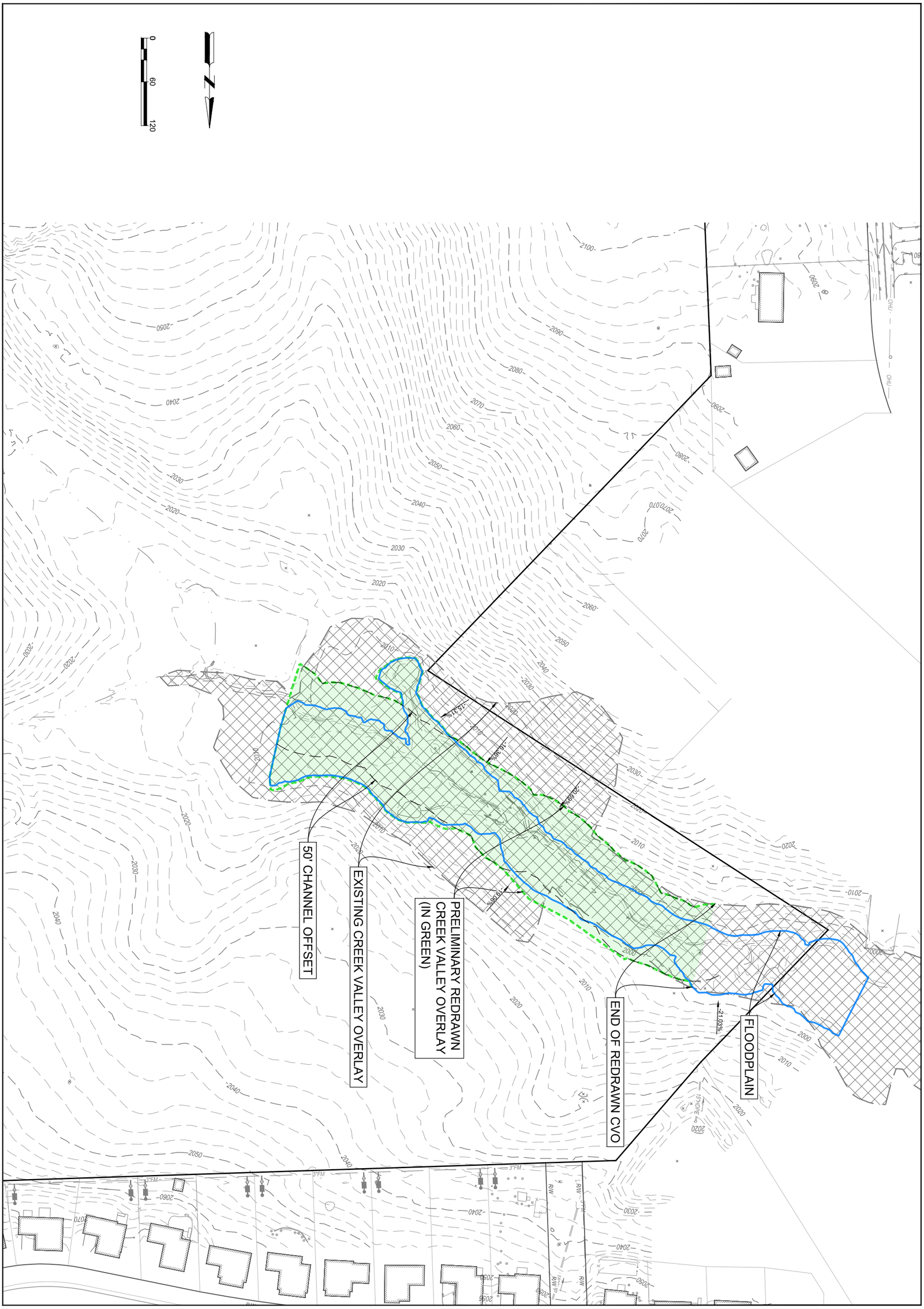

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Checked By:	---	Scale:	AS SHOWN
Date:	10/31/2022		
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PROPOSED DEVELOPMENT OF

GLADE SPRING CROSSING

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

TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

PROPOSED CREEK VALLEY OVERLAY MODIFICATION EXHIBIT

COMMONWEALTH OF VIRGINIA
PAUL BROWN
Lic. No. 036148
PROFESSIONAL ENGINEER
11/10/2022

No.	Revision/ Issue	Date

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BLACKSBURG, VIRGINIA 24060
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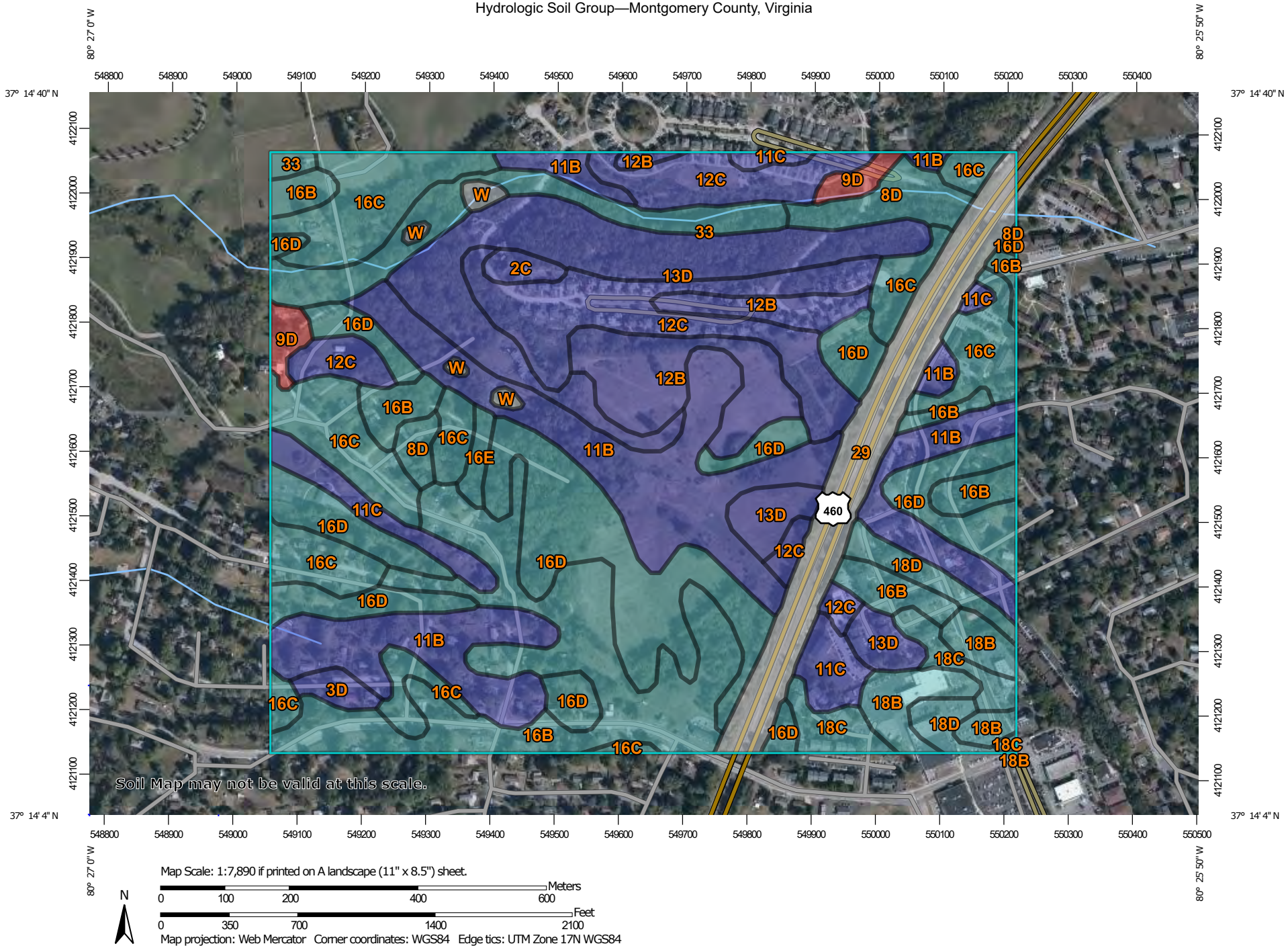
FAX. 276-632-3648

