



**TOWNSHIP of HOPEWELL
MERCER COUNTY**

**201 WASHINGTON CROSSING – PENNINGTON ROAD
TITUSVILLE, NEW JERSEY 08560-1410**

PROJECT / APPLICATION

BLOCK:

LOT:

ADDRESS:

PROJECT NAME:

**REPORTS AND SUPPORTING
DOCUMENTS**

ENVIRONMENTAL IMPACT STATEMENT

ENVIRONMENTAL IMPACT STATEMENT
Ordinance of the Township of Hopewell

Venue at Hopewell (aka the Deer Valley Property)
Block 93, Lots 19, 20, 45.01, 46 & 60
Hopewell Township
Mercer County, New Jersey

Prepared By

Envirotactics
1330 Laurel Avenue
Building #3
Sea Girt, New Jersey 08750

Envirotactics Project #5102

June 2024

1330 Laurel Ave.
Building 3
Sea Girt, NJ 08750

Phone 732.449.0077
www.envirotactics.com

Environmental Impact Statement

Deer Valley Property
Block 93, Lots 19, 20, 45.01, 46 & 60
Hopewell Township
Mercer County, New Jersey

Table of Contents

1.0 EXECUTIVE SUMMARY	1
2.0 PROJECT DESCRIPTION.....	2
3.0 SITE DESCRIPTION AND INVENTORY	3
3.1 SOILS AND SOIL CAPABILITIES	3
3.2 TOPOGRAPHY	4
3.3 GEOLOGY	4
3.4 VEGETATION AND WILDLIFE.....	5
3.4.1. Vegetation	5
3.4.2 Wildlife.....	5
3.5 SURFACE AND SUBSURFACE HYDROLOGY AND DRAINAGE	6
3.5.1 Surface Hydrology	6
3.5.2 Subsurface Hydrology.....	6
3.6 REGULATED WETLANDS	6
3.7 HISTORIC SITES AND ARCHEOLOGICAL RESOURCES.....	7
3.8 EXISTING FEATURES	7
3.9 MISCELLANEOUS – AIR QUALITY	7
3.10 MISCELLANEOUS - NOISE.....	7
3.11 ENERGY CONSERVATION	8
4.0 AREA AND REGIONAL DESCRIPTION	8
5.0 IMPACTS	8
5.1 SOIL EROSION AND SEDIMENTATION FROM SURFACE RUNOFF	8
5.2 FLOODING AND FLOODPLAIN DISRUPTION	8
5.3 DEGRADATION OF SURFACE WATER QUALITY	9
5.4 GROUNDWATER POLLUTION.....	9
5.5 REDUCTION OF GROUNDWATER CAPABILITIES	9
5.6 SEWAGE DISPOSAL	9
5.7 VEGETATION DESTRUCTION	9
5.9 DESTRUCTION OF SCENIC AND HISTORIC FEATURES	10
5.10 AIR QUALITY DEGRADATION	10
5.11 NOISE LEVELS.....	10
5.12 ENERGY UTILIZATION.....	10
5.13 NEIGHBORHOOD DETERIORATION.....	11
5.14 EFFECT ON PUBLIC SERVICE, SUCH AS SCHOOLS, FIRE AND POLICE	11
5.15 TRAFFIC CONGESTION	11
5.16 HEALTH, SAFETY, AND WELFARE OF EXISTING RESIDENTS	11
5.17 REGIONAL DEVELOPMENT POLICIES	11
6.0 DESCRIPTION OF NO ADVERSE IMPACTS	11
6.1 Drainage Plans.....	11
6.2 Sewage Disposal Techniques	11
6.3 Water Supply and Water Conservation Proposals.....	11
6.4 Site Design Techniques	12
6.5 Energy Conservation Measures	12
6.6 Noise Reduction Technologies	12
6.7 Construction Schedule.....	12
6.8 Miscellaneous On-site and Off-site Public Improvements	12

7.0 LICENSES, PERMITS, AND OTHER APPROVALS REQUIRED	12
8.0 CONCLUSIONS	13
FIGURE 1 – LOCAL STREET MAP	1
FIGURE 2 – USGS TOPOGRAPHIC QUADRANGLE MAP	2
FIGURE 3 – TAX MAP	3
FIGURE 4 – MONMOUTH COUNTY SOILS MAP	4
FIGURE 5 – TOPOGRAPHY MAP	5
FIGURE 6A – SURFICIAL GEOLOGY MAP	6
FIGURE 6B – BEDROCK GEOLOGY MAP	7
FIGURE 7 – VEGETATION COMMUNITY MAP	8
FIGURE 8 – LANDSCAPE MAP	9
FIGURE 9 – SURFACE WATER MAP	10
FIGURE 10 – SUBSURFACE WATER MAP	11
FIGURE 11 – EXISTING DEVELOPMENT MAP	12

Attachment 1 – List of Preparers

Attachment 2 – Natural Heritage Database Report

Attachment 3 – Stormwater Management Report

Attachment 4 – Flood Hazard Verification

Attachment 5 – Letter of Interpretation

Environmental Impact Statement

Deer Valley Property
Block 93, Lots 19, 20, 45.01, 46 & 60
Hopewell Township
Mercer County, New Jersey

1.0 EXECUTIVE SUMMARY

The project, herein referred to as the "site" or "subject property", is identified as Block 93, Lots 19, 20, 45.01, 46, and 60 in the Township of Hopewell, Mercer County, New Jersey. The site is approximately 186.45 acres as depicted on the Hopewell Tax Maps. The state plane coordinates at the approximate center of the subject property are Easting (x): 605,927 and Northing (y):461,723. The site fronts Nursery Road to the south and Scotch Road to the east with a combination of residential, farmland and undeveloped properties to the south and west.

The proposed age restricted inclusionary residential development involves the construction of 272 single-family homes, 118 duplex attached homes, 120 COAH affordable housing units, and 90 Multi-family (MF) homes located within three story buildings, for a total of 600 homes at the subject property. The proposed project will satisfy a portion of the Township's affordable housing obligation. An associated development within the community will include roads, parking lots, roundabouts, stormwater basins, tennis courts, pickleball courts, a playground, bocce courts, dog parks, and a clubhouse facility.

This Environmental Impact Statement (EIS) presents the findings of our comprehensive evaluation of the inclusionary project and identifies any effects the proposed development may have on the subject property and surrounding vicinity. This EIS is intended to provide a concise summary of Envirotactics' assessment of the anticipated environmental impacts of the proposed development. This report also includes an evaluation of any adverse or positive environmental impacts from the proposed development and a description of any anticipated public benefits.

All project team members who participated in the preparation of this report have been identified in Attachment 1 – List of Preparers. Please note that the preparation of an EIS is a collective effort between the site surveyors, site engineers, site professionals (traffic engineers, noise engineers, hydrologists, architects, attorneys, etc.) which requires a combination of data gathering and presentation of this information from all site professionals. While this EIS has been prepared by Envirotactics, it has been completed with the assistance of Bowman Consulting Group.

2.0 PROJECT DESCRIPTION

As described in Section 1.0, the subject property is identified as Block 93, Lots 19, 20, 45.01, 46, and 60 in the Township of Hopewell, Mercer County, New Jersey as depicted on Figure 1 – Local Street Map and Figure 2 – USGS Topographic Quadrangle Map. The site is approximately 186 acres as depicted on the Hopewell Township tax maps as illustrated on Figure 3 – Tax Map.

The subject property is currently being utilized as agricultural land with several structures onsite including storage garages and single-family homes. The site fronts Nursery Road to the south and Scotch Road to the east. A combination of residential, agricultural, and undeveloped properties are located to the south and west of the subject property.

An unnamed tributary of Woolsey Brook (Woolsey Brook UNT) is located on-site along the northeast portion of Block 93, Lot 20. An unnamed tributary of Ewing Creek (Ewing Creek UNT) is located on the southern portion of Block 93, Lot 20. An unnamed tributary of Jacob Creek (Jacob Creek UNT) is located on the western portion of Block 93, Lot 19. Portions of the on-site freshwater wetlands are associated with the onsite unnamed tributaries.

The proposed development involves the construction of 272 single-family homes, 118 duplex attached homes, 120 COAH Affordable Housing units, and 90 MF homes, for a total of 600 age restricted homes at the subject property. The proposed project will have associated development including but not limited to, roads, parking lots, roundabouts, stormwater basins, tennis courts, pickleball courts, a playground, bocce courts, dog parks, and a clubhouse facility.

The purpose of this report is to present an environmental analysis of the proposed activities with Hopewell Township's development plan and approval process.

3.0 SITE DESCRIPTION AND INVENTORY

3.1 SOILS AND SOIL CAPABILITIES

As depicted on the United States Department of Agriculture (USDA) Web Soil Survey, the subject property and surrounding areas are mapped with the below soil types:

Soil Type Name	Hydrologic Soil Group	Percent of Subject Property
Bowmansville silt loam, 0 to 2 percent slopes, frequently flooded	Hydric	1.3%
Bucks silt loam, 2 to 6 percent slopes	Nonhydric	27%
Bucks silt loam, 2 to 6 percent slopes, eroded	Nonhydric	4.9%
Bucks silt loam, 6 to 12 percent slopes, eroded	Nonhydric	4.8%
Chalfont silt loam, 2 to 6 percent slopes	Nonhydric	8.1%
Doylestown and Reaville variant silt loams, 0 to 2 percent slopes	Hydric	5.3%
Klinesville channery loam, 18 to 35 percent slopes	Nonhydric	1.8%
Penn channery silt loam, 12 to 18 percent slopes	Nonhydric	0.4%
Penn channery silt loam, 2 to 6 percent slopes	Nonhydric	5.8%
Penn channery silt loam, 6 to 12 percent slopes	Nonhydric	10.3%
Quakertown silt loam, 2 to 6 percent slopes	Nonhydric	7.8%
Quakertown channery silt loam, 6 to 12 percent slopes, eroded	Nonhydric	4.2%
Quakertown channery silt loam, 2 to 6 percent slopes	Nonhydric	1.5%
Reaville silt loam, 2 to 6 percent slopes	Nonhydric	14.2%
Reaville silt loam, 6 to 12 percent slopes, eroded	Nonhydric	2.7%

- Bowmansville silt loam (BoyAt) is a poorly drained soil with a soil profile of silt loam to 17 inches, clay loam to 26 inches, sandy clay loam to 38 inches, fine sand loam to 47 inches, stratified gravel to sand to 60 inches.
- Bucks silt loam (BucB) is a well-drained soil with a soil profile of silt loam to 27 inches, very channery silt loam to 48 inches, and weathered bed rock to 80 inches.
- Bucks silt loam, Eroded (BucB2) is a well-drained soil with a soil profile of silt loam to 27 inches, very channery silt loam to 48 inches, and weathered bed rock to 80 inches.
- Bucks silt loam, Eroded (BucC2) is a well-drained soil with a soil profile of silt loam to 32 inches, very channery silt loam to 44 inches, and weathered bed rock to 80 inches.
- Chalfont silt loam (ChcB) is a somewhat poorly drained soil with a soil profile of a silt loam up to 9, silty clay loam up to 42 inches, very channery silt loam up to 50 inches, and whether bedrock up to 80 inches.
- Doylestown and Reaville variant silt loams (DOZA) is a poorly drained soil with a soil profile of silt loam down to 60 inches.
- Klinesville channery loam (KkoE) is a somewhat excessively drained soil with a soil profile of channery loam to 10 inches, very channery loam to 14 inches, and weather bedrock to 80 inches.
- Penn channery silt loam (PeoD) is a well-drained soil with a soil profile of a channery silt loam 22 inches, very channery loam to 30 inches, and weather bedrock to 80 inches.
- Penn channery silt loam (PeoB) is a well-drained soil with a soil profile of a channery silt loam 22 inches, very channery loam to 30 inches, and weather bedrock to 80 inches.
- Penn channery silt loam (PeoC) is a well-drained soil with a soil profile of a channery silt loam 20 inches, very channery loam to 25 inches, and weather bedrock to 80 inches.

- Quakertown silt loam (QukB) is a well-drained soil with a soil profile of silt loam to 20 inches, silty clay loam to 36 inches, channery clay loam to 56 inches, and unweather bedrock to 80 inches.
- Quakertown channery silt loam (QumC2) is a well-drained soil with a soil profile of a channery silt loam to 8 inches, silt loam to 42 inches, and unweather bedrock to 80 inches.
- Quakertown channery silt loam (QumB) is a well-drained soil with a soil profile of a channery sil loam to 12 inches, silt loam to 42 inches, and unweather bedrock to 80 inches.
- Reaville silt loam (RehB) is a somewhat poorly drained soil with a soil profile of a silt loam to 19 inches, channery silt loam to 23 inches, and weathered bedrock to 80 inches.
- Reaville silt loam (RehC2) is a somewhat poorly drained soil with a soil profile of a silt loam to 15 inches, channery silt loam to 20 inches, and weathered bedrock to 80 inches.

Please refer to Figure 4 – Monmouth County Soils Map for soil type locations and additional details.

3.2 TOPOGRAPHY

According to the available Mercer County 2-foot topographic contour data, the elevations on the subject property range from 146 to 216 feet. The highest elevation onsite is located in the northwest corner of Block 93, Lot 20, and the elevation decreases in a diagonal slope towards the Manasquan River UNT and the most southeastern site corner. No steep slopes or severe elevation breaks are present in the areas of proposed development.

Please refer to Figure 5 – Topography Map for additional details.

3.3 GEOLOGY

The Bedrock Geology of New Jersey Geographic Information System (GIS) layer indicates that the site is located within the Passaic Formation and the Passaic Formation Gray bed. The Passaic Formation consists of red beds consisting of argillaceous siltstone, silty mudstone, argillaceous, fine sandstone and shale. The Passaic Formation Gray Bed consists of gray to black silty mudstone, gray and greenish-to purplish-gray argillaceous siltstone, black shale, and medium- to dark-gray, argillaceous, and fine-grained sandstone.

No dikes, faults, or folds are identified as being located on the site or within the immediate vicinity of the subject property.

According to the NJDEP Surficial Geology of New Jersey GIS layer, the subject property is identified with three geological formations including Weathered Shale, Mudstone, and Sandstone, Alluvium, and Alluvium and Colluvium. Weathered Shale, Mudstone, and Sandstone has a geologic age of Pleistocene and has a lithology of Silty sand to silty clay with shale, mudstone, or sandstone fragments; reddish brown, yellow, light gray. As much as 10 feet thick on shale and mudstone, 30 feet thick on sandstone. Alluvium has a geologic age of Holocene and late Pleistocene with a lithology of Sand, gravel, silt, minor clay and peat; reddish brown, yellowish brown, brown, gray. As much as 20 feet thick. Alluvium and Colluvium has a geologic age of Holocene and late Pleistocene and has a lithology of Interbedded alluvium as in unit Qal and colluvium as in units Qcg, Qcb, Qcd, Qcs, Qcc, Qccb, and Qcl. As much as 20 feet thick.

Please refer to Figure 6A – Surficial Geology Map and Figure 6B – Bedrock Geology Map for additional details.

3.4 VEGETATION AND WILDLIFE

3.4.1. Vegetation

The Vegetation on the subject property consists of three (3) general communities: freshwater wetlands, forested and current or historically used farmland,. Each community is described as follows:

- The wetland community onsite included the following species Sweet Gum (*Liquidambar styraciflua*), Black Willow (*Salix nigra*), Smooth Meadow Grass (*Poa pratensis*), Sweet Pepperbush (*Clethra anifolia*), Low bush blueberry (*Vaccinium angustifolium*), Sensitive Fern (*Onoclea sensibilis*), and Soft Rush (*Schoenolectus tabernaemontani*). This area consists of 39.1 acres and approximately 21% of the site.
- The forested areas are dominated with mature trees with a grass-dominated understory. This area consists of 82.53 acres and approximately 44.26% of the site.
- Farmland consists of areas that were historically or are currently being utilized to grow plants for farming operations. This area consists of 93.63 acres and approximately 50.21% of the site.

Please see Figure 7 – Vegetation Community Map for the location of these areas.

3.4.2 Wildlife

Based on the NJDEP's available Landscape Map (V 3.3) data, the subject property is located within the Piedmont Plains Region. There are two (2) landscape habitat patches mapped onsite. Rank 1 (Habitat specific requirements) areas are found throughout the subject property under Link ID's 331259 / 441245 / 466358 / 216061 / 226067 / 340987 / 341025 / 351269 / 357101 / 236894 / 226123 / 225972 / 226006 / 226012 / 204382 / 178662 / 204367 and Rank 2 (Special Concern) areas are located throughout the subject property under Link ID's 21926 / 3252506 / 238384 / 204416 / 263151 / 458834 / 321930/262983. Rank 2 habitat patches are listed as a breeding sight for the Eastern Meadowlark.

The Natural Heritage Database (NHD) Report indicates whether species of special concern, State-listed threatened or endangered or Federal listed endangered species are known to utilize the site or its habitat characteristics. The NHD obtained for the subject property is consistent with the T&E species listings above.

The subject property is not mapped within the NJDEP Division of Fish and Wildlife's Connecting Habitat across New Jersey (CHANJ) mapping. The CHANJ program is "an effort to make our landscape and roadways more permeable for terrestrial wildlife by identifying key areas and actions needed to achieve habitat connectivity across the state.".

Please refer to Figure 8 – Landscape Map and Attachment 2 – Natural Heritage Database Report for additional details.

3.5 SURFACE AND SUBSURFACE HYDROLOGY AND DRAINAGE

3.5.1 Surface Hydrology

Woolsey Brook UNT is a regulated waterbody, which is located on the northern portions of the subject property. Ewing Creek UNT is a regulated waterbody, which is located on the southern and eastern portions of the subject property. Jacobs Creek UNT is a regulated waterbody, which is located on the western portions of the subject property. Based on the NJDEP's Surface Water Quality Classification, Woolsey Brook UNT, Ewing Creek UNT, and Jacobs Creek UNT are classified as Freshwater 2 – Non-Trout (FW2-NT) waters.

A Flood Hazard Area Verification was approved by the NJDEP on December 2, 2020, under NJDEP File No.: 1106-19-0002.2 – LUP200001. The flood hazard area was established using Method 6 (calculation method) as described at N.J.A.C. 7:13-3.6. The following flood hazard area design flood elevations were established.

- The flood hazard elevation of the unnamed tributary to Ewing Creek varies from 152.1 feet to 170.9 feet NAVD88 across lots 20 and 45.01
- The flood hazard elevation of the unnamed tributary to Woolsey Creek varies from 181.1 feet to 185.4 NAVD88 across lot 60.

The letter also establishes that a 50-foot riparian zone extends from the top of bank along both sides of the regulated waters onsite.

Please refer to Figure 9 – Surface Water Map, Attachment 5 – Flood Hazard Area Verification report for additional details, and the Flood Hazard Area Engineering Report, prepared by Bowman Consulting

3.5.2 Subsurface Hydrology

NJDEP GIS mapping titled "Bedrock Aquifers" mapped the subject property as containing a Brunswick aquifer (C). Additionally, no public community supply wells or community well head protection areas are located on the subject property.

Please refer to Figure 10 – Subsurface Water Map for additional details.

3.6 REGULATED WETLANDS

A NJDEP Freshwater Wetlands Letter of Interpretation: Line Verification was issued on 04/13/2022 under NJDEP File No.: 1106-19-0002.2 FWW200001. The letter confirmed the boundary line as shown on the plan entitled: "ALTA/NPS LAND TITLE SURVEY BLOCK 93, LOTS 19, 20, 45.01, 46 & 60 HOPEWLL TOWNSHIP, MERCER COUNTY, NEW JERSEY". The Letter of Interpretation depicted classified the onsite wetlands under the following:

- Ordinary: WF-Y6 through WF-Y13: these wetlands have been determined to be a manmade "ditch". WF-X2 through WF-X7: these wetlands have been determined to be a "swale". These wetlands are determined to have no wetland buffer
- Isolated: WF-W1 through WF-W6 are considered by the Department to be isolated wetlands and not part of a surface water tributary system
- Intermediate: All remaining freshwater wetlands not classified as Ordinary have a buffer of 50 feet.

- State Open Water: All state open waters within wetlands have no wetland buffer.

Please refer to Figure 12 – NJDEP Mapped Wetlands and Attachment 6 – Letter of Interpretation for further details.

3.7 HISTORIC SITES AND ARCHEOLOGICAL RESOURCES

A portion of the subject property is identified on the NJDEP Historic Archaeological Site Grid CB148. The Grid data indicates that the presence of Archaeological Districts or Sites that: 1. are National Historic Landmarks, 2. are included in the New Jersey or National Registers of Historic Places, 3. have been determined eligible for inclusion in the registers through federal or state processes administered by the HPO, 4. have been designated as Local Landmarks or Districts by local government, or 5. have been identified through early 20th century state-wide archaeological survey, modern cultural resource survey, or other documentation on file at the HPO. The grid is listed as Eligible and contains no data for any specific archaeological district or site.

Lots 19 & 60 of the subject property contains the historic property of Hart Farmstead. The area under Lot 19 is listed under the New Jersey Environmental Management System (NJEMS) Project ID of 99120013. The lot 60 area is listed under the New Jersey Environmental Management System (NJEMS) Project ID of 99104168. The historic site is not listed as being eligible for survey and has been demolished.

3.8 EXISTING FEATURES

There are three (3) note-worthy features of existing development on subject property. The following features are represented as follows: 1 – Existing Operations and 2 – Farmland, and 3 – Undeveloped Wooded Areas. The existing operations consist of the buildings (multiple buildings, and storage areas). The farmland portions of the site include all areas that are currently or historically farm fields. As confirmed in the NJDEP Freshwater Wetlands Letter of Interpretation, there are isolated wetlands located within the existing agricultural fields. The undeveloped wooded areas include upland forest, freshwater wetland areas associated with Woolsey Brook UNT, Ewing Creek UNT, Jacobs Creek UNT and upland wooded areas on-site.

Please refer to Figure 11 – Existing Development Map for additional details and Attachment 6 – Letter of Interpretation

3.9 MISCELLANEOUS – AIR QUALITY

Existing air quality surrounding the site is typical for a New Jersey suburban setting. There are existing hazardous air pollutants (HAP's) which come from cars, heavy duty trucks, buses, and other highway vehicles which come from Scotch road and US Route 295. There are known health standards associated with these pollutants. It is anticipated there will no significant increase in HAP's as a result of project.

3.10 MISCELLANEOUS - NOISE

The State of New Jersey has promulgated noise standards, which dictate that noise levels are to be kept below 65 decibels during daytime and 50 decibels at night. Noise sources that may arise from the project will occur during two time periods: a temporary construction period and a post construction operational period. The proposed project will conduct construction activity at hours outlined by the Township's guidelines. Construction noise during development will typically be higher for a limited period and is usually highest during the early stages of construction. Construction noise is considered temporary since it ends with the completion of the development. Once complete the proposed

development will generate noise levels that are consistent with surrounding area and not exceed the decibel limits as detailed above.

3.11 ENERGY CONSERVATION

As depicted on the available NJDEP GIS data titled "Solar Siting Analysis", the subject property is currently mapped as not preferred due to existing agriculture facilities at the site. The construction of the proposed development may change this designation to preferred.

4.0 AREA AND REGIONAL DESCRIPTION

There are 23 tax parcels within 500 feet of the subject property, ranging in size from 0.46 acres to 101 acres with an average lot size of 4.4 acres. These parcels are broken out into the following tax codes to identify property use within the immediate vicinity of the subject property:

Property Use	# of Parcels within 500 feet
Vacant	3
Residential	15
Commercial	0
Farm	4
Open Space	1

As indicated in the above table, the majority of the tax parcels within 500 feet of the subject property are utilized for residential use. The largest parcel within the vicinity of the subject property is a 101-acre lot that is currently being utilized as public property. The smallest parcel within 500 feet of the subject property is a 0.46-acre lot utilized for residential purposes. Also, directly to the north of the property is the Hopewell Park inclusionary development which is under construction and will total 1,077 homes upon completion.

The subject property is not currently serviced by municipal water and sewer and is not located within a municipal sewer service area. Sewer service for the project is available within Scotch Road and is being challenged by the property owner and developer. The existing infrastructure will not remain following the construction of the proposed development. As depicted on the submitted plans, the proposed development will construct new utilities and infrastructure for the site.

5.0 IMPACTS

5.1 SOIL EROSION AND SEDIMENTATION FROM SURFACE RUNOFF

No unmitigated impacts to soils, soils with limiting factors, high acid, or erodible soils are anticipated to occur as a result of the proposed development. The proposed development will utilize off-site laboratory certified clean fill, as required, during construction grading.

The redevelopment of the site will be completed in accordance with all regulations for Soil Erosion and Sediment Control and will result in an improvement and reduce the amount of soil erosion and sediment runoff on-site and off-site.

5.2 FLOODING AND FLOODPLAIN DISRUPTION

The proposed development includes the development of a residential community, paving of the road and driveways, and construction of twenty-seven storm water basins. Woolsey Brook, Eging Creek and Joshua Creek UNT are located on the subject property and as detailed above, the flood hazard elevation of the unnamed tributary to Ewing Creek varies from 152.1 feet to 170.9 feet NAVD88 across lots 20 and 45.01. The flood hazard elevation of the unnamed tributary to Woolsey Creek varies from

181.1 feet to 185.4 NAVD88 across lot 60. The proposed development will be located outside of the onsite flood hazard areas and therefore, there will be no disruption of any flooding or floodplains.

Please refer to Attachment 5 – Flood Hazard Verification

5.3 DEGRADATION OF SURFACE WATER QUALITY

As the site qualifies a major development, stormwater best management practices will be implemented with the proposed project. The project involves the installation of 27 stormwater basins for the management of stormwater runoff generated from the project. All stormwater will be treated accordingly prior to distribution in the basins. As a result, it is not anticipated that any surface water will be affected by the resulting stormwater run-off generated during the project. Additionally, the project will not disrupt any surface water located within the project vicinity nor will it utilize the surrounding surface water upon completion.

Please refer to Attachment 3 - Stormwater Management Report by Bowman Consulting for further information.

5.4 GROUNDWATER POLLUTION

As the site qualifies a major development stormwater best management practice will be implemented with the project. The project involves the installation of 27 stormwater basins for the management of stormwater runoff generated from the project. All stormwater will be treated accordingly prior to their distribution in the basins and percolation into the groundwater. It is not anticipated that the completed project will draw upon or utilize any existing groundwater at the subject property.

Please refer to Attachment 3 - Stormwater Management Report by Bowman Consulting for further information.