SECTION B: Site Mapping

B2. Contributing Drainage Areas



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

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

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

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

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

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

Hydrologic Soil Group

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

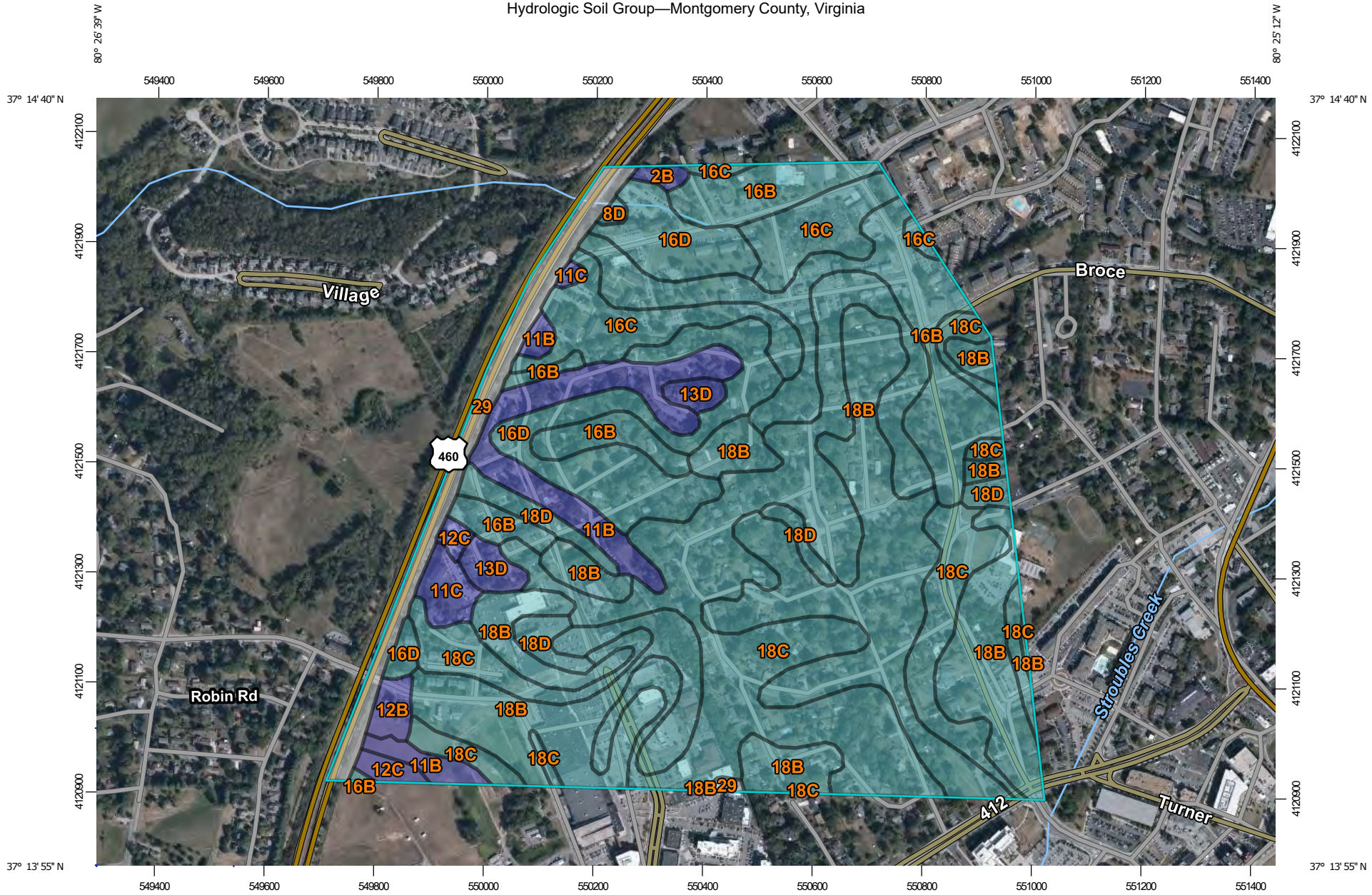
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
29	Udorthents and Urban land		16.2	6.1%
33	Weaver soils	C	9.6	3.6%
W	Water		1.3	0.5%
Totals for Area of Interest			**268.1**	**100.0%**