5.5 REDUCTION OF GROUNDWATER CAPABILITIES

As the site qualifies a major development stormwater best management practice will be implemented with the project. The project involves the installation of 27 stormwater basins for the management of stormwater runoff generated from the project. All stormwater will be treated accordingly prior to distribution in the basins and percolation into the groundwater system. It is not anticipated that the completed project will draw upon or utilize any existing groundwater at the subject property.

Please refer to Attachment 3 - Stormwater Management Report by Bowman Consulting for further information.

5.6 SEWAGE DISPOSAL

Currently the subject property is not located within the municipal sewer service area. It is anticipated that a NJDEP Water Quality 208 Amendment will be submitted, and the proposed development will be connected to the municipal sewer system. It is anticipated that proposed project will comply with Sections 201, 208 and 303 of the Clean Water Act

5.7 VEGETATION DESTRUCTION

The proposed development will impact the wooded areas and existing farmlands on the subject property. Additionally, there will be minor disturbances to wetland transition areas on the subject. Lastly, the proposed project will impact the isolated wetlands found throughout the subject property. Appropriate NJDEP permitting will be sought for the disturbance of these areas and will comply with the Freshwater Wetlands Protection Act Rules at N.J.A.C. 7:7A.

5.8 DISRUPTION OF WILDLIFE HABITATS

No impacts to regulated wildlife and/or wildlife habitats are anticipated as a result of the proposed development. As detailed above, the majority of the site is listed as Rank 1 and Rank 2 under the NJDEP Landscape 3.3 mapping. There are no species of special concern found within or immediately adjacent to the subject property. Additionally, while the site contains more than 20 acres of contiguous forested areas, denoting the area as a critical wildlife habitat for potential nesting birds, the proposed development will not reduce these areas below 20 contiguous areas nor will it fragment any wildlife habitat corridors. Due to the onsite farming operations, there is no significant wildlife habitat corridor between the northwestern forested areas and southeastern forested areas.

5.9 DESTRUCTION OF SCENIC AND HISTORIC FEATURES

The proposed development will not result in the destruction of any historic structures and the development will not impact any known archaeologically sensitive or historical areas. As detailed above Lots 19 & 60 of the subject property contains the historic property of Hart Farmstead. The historic site is not listed as being eligible for survey and has been demolished. Therefore, it is anticipated that there will be no destruction of scenic and/or historical features. If at any point during construction, historical features are found, then appropriate New Jersey Phase 1 Archaeological Investigations will be conducted at the subject property.

5.10 AIR QUALITY DEGRADATION

There are no significant impacts associated with air quality with the construction of the proposed development. The proposed development will not require any permits for air quality from the NJDEP during or following construction. There may be some temporary airborne dust and disturbance associated with the construction process. These conditions will be localized and will dissipate with the stoppage of each workday. Standard construction mitigation measures such as application of mist to suppress dust, use of interior chutes and dumpster covers, prompt debris removal, wind covers, and use of crushed stone for landing pads will take place during construction, if necessary.

The proposed development will not impact the on-site or surrounding area's long term air quality and is relatively consistent with other residential developments within the immediate vicinity. No variances regarding air quality will be required.

5.11 NOISE LEVELS

The increase in noise levels temporarily and following local hours of operation requirements during the construction process will have no long-term significant or adverse impacts to the subject property or surrounding areas. Following the completion of the proposed construction it is anticipated that the noise levels will remain consistent with the surrounding noise levels of the subject property. The operation of the venue will comply with all municipal laws and regulations regarding noise. Further, the proposed development will comply with all zoning requirements, no variances regarding noise will be required for the proposed construction.

5.12 ENERGY UTILIZATION

It is anticipated that upon the completion of the proposed development, energy demand will rise. The demand in electrical consumption will be consistent the average single-family home and multi-unit development use. Appropriate electrical and utility lines will be provided at the subject property to provide consistent sources of energy. The demand is anticipated not to have an adverse impact to the local grid as well as supply for other utilities used at the subject property and the surrounding development.

5.13 NEIGHBORHOOD DETERIORATION

The proposed project is not anticipated to contribute to any neighborhood deterioration. Local roads will not be disrupted nor impacted by traffic as a result of the construction. The development will not interfere nor impact any existing residential communities. Appropriate buffers between the development and the surrounding residential properties will be implemented.

5.14 EFFECT ON PUBLIC SERVICE, SUCH AS SCHOOLS, FIRE AND POLICE

The proposed development will not result in an increase of the local school's population. Given all homes are age restricted. Additionally, other public services such as fire and police will see an increase in their typical daily operations as needed. The project has been designed to be accessible to emergency vehicles in. No overt negative impacts are anticipated to affect public services.

5.15 TRAFFIC CONGESTION

A Traffic Impact Study was conducted by Langan Engineering & Environmental Services, Inc, dated May 6, 2024. The report concluded that the adjacent roadway network has sufficient capacity to accommodate the site-generated trips associated with the proposed development. The Scotch Road corridor has sufficient capacity to accommodate the proposed project and area growth. The site's access points are expected to operate at acceptable levels of service during peak traffic hours. Moreover, the onsite circulation has been designed to provide logical and efficient circulation for vehicular and pedestrian traffic in accordance with the Residential Site Improvements Standards.

Bowman Consulting will be submitting the Traffic Impact Study along with the EIS report.

5.16 HEALTH, SAFETY, AND WELFARE OF EXISTING RESIDENTS

The proposed project is not anticipated to adversely affect the health, safety, and welfare of existing residents. As detailed above, the proposed project will have minimal to no impact on the surrounding community.

5.17 REGIONAL DEVELOPMENT POLICIES

The subject property is located within Delaware and Raritan Canal Commission (DRCC) regional planning area Zone B.

6.0 DESCRIPTION OF NO ADVERSE IMPACTS

6.1 Drainage Plans

No adverse impacts from the proposed drainage system are anticipated. The proposed project will use stormwater best management practices.

Please refer to Attachment 3 - Stormwater Management Report by Bowman Consulting for further information.

6.2 Sewage Disposal Techniques

No adverse impacts from the sewage disposal are anticipated. It is anticipated that a NJDEP Water Quality 208 Amendment will be applied to include the site within the municipal sewer service area.

6.3 Water Supply and Water Conservation Proposals

There will be no adverse impacts to the local water supply. There will be no significant increase in the demand for available water as the existing facilities on the site are agricultural. Water capacity to service the project will be confirmed with the local supplier prior to construction.

6.4 Site Design Techniques

There will be no adverse impacts from the proposed development design are anticipated. The proposed development meets all local zoning requirements and/or variances as required. The subject property is a residential development and will be designed in such a manner which is similar to adjacent properties within the immediate vicinity of the site.

6.5 Energy Conservation Measures

No adverse impacts from energy consumption are anticipated. The proposed development will not result in a significant increase in energy or utility demand. Energy demand may increase during the construction period; however, energy demand will return to a steady level once construction is completed.

6.6 Noise Reduction Technologies

No adverse impacts from the on-site noise are anticipated. It is expected that the noise emanating from the subject property will temporarily increase during construction then decrease after the proposed development is completed.

6.7 Construction Schedule

No adverse impacts from the proposed construction schedule are anticipated. The proposed development will comply with the local ordinances for construction and scheduling.

6.8 Miscellaneous On-site and Off-site Public Improvements

No adverse miscellaneous impacts are anticipated for onsite or off-site public improvement. All proposed roadways will match the existing grade of any local roadways.

7.0 LICENSES, PERMITS, AND OTHER APPROVALS REQUIRED

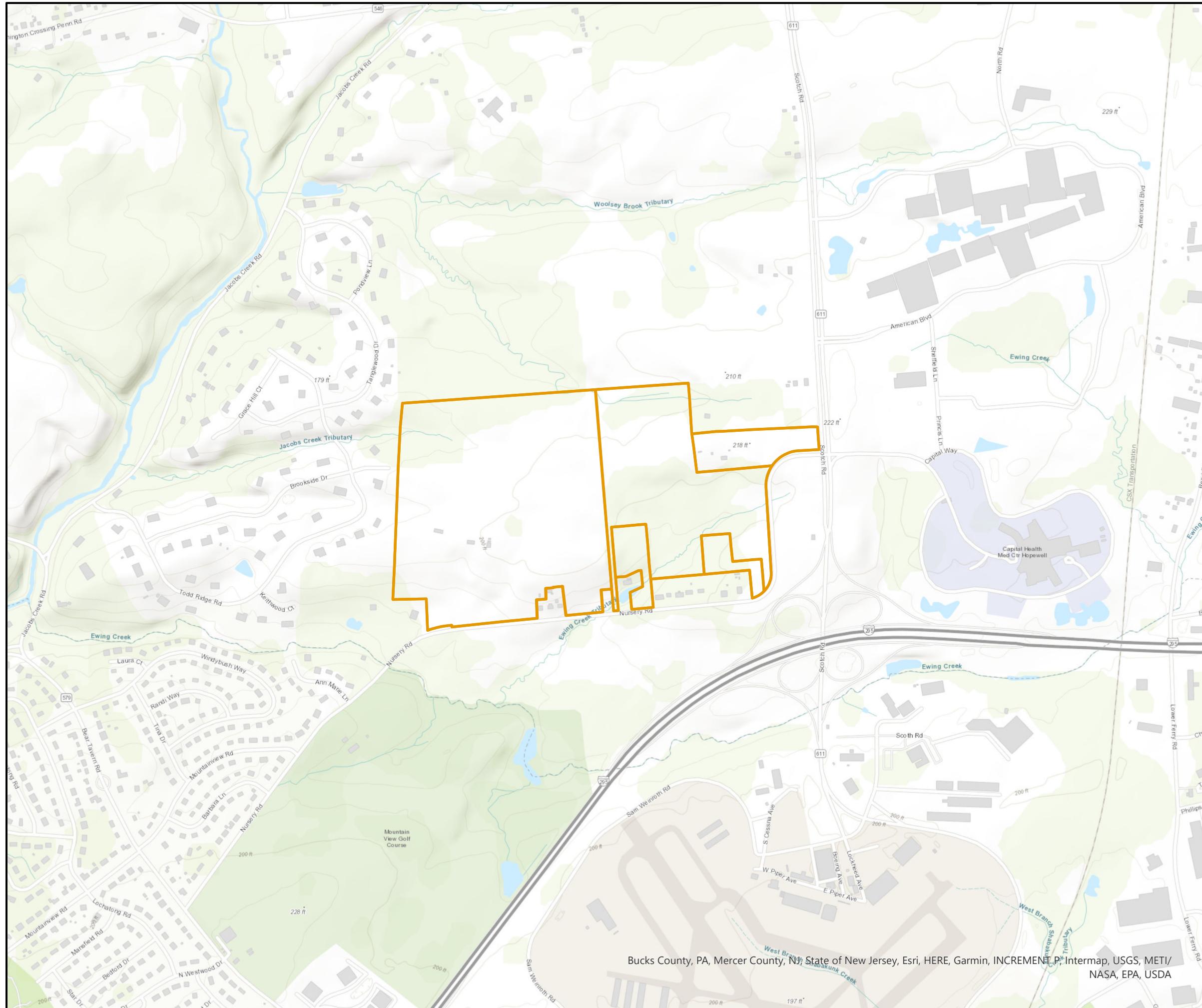
The project has been reviewed and has been determined to be compliant with or require the following permits:

- State
 - NJDEP
 - Freshwater Wetlands (FWW)General Permit #2 underground utilities lines.
 - Freshwater Wetlands General Permit #6 for the filling of non-tributary wetlands
 - Freshwater Wetlands General Permit #7 for the the filling of human made ditches or swales in headwaters
 - Freshwater Wetlands General Permit #10 A & B for the construction of very minor and minor road crossings.
 - Freshwater Wetlands General Permit #11 for the construction of outfalls/intakes structures.
 - Freshwater Wetlands Transition Area Waiver Buffer Disturbance.
- County
 - Mercer County Planning Board
 - A Site Plan Application will be submitted to the county planning board.
 - Soil Conservation District
 - A Soil Erosion & Sediment Control Plan Application
- Local
 - Township of Hopewell
 - A Preliminary and Final Site Plan Approval is required.

8.0 CONCLUSIONS

Based on the above inventory and analysis, it is Envirotactics' professional opinion that the proposed inclusionary age restricted development will not result in any significant or adverse impact on the environment or cultural resources of Hopewell Township. No negative impacts to any critical, physical, social, or historic environments will result from the proposed development. Additionally, the development will be completed in accordance with all permit requirements, conditions, and approvals.

Figure 1 – Local Street Map



LEGEND

Subject Property

1 inch equals 1,000 Feet

0 500 1,000 2,000 Feet

**Lennar - Deer Valley
Block 93, Lot(s) 19, 20, 45.01 46, 60
Hopewell Township, Mercer County**

Project #: 5102 Date: September 05, 2023

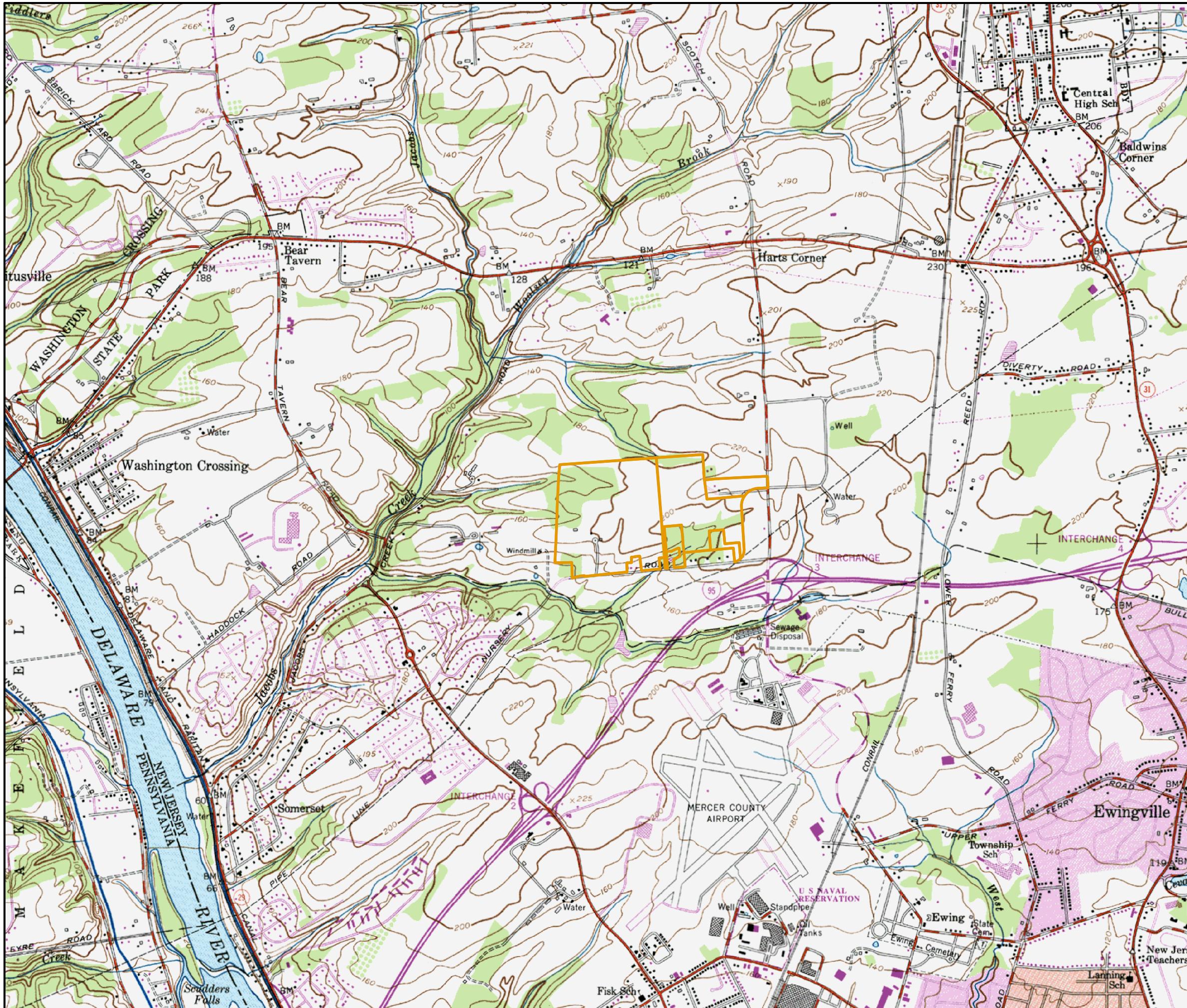
enviroTACTICS
Your Environmental Resource

1330 Laurel Avenue, Building #3, Sea Girt, NJ 08750
Phone: 732.449.0077 Fax: 732.449.5810
www.envirotactics.com

This map was developed using New Jersey Department of Environmental Protection Geographic Information System Digital Data, but this secondary product has not been verified by NJDEP and is not state Authorized.

Figure 1 - Local Street Map

Figure 2 – USGS Topographic Quadrangle Map



Lennar - Deer Valley
Block 93, Lot(s) 19, 20, 45.01 46, 60
Hopewell Township, Mercer County

Project #: 5102 Date: September 05, 2023

enviroTACTICS
 Your Environmental Resource

1330 Laurel Avenue, Building #3, Sea Girt, NJ 08750
 Phone: 732.449.0077 Fax: 732.449.5810
www.envrotactics.com

This map was developed using New Jersey Department of Environmental Protection Geographic Information System Digital Data, but this secondary product has not been verified by NJDEP and is not state Authorized.