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

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

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

Hydrologic Soil Group

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

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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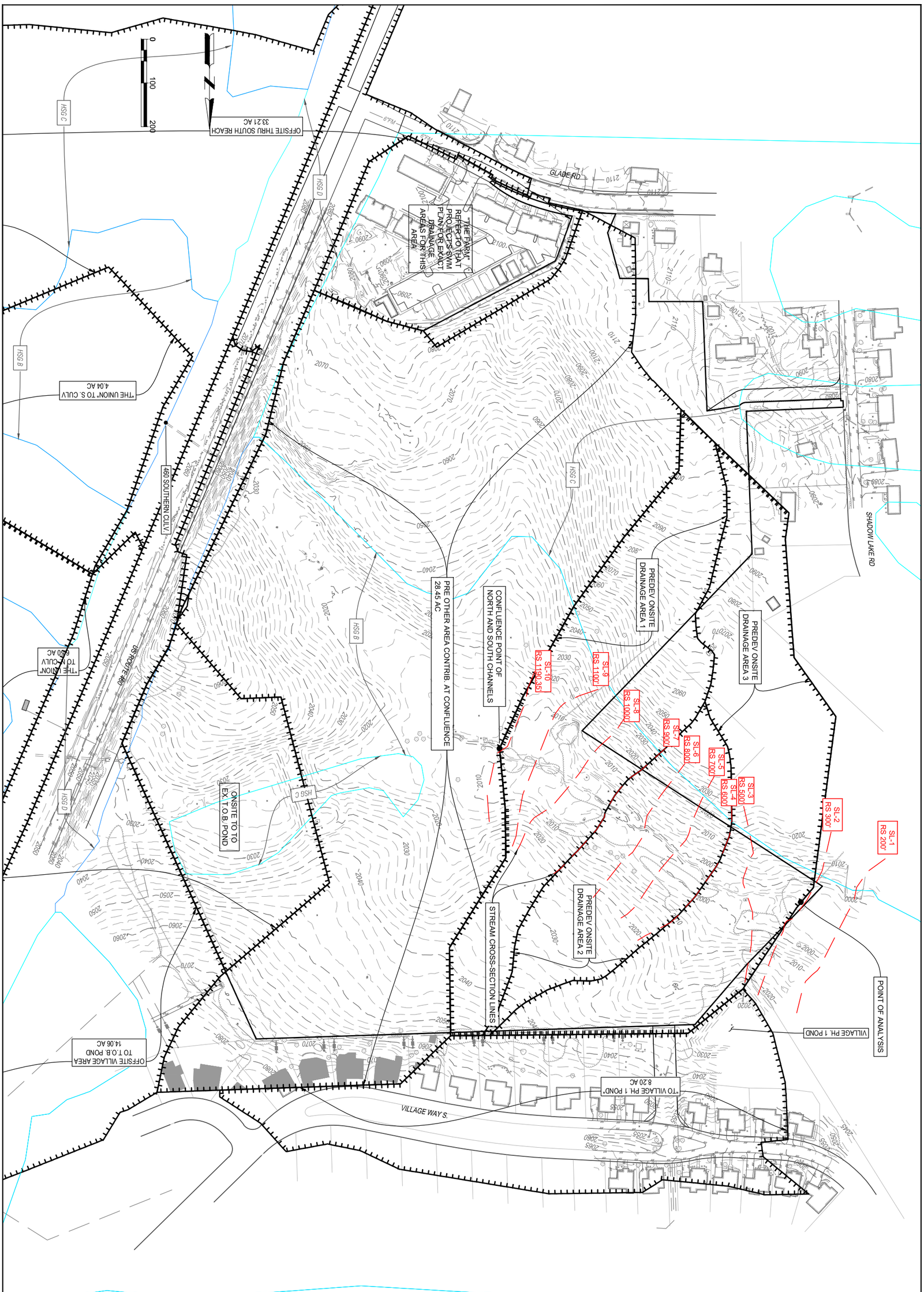

Sheet No. 1 of 1	Checked By: ---	Drawn By: MSF	PROPOSED DEVELOPMENT OF
D2	Date: 10/31/2022	Scale: AS SHOWN	GLADE SPRING CROSSING

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

PREDEVELOPMENT ONSITE DRAINAGE AREAS

COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER
PAUL BROWN
Lic. No. 036148
11/10/2022

No.	Revision Issue	Date

EDEN & ASSOCIATES
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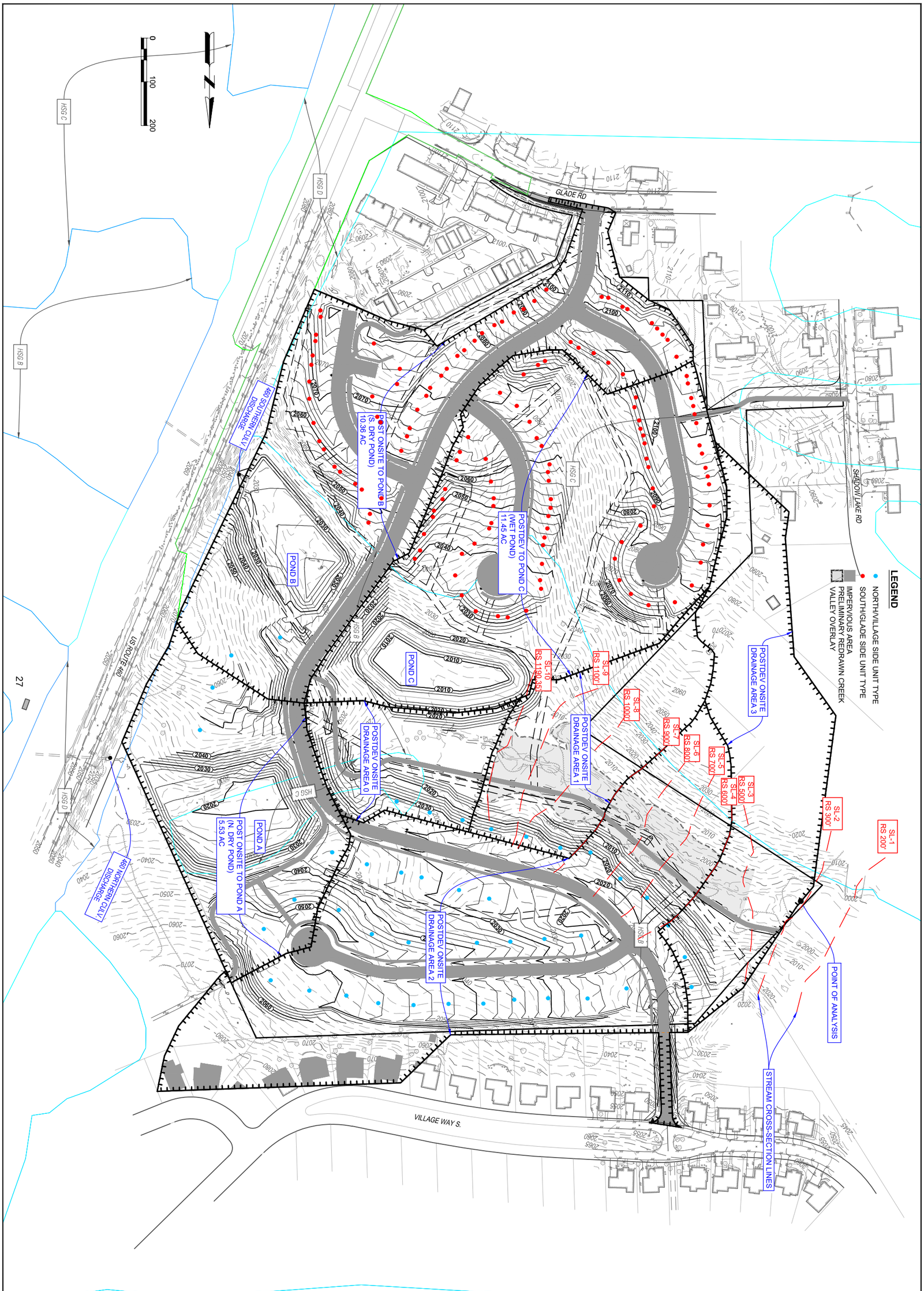

PROPOSED DEVELOPMENT OF

GLADE SPRING CROSSING

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

TOWN OF BLACKSBURG - PRICES FORK DISTRICT
MONTGOMERY COUNTY, VIRGINIA

POSTDEVELOPMENT ONSITE DRAINAGE AREAS

Drawn By: MSF
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Scale: AS SHOWN
Date: 10/31/2022
Sheet No. 1 of 1
D3

COMMONWEALTH OF VIRGINIA
PROFESSIONAL ENGINEER
PAUL BROWN
Lic. No. 036148
11/10/2022

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SECTION C:
Base Flows for Floodplain Model

SECTION C:

Base Flows for Floodplain Model

C1. Pre-development

Documentation of analyzed flows:

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

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

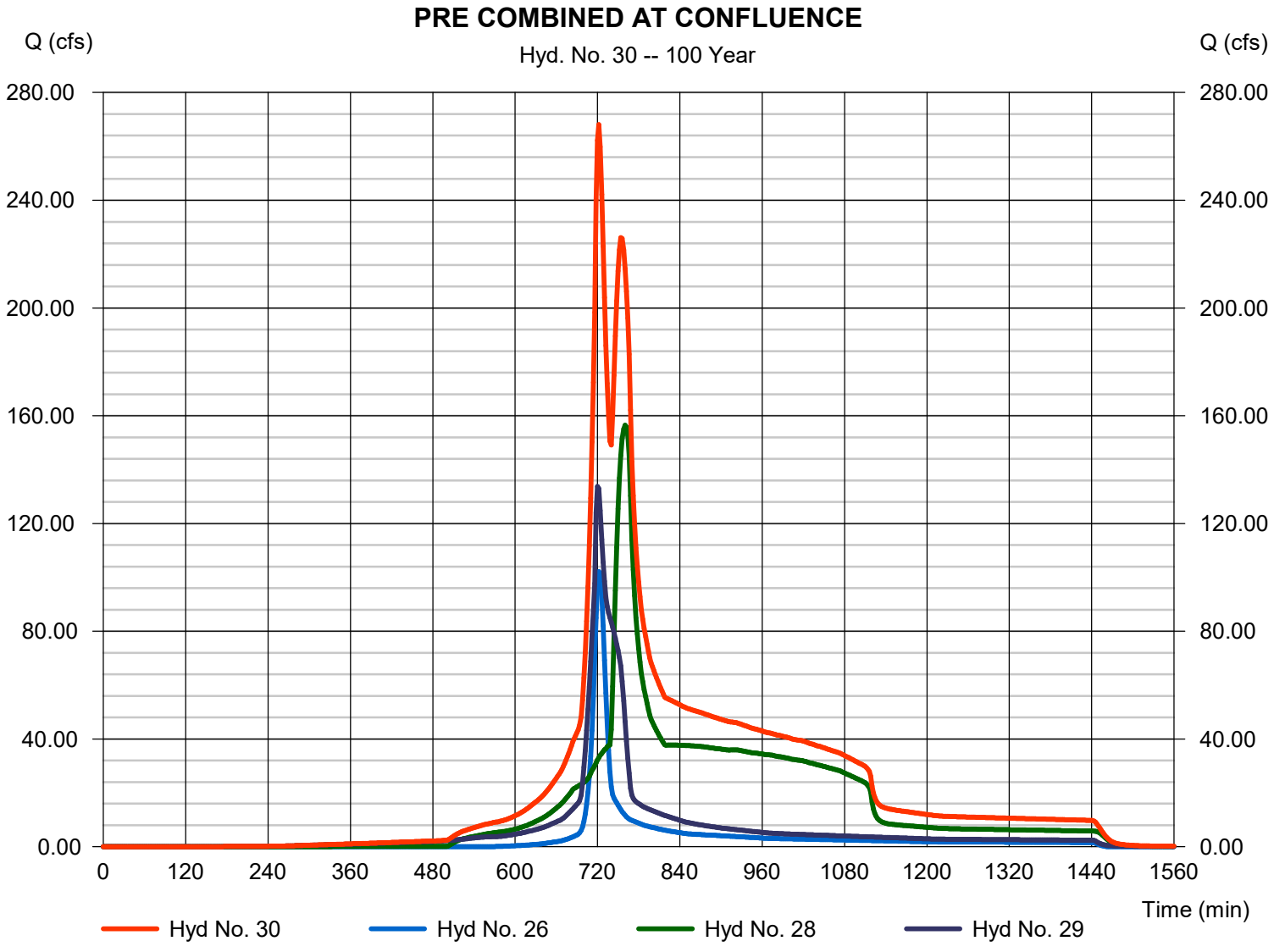
Please note the reduction in post-developed flow rates beginning at SL-10 due to planned upland detention which reduces the peak flow in the post developed condition.

Hydrograph Report

Hyd. No. 30

PRE COMBINED AT CONFLUENCE

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



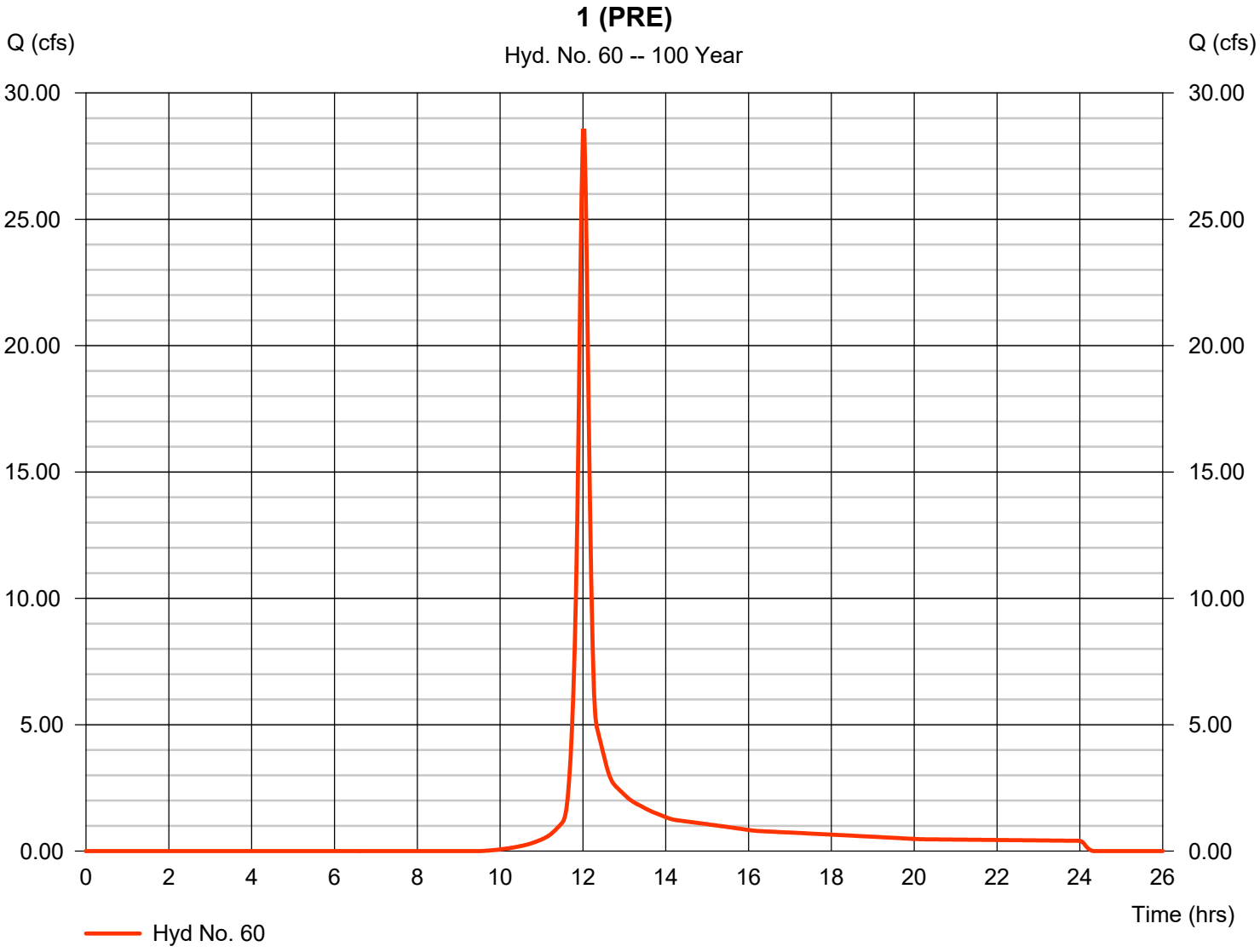
Hydrograph Report

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

Hyd. No. 60

1 (PRE)