Figure 2 - USGS Topographic Quad Map - Pennington

Figure 3 – Tax Map

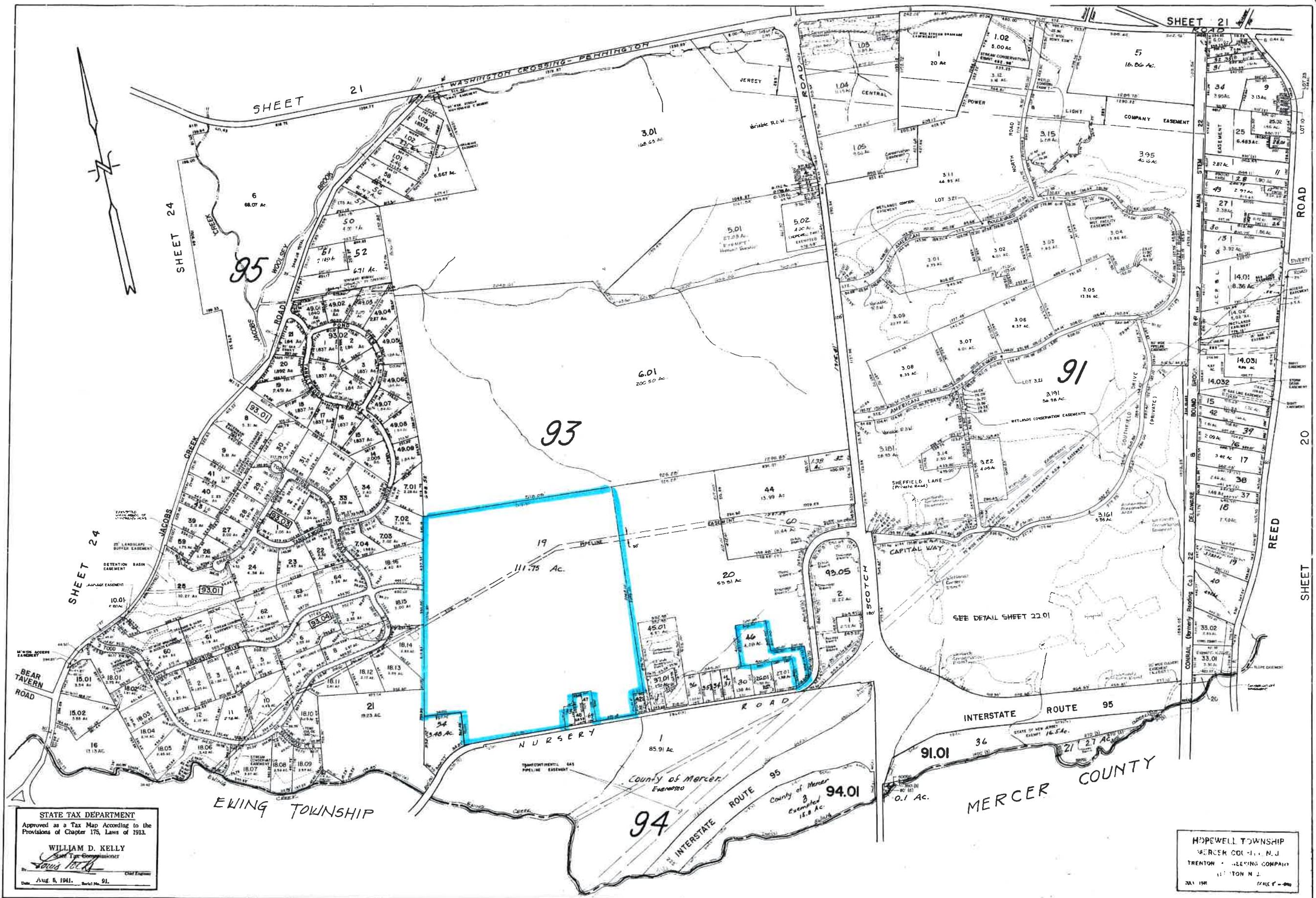


Figure 4 – Monmouth County Soils Map

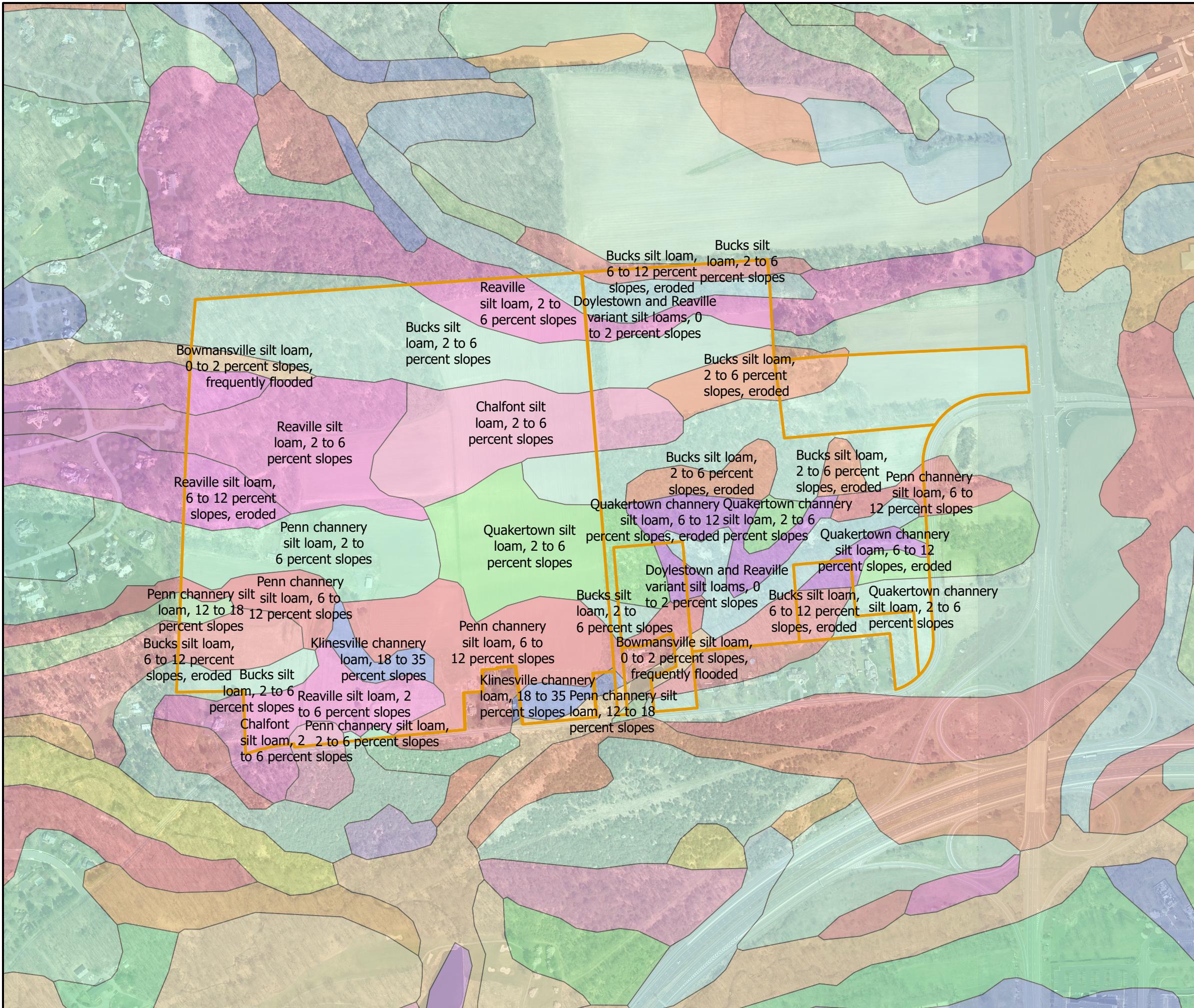


Figure 4 - Mercer County Soils Map

Figure 5 – Topography Map

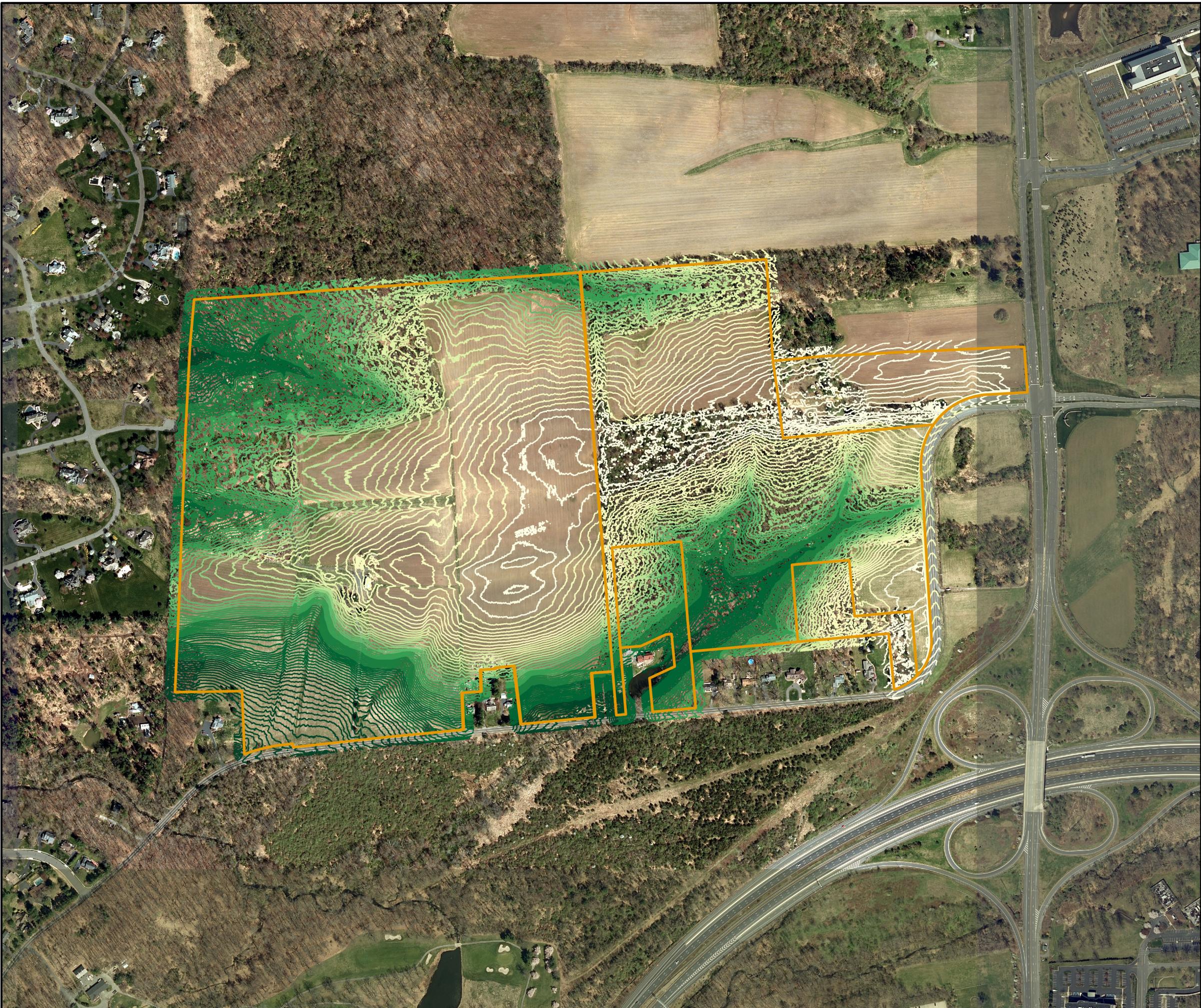


Figure 6A – Surficial Geology Map

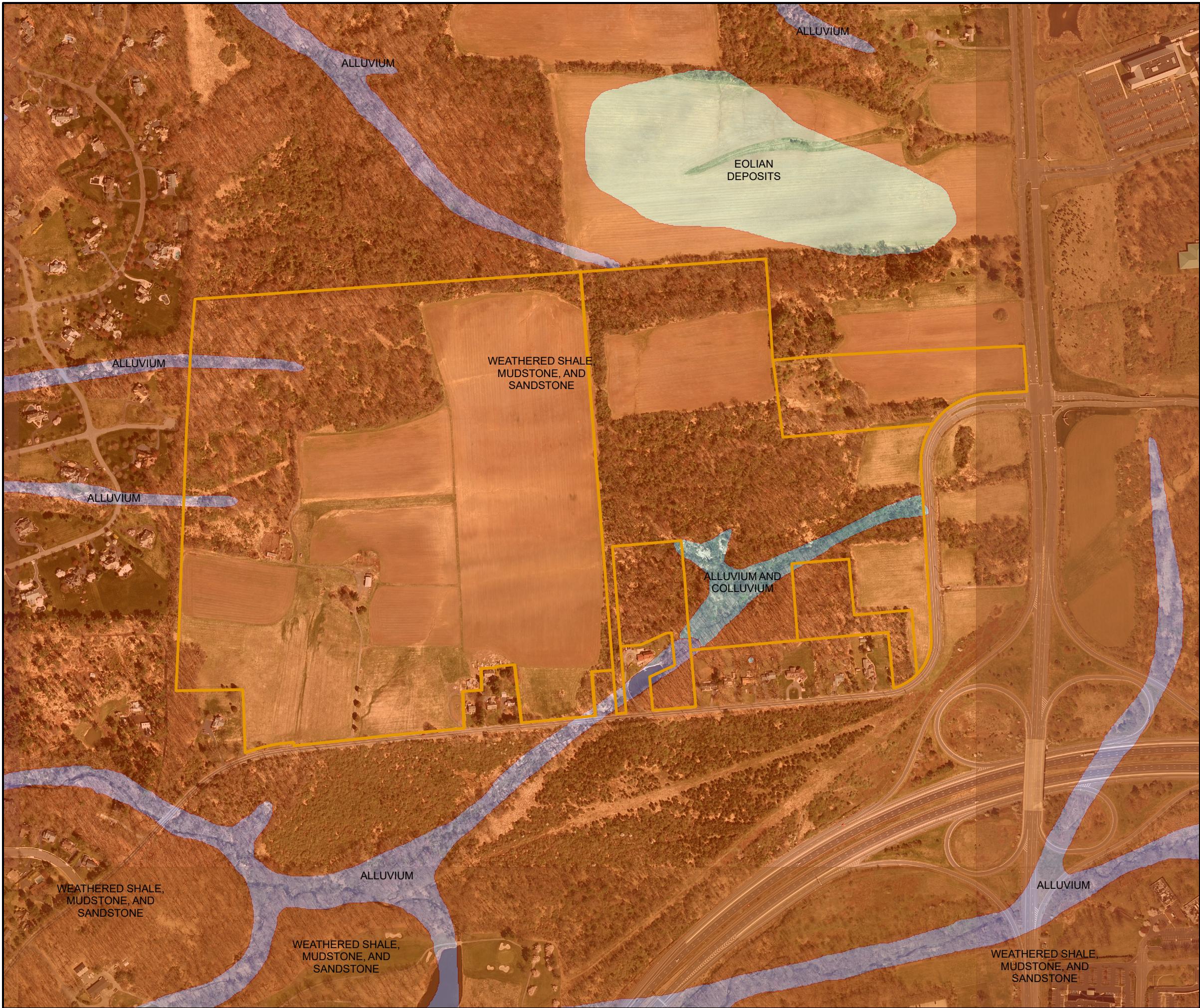
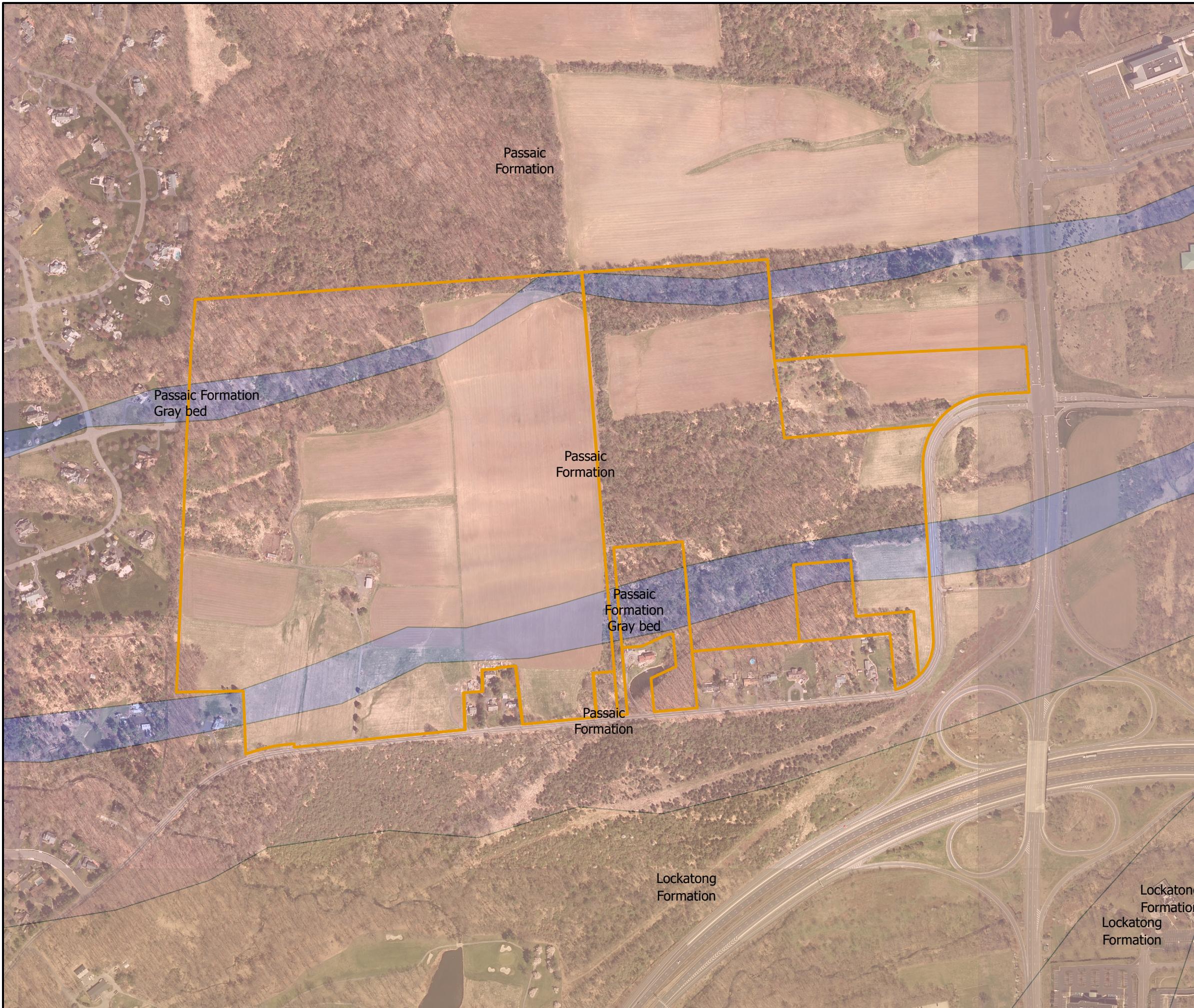


Figure 4 - Mercer County Soils Map

Figure 6B – Bedrock Geology Map



LEGEND

New Jersey Bedrock Geology

Lockatong Formation
Passaic Formation
Passaic Formation Gray bed

1 inch equals 500 Feet

0 250 500 1,000 Feet

Lennar - Deer Valley
Block 93, Lot(s) 19, 20, 45.01 46, 60
Hopewell Township, Mercer County

Project #: 5102 Date: September 05, 2023

enviroTACTICS
 Your Environmental Resource

1330 Laurel Avenue, Building #3, Sea Girt, NJ 08750
 Phone: 732.449.0077 Fax: 732.449.5810
www.envrotactics.com

This map was developed using New Jersey Department of Environmental Protection Geographic Information System Digital Data, but this secondary product has not been verified by NJDEP and is not state Authorized.

Figure 6B - Bedrock Geology

Figure 7 – Vegetation Community Map



Lennar - Deer Valley
Block 93, Lot(s) 19, 20, 45.01 46, 60
Hopewell Township, Mercer County

Project #: 5102 Date: August 28, 2023

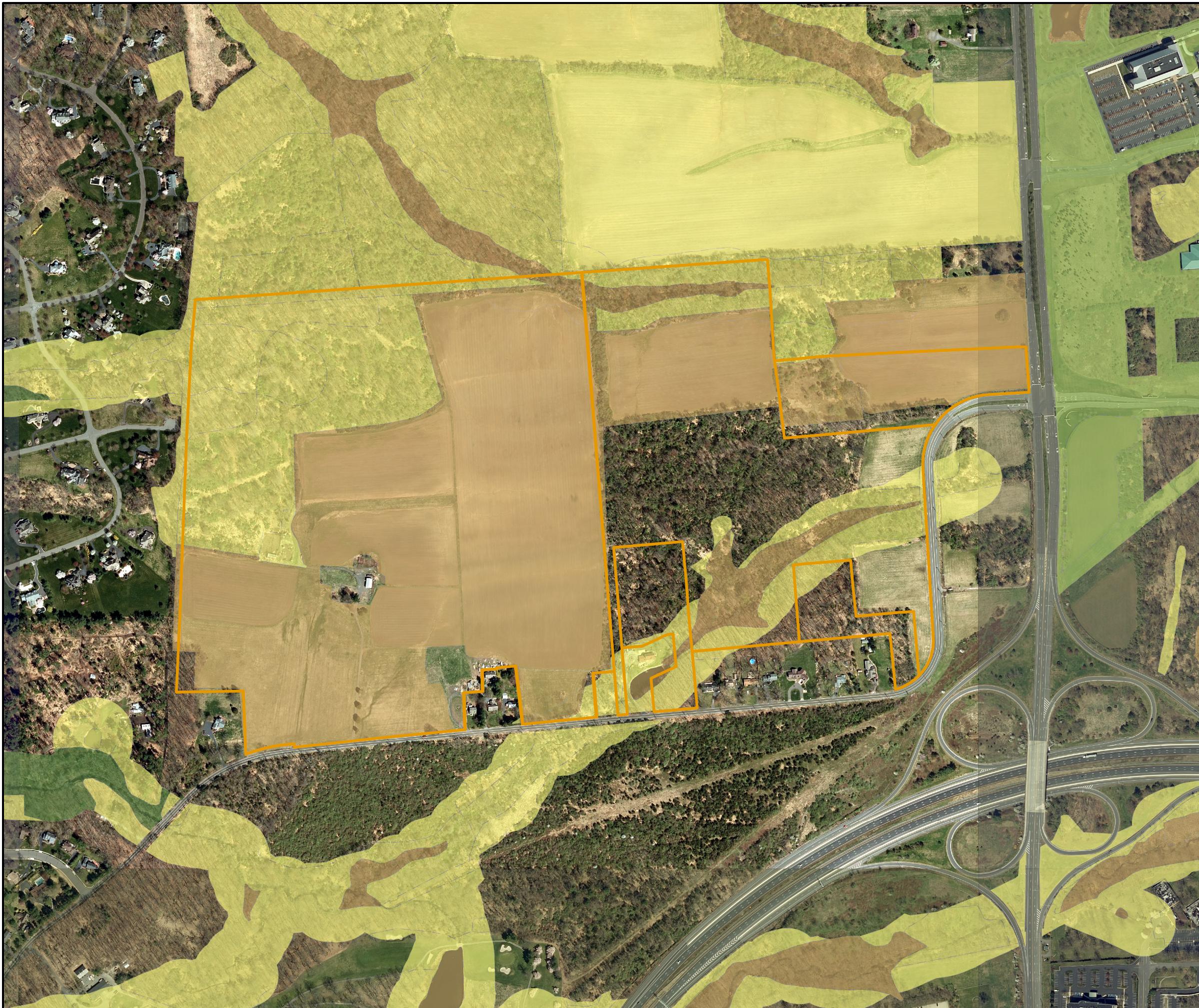
enviroTACTICS
 Your Environmental Resource

1330 Laurel Avenue, Building #3, Sea Girt, NJ 08750
 Phone: 732.449.0077 Fax: 732.449.5810
www.envrotactics.com

This map was developed using New Jersey Department of Environmental Protection Geographic Information System Digital Data, but this secondary product has not been verified by NJDEP and is not state Authorized.

Figure 7 - Vegetation Community Map

Figure 8 – Landscape Map



Lennar - Deer Valley
Block 93, Lot(s) 19, 20, 45.01 46, 60
Hopewell Township, Mercer County

Project #: 5102 Date: September 05, 2023

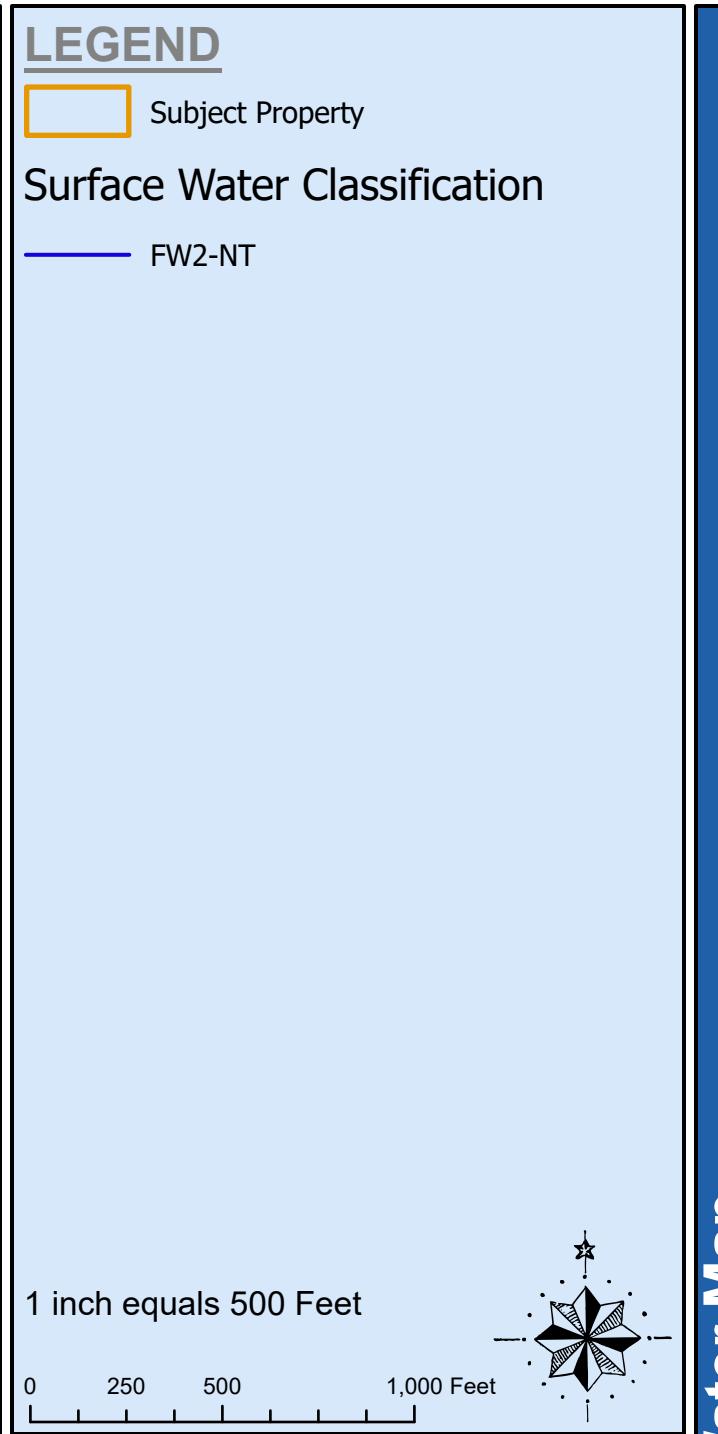
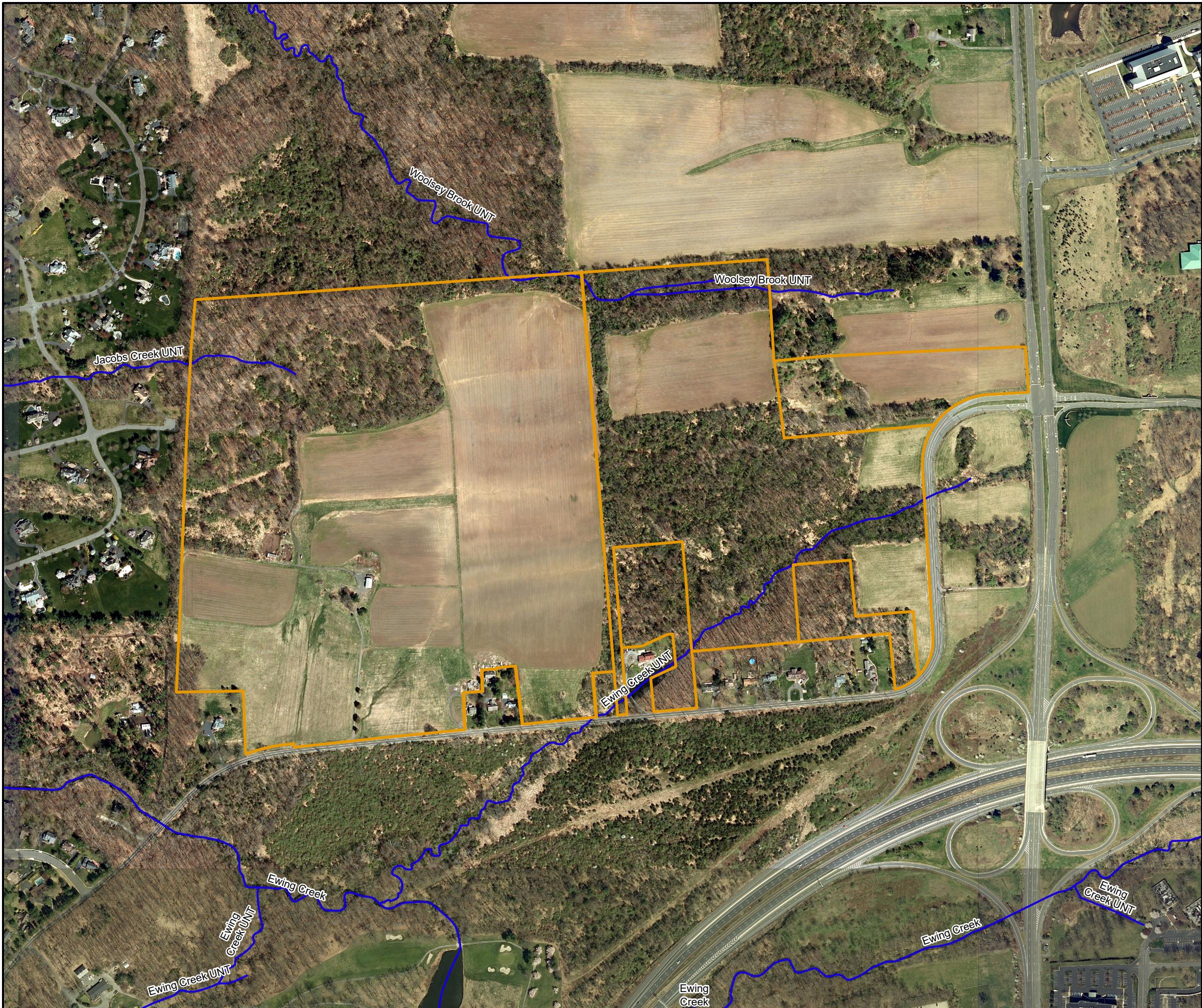
enviroTACTICS
 Your Environmental Resource

1330 Laurel Avenue, Building #3, Sea Girt, NJ 08750
 Phone: 732.449.0077 Fax: 732.449.5810
www.envrotactics.com

This map was developed using New Jersey Department of Environmental Protection Geographic Information System Digital Data, but this secondary product has not been verified by NJDEP and is not state Authorized.

Figure 8 - Landscape Map

Figure 9 – Surface Water Map



Lennar - Deer Valley
Block 93, Lot(s) 19, 20, 45.01 46, 60
Hopewell Township, Mercer County

Project #: 5102 Date: September 05, 2023

enviroTACTICS
 Your Environmental Resource

1330 Laurel Avenue, Building #3, Sea Girt, NJ 08750
 Phone: 732.449.0077 Fax: 732.449.5810
www.envrotactics.com

This map was developed using New Jersey Department of Environmental Protection Geographic Information System Digital Data, but this secondary product has not been verified by NJDEP and is not state Authorized.

Figure 9 - Surface Water Map

Figure 10 – Subsurface Water Map

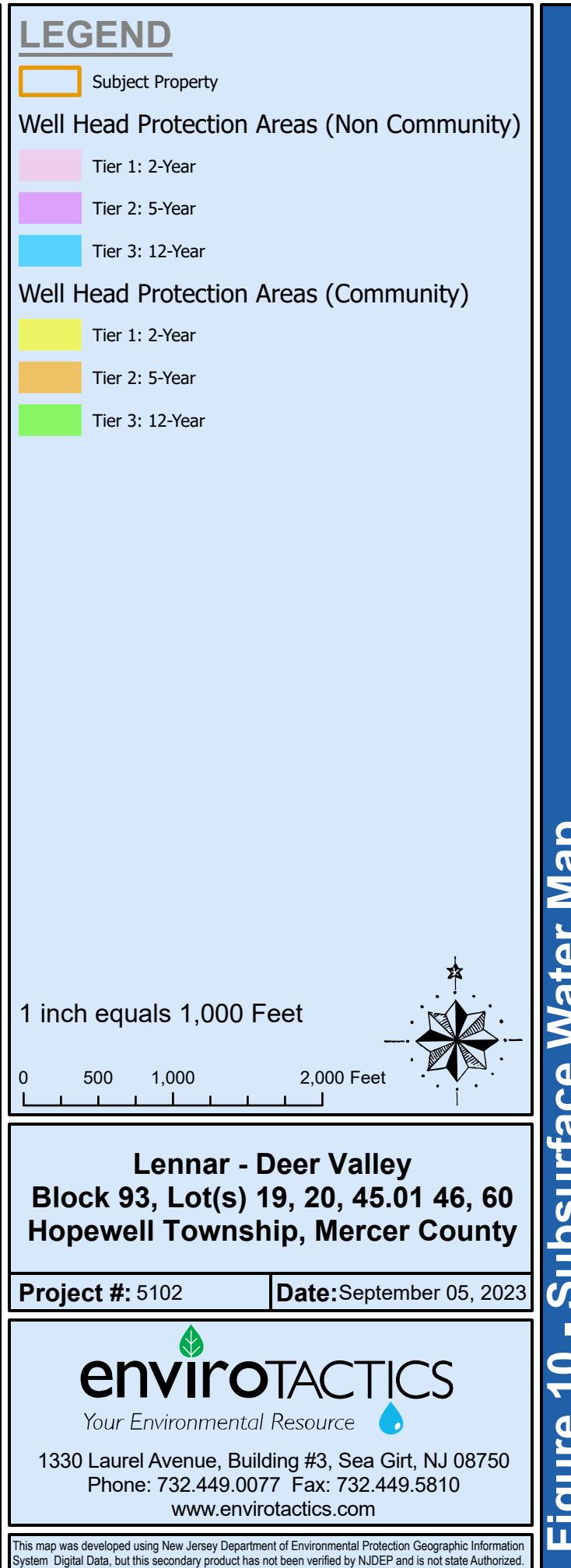
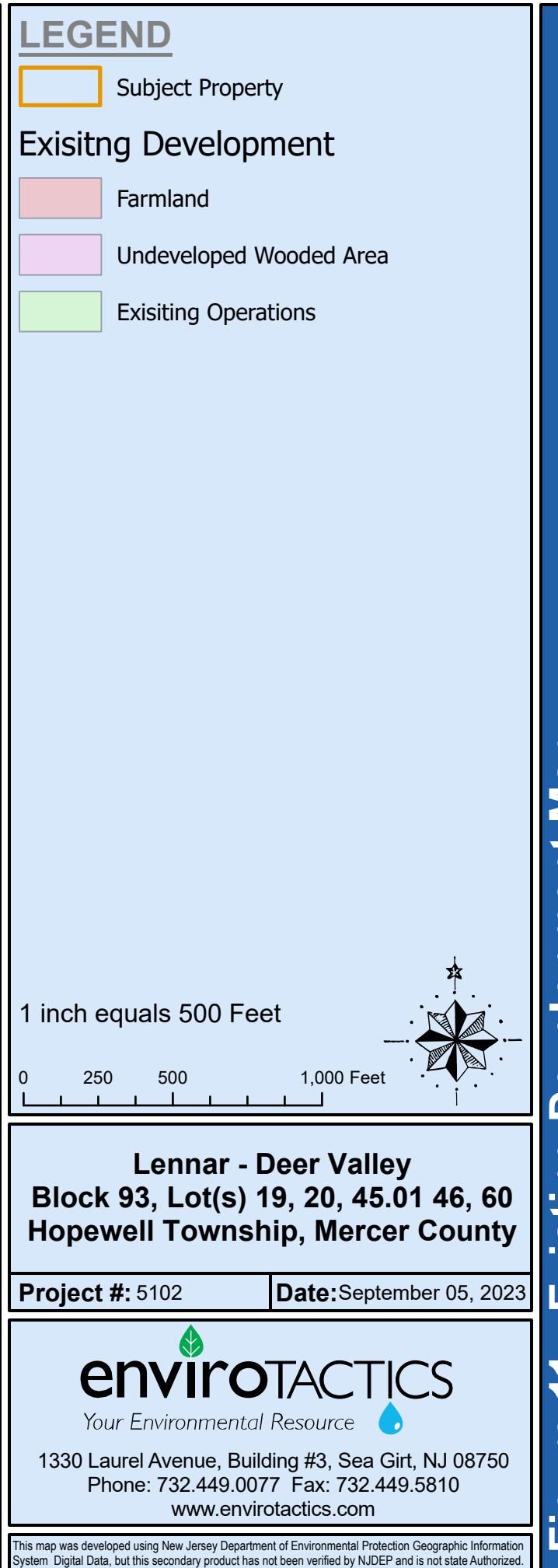