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



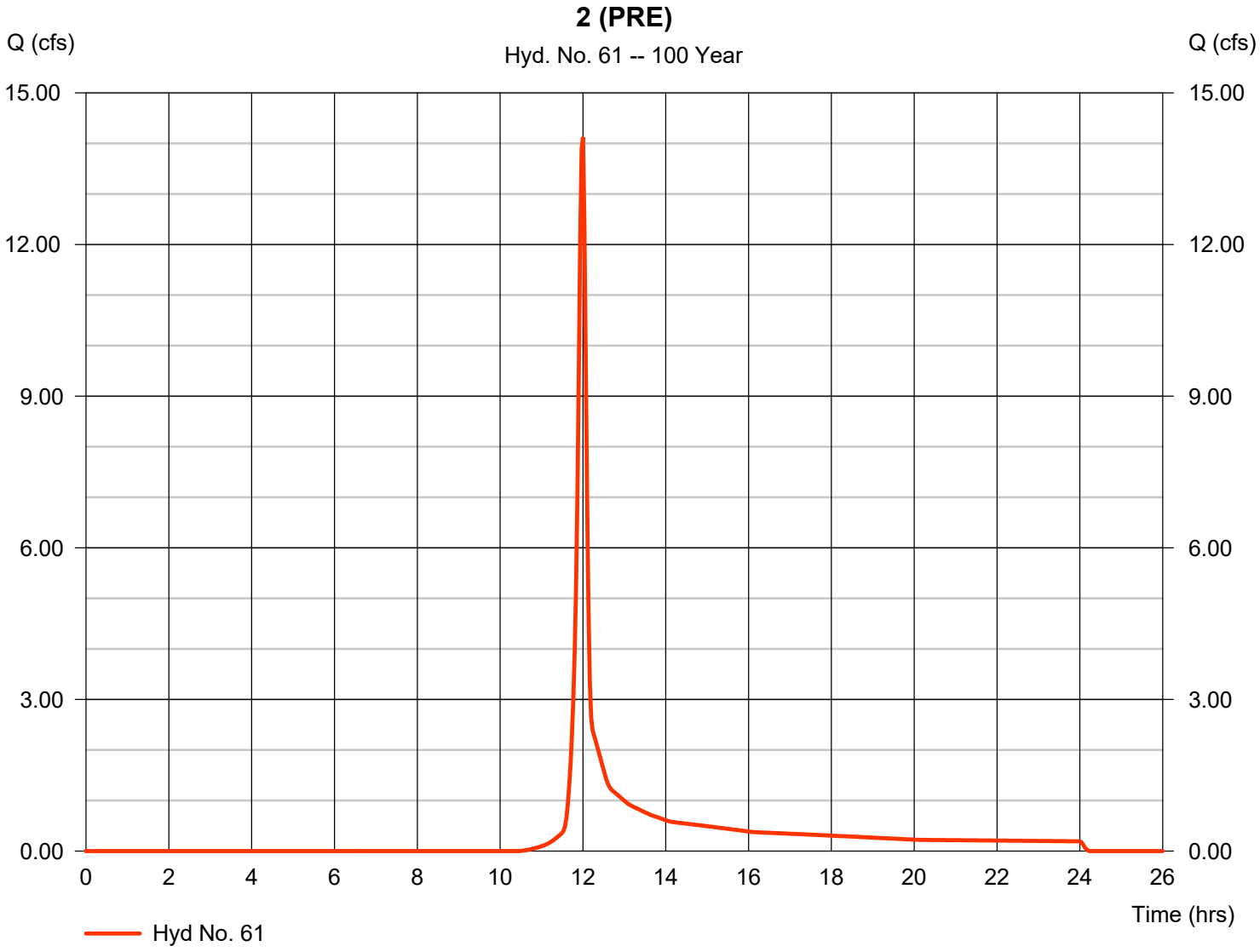
Hydrograph Report

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

Hyd. No. 61

2 (PRE)

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



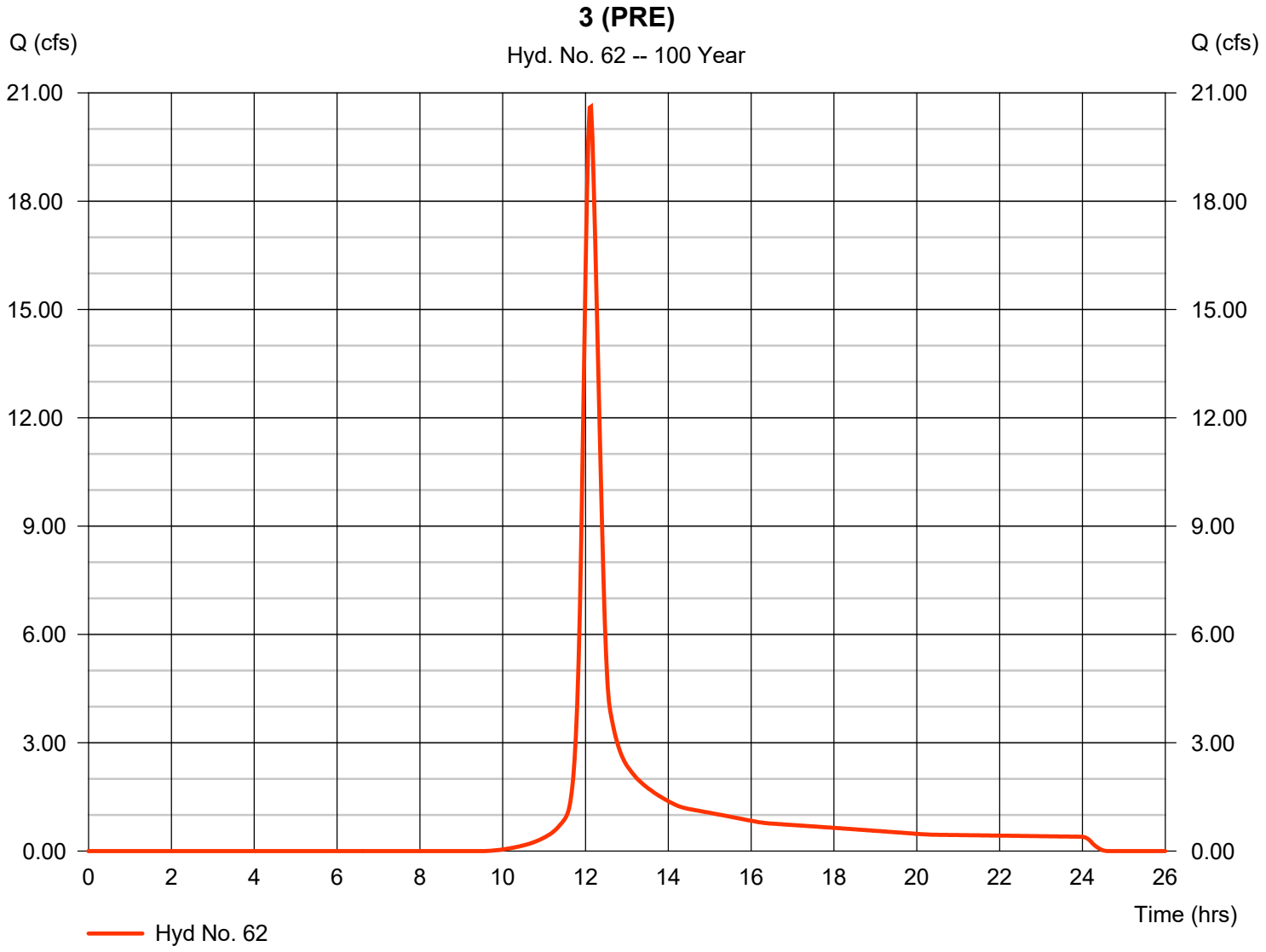
Hydrograph Report

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

Hyd. No. 62

3 (PRE)

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



Hydrograph Report

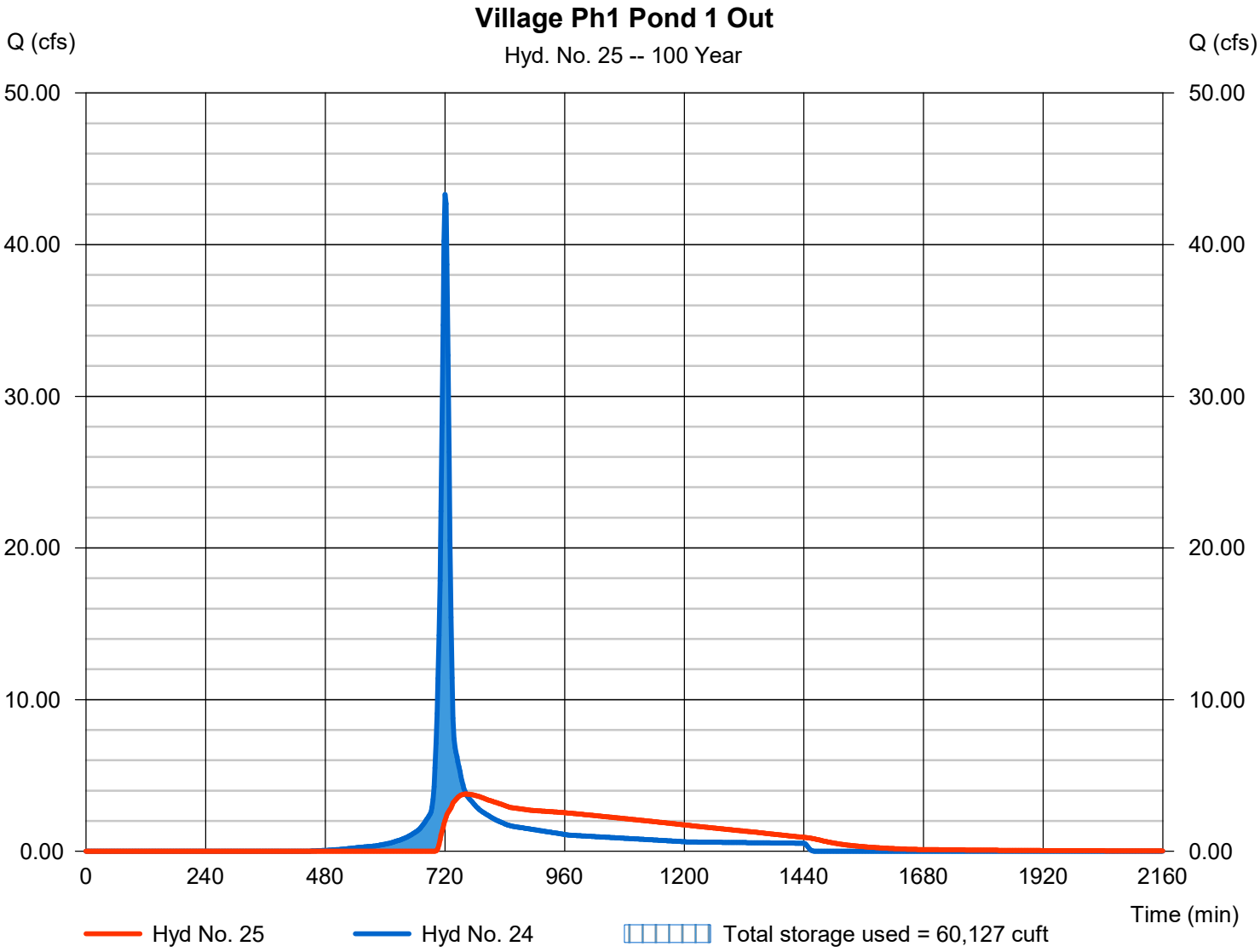
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 11 / 8 / 2022

Hyd. No. 25

Village Ph1 Pond 1 Out

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

Storage Indication method used.



SECTION C:

Base Flows for Floodplain Model

C2. Post-development

Documentation of analyzed flows:

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

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

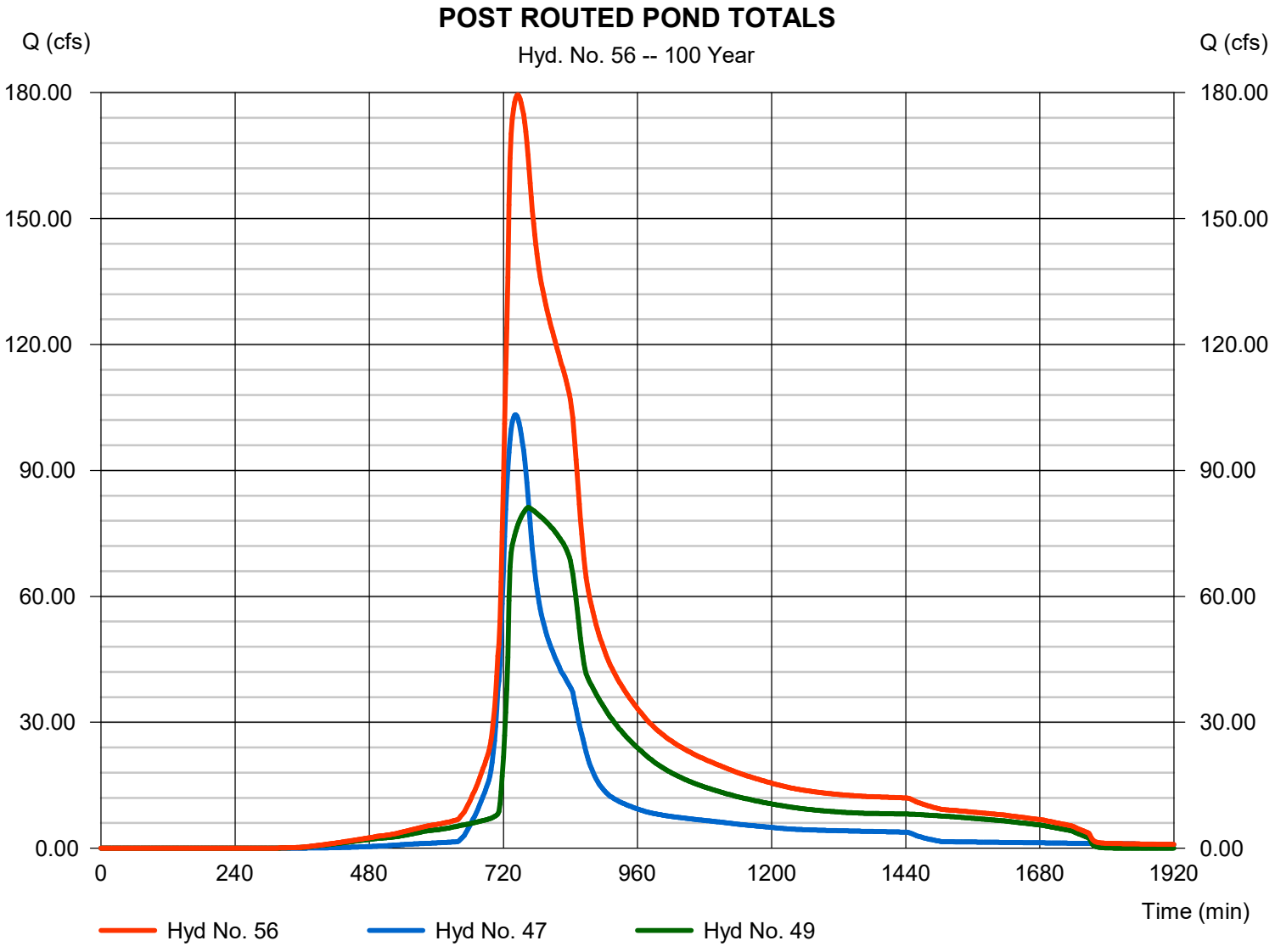
Please note the reduction in post-developed flow rates beginning at SL-10 due to planned upland detention which reduces the peak flow in the post developed condition.

Hydrograph Report

Hyd. No. 56

POST ROUTED POND TOTALS

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



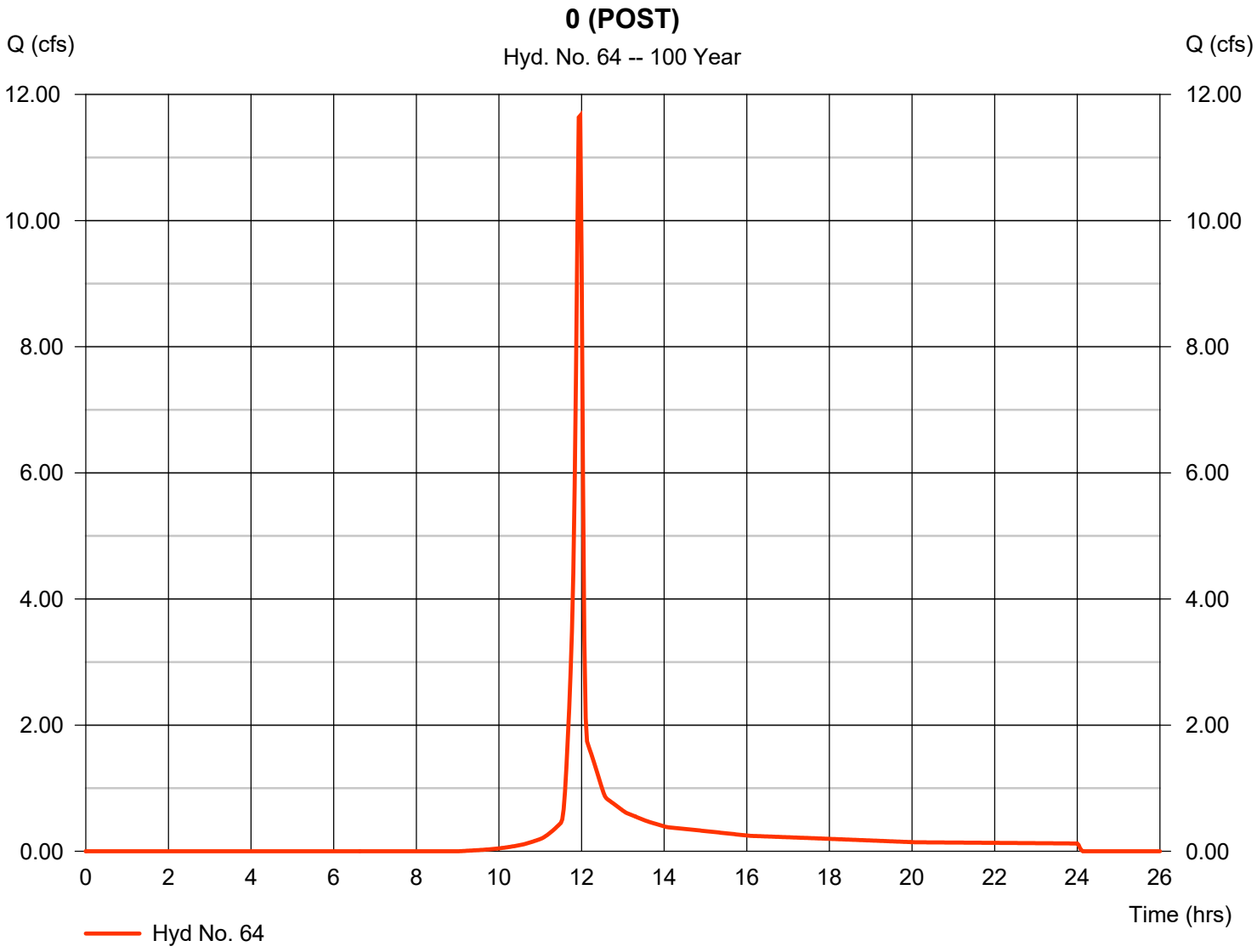
Hydrograph Report

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

Hyd. No. 64

0 (POST)