Figure 11 – Existing Development Map



Attachment 1 – List of Preparers

GARRETT ESLER
Senior Project Manager

EDUCATION:

Bachelor of Arts, Environmental Science, Elon University, 2015
Minor, Geographic Information Systems

CERTIFICATIONS:

Wetlands Delineation Series Certificate – Rutgers Office of Continuing Professional Ed.
OSHA 40 Hour

EXPERIENCE:

Senior Project Manager • Envirotactics, Inc. • Sea Girt, New Jersey • May 2022 – Present

Mr. Esler is responsible for managing land use projects. These tasks include Land Use Assessments, Freshwater Wetlands investigations, delineations, and permit applications. His other work includes CAFRA, Waterfront Development, Flood Hazard Area, Tidelands, and Army Corps of Engineer permit applications. He has extensive experience with New Jersey State Law, Rules, and Regulations which include N.J.A.C. 7:7 Coastal Zone Management Rules, N.J.A.C. 7:7A Freshwater Wetlands Protection Act Rules, & N.J.A.C. 7:13 Flood Hazard Area Control Act Rules. Mr. Esler is fluent with GIS analysis which includes GPS surveying and field sampling, spatial analysis, and remote sensing.

Environmental Specialist II • NJDEP Coastal Permitting • Trenton, New Jersey • April 2017 – May 2022

Mr. Esler worked as a project manager for NJDEPs Coastal Permitting Program, Division of Land Resource Protection [Watershed and Land Management Program]. His responsibilities included permit application review for compliance with the Freshwater Wetlands Protection Act, Coastal Zone Management Rules, and Flood Hazard Control Act Rules of New Jersey. His other work included the evaluation and creation of environmental impact statements and assessments for these projects.



1330 Laurel Ave.
Building 3
Sea Girt, NJ 08750

Phone 732.449.0077
www.envirotactics.com

Jared Cook
Environmental Scientist

EDUCATION:

Bachelor of Science, Environmental Conservation and Sustainability, Concentration in Watershed and Water Quality, University Of New Hampshire, 2022

CERTIFICATIONS:

- OSHA 40 Hr Hazwopper Training

EXPERIENCE:

Environmental Scientist • Envirotactics, Inc. • Sea Girt, New Jersey

June 2022 - Present

Mr. Cook is responsible for assisting land use projects in preparing NJDEP permitting for Freshwater Wetlands Protection Act Rules, Coastal Applicability Facility Review Act (CAFRA), Coastal Zone Management Rules, and Flood Hazard Area Control Act. Prep for NJDEP permits includes thrr of set up of application folders, creation of GIS maps and documents. As well as site visit to conduct land use site assessment and wetland delineations. Mr. Cook also perform groundwater and surface water sampling, soil sampling, and the vapor intrusion sampling for the Envirotactics Team.

New Hampshire Department of Environmental Protection • Concord, New Hampshire

May 2021 – September 2021

Mr. Cook performed the following tasks when employed by the NH Department of Environmental Services: assisted in the assessment of stream crossing structures for aquatic organism passage, Geomorphic compatibility, and the hydraulic capacity of the structures. Mr. Cook has assisted the state in the quality assurance / quality control (QA/QC) of the data submitted using the New Hampshire Stream Crossing Initiative Protocol. Assist in the data collection, storage, analysis, and display of spatial data across the state. Mr. Cook help government agencies enhance the outreach a support programs going on through out the state.



Envirotactics, Inc.
1330 Laurel Ave.
Building 3
Sea Girt, NJ 08750

Phone 732.449.0077
Fax 732.449.5810
www.envirotactics.com

MICHAEL GREENE
Director of Land Use

EDUCATION:

Bachelor of Science, Environmental Science, Richard Stockton College of New Jersey, 2002

CERTIFICATIONS:

Certified Wetlands Specialist, Cook College, Rutgers University

40 Hour OSHA Health & Safety Training

8 Hour Annual OSHA Health & Safety Refresher Training

EXPERIENCE:

Director of Land Use, Senior Project Manager, Wetlands Specialist • Envirotactics, Inc. • Sea Girt, New Jersey • March 2002 - Present

Mr. Greene is responsible for managing and directing of project managers and field personnel during all land use projects. Responsibilities include but are not limited to, the land use approval process, wetlands investigations and delineations, Threatened and Endangered Species Assessments, GIS mapping and analysis, including mapping and plotting the delineation of structures, vegetation limits, flood hazard analysis, drainage areas, habitat analysis, contour creation, dune profiling, and georeferencing, and the preparation of CAFRA, Freshwater Wetlands, Flood Hazard Area and Pinelands permit application.

Mr. Greene has testified before planning boards and zoning boards of adjustment with respect to land use applications including applications for subdivision, and site plan approvals. During the course of preparing to testify and testifying, Mr. Greene has reviewed and analyzed the location of structures on properties, the use and disturbance of land and vegetation on properties, the topography of the properties, the land use patterns of the properties, and how these factors relate to the land use applications, and the review and preparation of maps submitted to the land use boards. Additionally, Mr. Greene has provided expert witness testimony for land use applications to planning and zoning boards throughout New Jersey and to County Superior Courts and State Appellate Courts.

Mr. Greene is experienced in performing species and habitat analysis of sensitive areas throughout New Jersey and is fluent in performing GIS analysis on field collected GPS based survey information. His background includes extensive experience involving plant ecology and identification, wetland delineations, regulatory guidance, indoor air quality investigations and microbial sampling.

COURSES INSTRUCTED / GUEST LECTURER:

- Guest lecturer, 2007 Coastal Development Institute, New Jersey Institute for Continuing Legal Education (ICLE), 2007.
- Guest lecturer for American Institute of Architects (Jersey Shore Chapter) that provided CEU's for Architects, "CAFRA Permitting & Regulations", 2008.
- Facilitator for Land Conservation Rally, "Wetlands: Impact on property acquisitions and development" roundtable, March 2011.
- Facilitator for Land Conservation Rally, "Wetlands" roundtable, March 2012.

Envirotactics, Inc.
1330 Laurel Ave.
Building 3
Sea Girt, NJ 08750

Phone 732.449.0077
Fax 732.449.5810
www.envirotactics.com

Attachment 2 - Natural Heritage Database Report



State of New Jersey

MAIL CODE 501-04

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE PARKS, FORESTS & HISTORIC SITES

OFFICE OF NATURAL LANDS MANAGEMENT

501 East State Street

P.O. Box 420, Mail Code 501-04

Trenton, NJ 08625-0420

Tel. (609) 984-1339 • Fax (609) 984-0427

SHAWN M. LATOURETTE

Commissioner

PHILIP D. MURPHY

Governor

SHEILA Y. OLIVER

Lt. Governor

September 20, 2023

Jared Cook
Envirotactics, Inc.
1330 Laurel Avenue, Building 3
Sea Girt, NJ 08750

Re: Lennar - Hopewell
Block(s) - 93, Lot(s) - 19, 20, 45.01, 46, 60
Hopewell Township, Mercer County

Dear Jared Cook:

Thank you for your data request regarding rare species information for the above referenced project site.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.3) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the map(s) submitted with the Natural Heritage Data Request Form into our GIS. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within $\frac{1}{4}$ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within $\frac{1}{4}$ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

We have also checked the Landscape Project habitat mapping and Biotics Database for all occurrences of rare wildlife species or wildlife habitat within one mile of the referenced site. Please refer to Table 3 (attached) to determine if any rare wildlife species or wildlife habitat is documented within one mile of the project site. Detailed reports are provided for each category coded as 'Yes' in Table 3. These reports may include species that have also been documented on the project site.

For requests submitted in order to make a riparian zone width determination as part of a Flood Hazard Area Control Act (FHACA) rule application, we report records for all rare plant species and ecological communities tracked by the Natural Heritage Program that may be on, or in the immediate vicinity of, your project site. A subset of these plant species is also covered by the FHACA rules when the records are located within one mile of the project site. One-mile searches for FHACA plant species will only report precisely located occurrences for those wetland plant species identified under the FHACA regulations as being critically dependent on the watercourse. Please refer to Table 3 (attached) to determine if any precisely located rare wetland plant species covered by the FHACA rules have been documented. Detailed reports are

provided for each category coded as 'Yes' in Table 3. These reports may include species that have also been documented on, or in the immediate vicinity of, the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1, 2 and 3 (attached) to determine if any priority sites are located on, in the immediate vicinity, or within one mile of the project site.

A list of rare plant species and ecological communities that have been documented from the county (or counties), referenced above, can be downloaded from <https://nj.gov/dep/parksandforests/natural/heritage/database.html>. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from https://nj.gov/dep/parksandforests/natural/docs/nhpcodes_2010.pdf.

Beginning May 9, 2017, the Natural Heritage Program reports for wildlife species will utilize data from Landscape Project Version 3.3. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive web application at the following URL, <https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=0e6a44098c524ed99bf739953cb4d4c7>, or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

For additional information regarding any Federally listed plant or animal species, please contact the U.S. Fish & Wildlife Service, New Jersey Field Office at <http://www.fws.gov/northeast/njfieldoffice/endangered/consultation.html>.