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

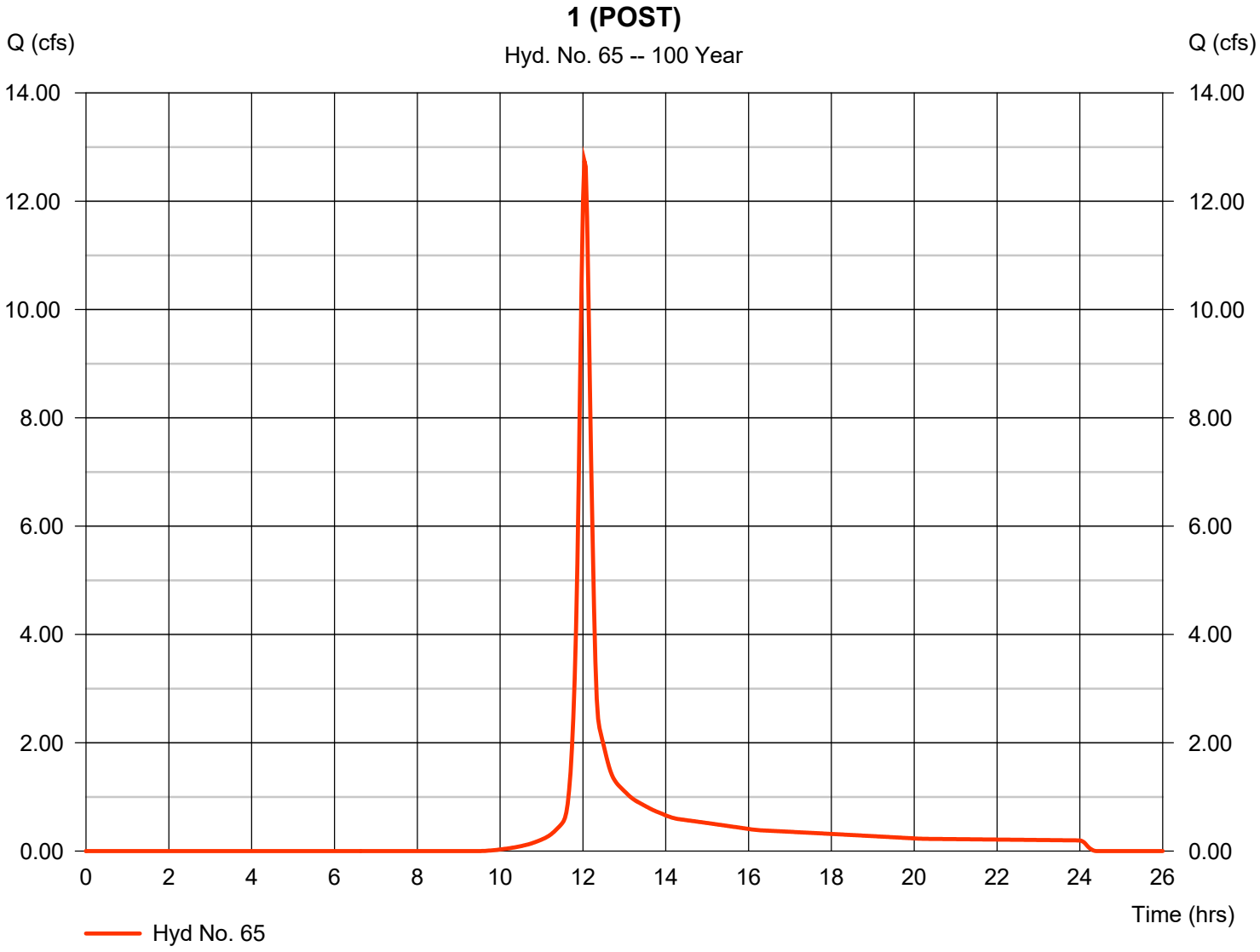


Hydrograph Report

Hyd. No. 65

1 (POST)

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



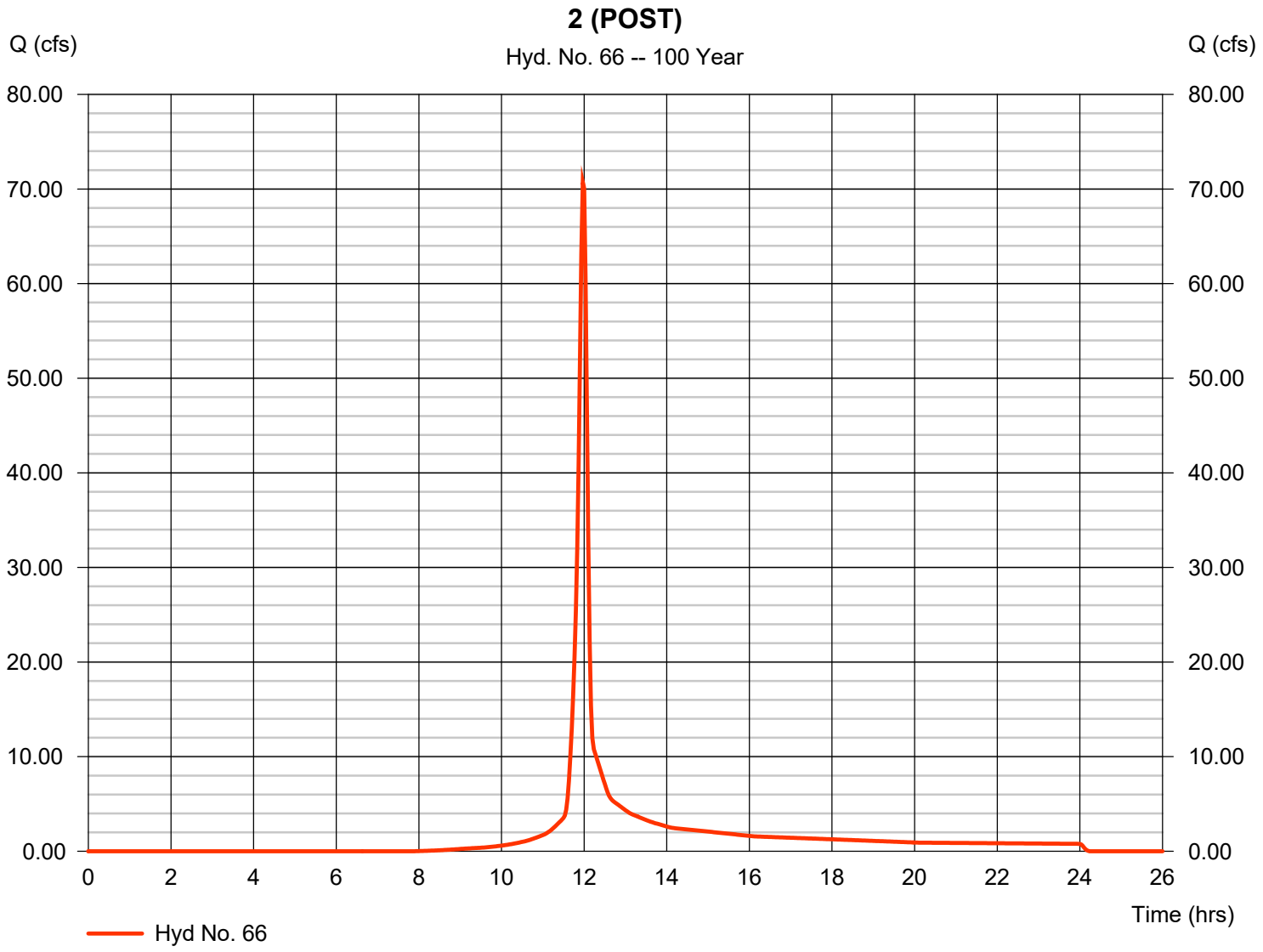
Hydrograph Report

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

Hyd. No. 66

2 (POST)

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



Hydrograph Report

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

Hyd. No. 67

3 (POST)

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