Information supplied by the Natural Heritage Program summarizes existing data known to the program at the time of the request regarding the biological elements (species and/or ecological communities) or their locations. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,



Robert J. Cartica
Administrator

c: NHP File No. 23-4007437-28553

Table 1: On Site Data Request Search Results (6 Possible Reports)

<u>Report Name</u>	<u>Included</u>	<u>Number of Pages</u>
1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites On Site	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.3	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Stream Habitat File	No	0 pages included
6. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

**Rare Wildlife Species or Wildlife Habitat on the
Project Site Based on Search of
Landscape Project 3.3 Species Based Patches**

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Eastern Meadowlark	<i>Sturnella magna</i>	Breeding Sighting	2	NA	Special Concern	G5	S3B,S3N
	Great Blue Heron	<i>Ardea herodias</i>	Foraging	2	NA	Special Concern	G5	S3B,S4N

Table 2: Vicinity Data Request Search Results (6 possible reports)

<u>Report Name</u>	<u>Included</u>	<u>Number of Pages</u>
1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites within the Immediate Vicinity	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.3 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.3	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.3 Stream Habitat File	No	0 pages included
6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

**Rare Wildlife Species or Wildlife Habitat Within the
Immediate Vicinity of the Project Site Based on Search of
Landscape Project 3.3 Species Based Patches**

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Foraging	4	NA	State Endangered	G5	S1B,S2N
	Eastern Meadowlark	<i>Sturnella magna</i>	Breeding Sighting	2	NA	Special Concern	G5	S3B,S3N
	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Breeding Sighting	3	NA	State Threatened	G5	S2B,S3N
	Great Blue Heron	<i>Ardea herodias</i>	Foraging	2	NA	Special Concern	G5	S3B,S4N

**Table 3: Within 1 Mile for Riparian Zone Width Determination
(6 possible reports)**

<u>Report Name</u>	<u>Included</u>	<u>Number of Pages</u>
1. Rare Plant Species Occurrences for Riparian Zone Width Determination (Flood Hazard Area Control Act Rule Application) - Within One Mile of the Project Site Based on Search of Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites for Riparian Zone Width Determination - Within One Mile of the Project Site	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat for Riparian Zone Width Determination - Within One Mile of the Project Site Based on Search of Landscape Project 3.3 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat for Riparian Zone Width Determination - Within One Mile of the Project Site Based on Search of Landscape Project 3.3	Yes	1 page(s) included
5. Rare Wildlife Species or Wildlife Habitat for Riparian Zone Width Determination - Within One Mile of the Project Site Based on Search of Landscape Project 3.3 Stream Habitat File	No	0 pages included
6. Other Animal Species for Riparian Zone Width Determination - Within One Mile of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

**Rare Wildlife Species or Wildlife Habitat for Riparian Zone Width Determination
Within One Mile of the Project Site
Based on Search of Landscape Project 3.3 Species Based Patches**

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Foraging	4	NA	State Endangered	G5	S1B,S2N
	Cooper's Hawk	<i>Accipiter cooperii</i>	Breeding Sighting	2	NA	Special Concern	G5	S3B,S4N
	Eastern Meadowlark	<i>Sturnella magna</i>	Breeding Sighting	2	NA	Special Concern	G5	S3B,S3N
	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Breeding Sighting	3	NA	State Threatened	G5	S2B,S3N
	Great Blue Heron	<i>Ardea herodias</i>	Foraging	2	NA	Special Concern	G5	S3B,S4N
Reptilia								
	Eastern Box Turtle	<i>Terrapene carolina carolina</i>	Occupied Habitat	2	NA	Special Concern	G5T5	S3

**Vernal Pool Habitat for Riparian Zone Width Determination
Within One Mile of the Project Site
Based on Search of Landscape Project 3.3**

<u>Vernal Pool Habitat Type</u>	<u>Vernal Pool Habitat ID</u>
Potential vernal habitat area	1563
Potential vernal habitat area	1597
Total number of records:	2

Attachment 3 – Stormwater Management Report

Attachment 4 - Flood Hazard Area Engineering Report

ENGINEER'S REPORT

FLOOD HAZARD AREA ANALYSIS

**Lennar - Deer Valley
Block 93, Lots 19, 20, 45.01, 46 & 60
Hopewell Township**

Prepared for:

US Home Corporation dba Lennar
2465 Kuser Road
Hamilton, New Jersey 08690

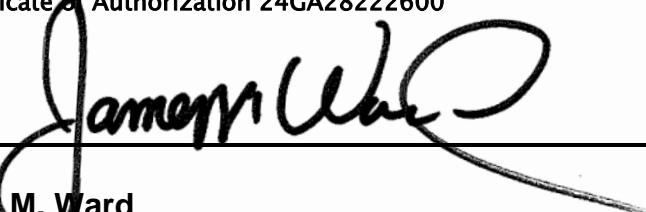
Date: April 23, 2020

BCG File No.: 081077-01-001

Prepared by:

Bowman
CONSULTING

303 W. Main Street, 4th Floor
Freehold, NJ 07728
Phone: 732-665-5500
NJ Certificate of Authorization 24GA28222600



James M. Ward
New Jersey Professional Engineer
License No. 43434

TABLE OF CONTENTS

	<u>PAGE NO.</u>
I. INTRODUCTION	1
A. Purpose of Report and Accompanying Documents	1
B. Location and Description of Project Site	2
C. Project Description	2
 II. DELINEATION OF FLOOD HAZARD AREAS	 2
A. Selection of Delineation Method.....	2
B. Floodplain Delineation Via Method 6.....	2
1. Hydrology	2
2. Hydraulics.....	4

LIST OF APPENDICES

- A. STREAM HYDROLOGY**
TR-55 CALCULATIONS OF EXISTING CONDITIONS
- B. STREAM HYDRAULICS**
HEC-RAS ANALYSIS
- C. SOILS MAP OF STUDY AREA**
- D. DRAINAGE AREA MAPS WITH LAND USE COVERAGE**
AERIAL PHOTO AND SOIL TYPES
- E. STREAM CROSS-SECTIONS, PROFILE, AND FLOOD**
HAZARD AREA METES AND BOUNDS PLAN

I. INTRODUCTION

A. Purpose of Report and Accompanying Document

This report has been prepared in support of an FHA Verification application made to the New Jersey Department of Environmental Protection (NJDEP) pursuant to the Flood Hazard Area Control Act Rules (NJAC 7:13 et. seq., hereinafter "the Flood Hazard Rules"). More specifically, this report has been prepared to satisfy the requirements for an "Engineering Report" under Subpart 15.4 of the Flood Hazard Rules for a site known as Lennar Deer Valley. The subject property is located on Block 93, Lots 19, 20, 45.01, 46 & 60 in the Township of Hopewell, Mercer County, New Jersey.

All of the project documents prepared by Bowman Consulting, Inc. were done under the responsible charge of James M. Ward, PE. Mr. Ward's signature and seal is affixed to each document prepared under his supervision, as required Subpart 18.5(a)(1) of the Flood Hazard Rules.

In accordance with the requirements at Subpart 18.5(a)(2), all project documents display the address and phone number for Bowman Consulting. Mr. Ward can be reached at 732-665-5500 or jward@bowmanconsulting.com

The content requirements for an "Engineering Report" pursuant to Subpart 15.4 of the Flood Hazard Rules require the submission of all applicable engineering calculations, with a supporting narrative, including, but not limited to the following design considerations:

- Establishing the limits of any regulated floodplain and/or floodway upon the property
- Identifying any project activities proposed within the regulated floodplain and/or floodway
- Verifying that any activities proposed within a regulated floodplain or floodway comply with the various restrictions set forth in the Flood Hazard Rules. This may include, but not be limited to, calculations relevant to net fill compliance and / or stability calculations for any retaining walls or other structures proposed within the regulated floodplain.
- Addressing compliance with the State's Stormwater Management Rules (NJAC 7:8) for any projects constituting "major development," as defined at NJAC 7:8-1.2.

The requirements pertaining to establishing the limits of the regulated floodplain upon the project tract are addressed in Section II of this report. As this is a verification

application, future application will be made addresses the future project's compliance with respect to the project elements and activities proposed within the regulated flood fringe and stormwater management.

B. Location and Description of Project Site

The subject property is located on Block 93, Lots 19, 20, 45.01, 46 & 60 in the Township of Hopewell, Mercer County, New Jersey. It is approximately 185 acres in size consisting of farm fields and wooded areas.

C. Project Description

Future project is anticipated to be single family housing.

II. Delineation of Flood Hazard Areas

A. Selection of Delineation Method

Subchapter 3 of the Flood Hazard Rules provides six methods for determining regulated flood hazard area limits and elevations. Method No. 1 (use of State delineation) was not an option for the proposed project site because there is no State delineation available. Similarly, flood limits and elevations along the onsite tributaries in the vicinity of the proposed project property were not delineated by FEMA with a flood elevation. Therefore, Methods 2 through 4 were not an option. Further, Method 5, being an approximation method, was not considered a viable option because of the inherent intent to be conservative and the limitations associated with the use of an approximation method set forth in Subpart 9.7 of the Flood Hazard Rules. Therefore, in consideration of all of the above, Method 6 was selected. The remainder of this section of this report explains the Method 6 calculations, which are provided in the Appendices of this report.

B. Floodplain Delineation via Method 6

The delineation of floodplain limits via Method 6 necessitates estimating the peak rate of runoff tributary to the watercourse (Hydrology) and then determining the depth, width and velocity of flow required to convey the peak rate along the watercourse and adjacent overbank areas (Hydraulics). These considerations are addressed in Subsections 1 and 2 below, respectively.

1. Hydrology

Appendix D of this report contains a drainage area map overlaid onto and aerial photo showing existing land use coverages and illustrates the

watershed area(s) tributary to the reach of Ewing Creek and Woolsey Creek.

The peak flows for establishing the regulated flood hazard elevations and limits upon the proposed project site have been estimated using the NRCS TR-55 method and being a fluvial flood hazard area, the computed peak flows rates for the 100-year storm event were increased by 25% as required for method 6 per NJAC 7:13-3.6(c)3.

A time of concentration was estimated for each subwatershed in accordance with the NRCS TR-55 methodology. The path used to estimate each time of concentration is illustrated on the Drainage Area Maps. In addition, CN values were assigned based upon current soil and surface conditions within each subarea. Aerial mapping and municipal zoning were relied upon, in part, to determine existing land use cover conditions. In general, cover conditions were assigned based upon an area within a given subwatershed area being either fully developed per the municipalities zoning, or predominately comprised of a specific cover (such as "impervious," "lawn" or "woods"). Soil conditions were as taken from the *USDA Web Soil Survey*.

The calculations for the times of concentration, weighed CN values and peak runoff rates using the data described above are provided in **Appendix A** of this report. The relevant hydrologic data for each subwatershed area, as well as the total watershed, is summarized in Table No. 1 below.

TABLE NO. 1					
SUMMARY OF HYDROLOGIC CALCULATIONS					
Watershed Area	Size (acres)	CN	Tc (hours)	Peak Rate of Runoff (cfs)	
				100-Yr	100-Yr plus 25%
Ewing Creek	91.56	68	0.5907	249.14	311.42
Woolsey Creek	57.08	70	0.5934	163.23	204.03

The Flood Hazard Rules require the estimation of the horizontal limits and elevation of the regulated floodplain to be determined for the "flood hazard area design storm," defined as 25% greater than the 100-year storm. Accordingly, the TR-55 calculations were performed for the 100-year storm, using the NRCS 24-hour Type III rainfall distribution. The 24-hour rainfall depth for Mercer County is 8.33 inches for the 100-year storm.

2. Hydraulics

The flood hazard area design flood elevation has been estimated using software developed by the Corps of Engineers (HEC-RAS). The hydraulic model was created by inputting surveyed cross-sectional data for the channel which was supplemented by the topographic mapping to extend each cross section as required for hydraulic modeling.

Manning's n values along the main channel was 0.03 based upon visual observation of the channel. Overbank areas were assigned an n values of 0.08 for grassed, light brush and tree areas.

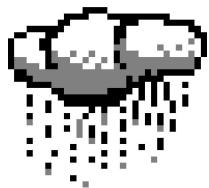
Standard energy loss coefficients of 0.3 and 0.1 for expansion and contraction were also assigned for the model.

Appendix B of this report contains the HEC-RAS calculations for 100-year plus 25% "flood hazard area design storm". The limits of flooding for the "flood hazard area design storm" have been plotted by elevation on the accompanying plans. The corresponding limits of the regulated floodway are also described by metes and bounds on the accompanying Flood Hazard Area Verification Map.

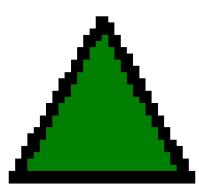
Cross-sections of the stream tributaries developed for the analyses are provided in **Appendix B**. The computed water surface elevation for the flood hazard area design storm event modeled is illustrated on the cross-sections. It is noted that the owner of lot 37.01, block 93 would not allow Bowman survey crew to as-built the outlet control of the existing on-line pond on the Ewing Creek tributary. As a result, the culvert analysis of the driveway crossing and culvert immediately downstream at the crossing with Nursery Road were eliminated from the calculations. The portion of stream flow that would have been accommodated through the culvert was analyzed as overland flow resulting in a conservative analysis and higher flood hazard water surface elevation had the culverts been included in the analysis.

APPENDIX A.
STREAM HYDROLOGY
TR-55 CALCULATIONS OF EXISTING CONDITIONS

Woolsey Creek



Addlink 30

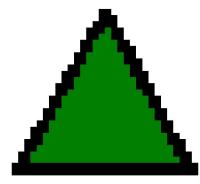


Woolsey Creek

Ewing Creek



Addlink 10



Ewing Creek

Job File: V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley
Rain Dir: V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley

=====
JOB TITLE
=====

Project Date: 11/20/2019
Project Engineer: jmw
Project Title: Hopewell - Deer Valley
Project Comments:
FHA Hydrology

Table of Contents

***** MASTER SUMMARY *****

Watershed..... Master Network Summary 1.01

***** TC CALCULATIONS *****

EWING CREEK..... Tc Calcs 2.01

WOOLSEY CREEK... Tc Calcs 2.04

***** CN CALCULATIONS *****

EWING CREEK..... Runoff CN-Area 3.01

WOOLSEY CREEK... Runoff CN-Area 3.02

***** RUNOFF HYDROGRAPHS *****

EWING CREEK..... 2
 Unit Hyd. Summary 4.01EWING CREEK..... 10
 Unit Hyd. Summary 4.02EWING CREEK..... 100
 Unit Hyd. Summary 4.03WOOLSEY CREEK... 2
 Unit Hyd. Summary 4.04WOOLSEY CREEK... 10
 Unit Hyd. Summary 4.05

Table of Contents (continued)

WOOLSEY CREEK...	100
Unit Hyd. Summary	4.06

MASTER DESIGN STORM SUMMARY

Network Storm Collection: 2-100 (4)

Return Event	Total Depth in	Rainfall Type	RNF ID
2	3.3100	Synthetic Curve	TypeIII 24hr
10	5.0100	Synthetic Curve	TypeIII 24hr
100	8.3300	Synthetic Curve	TypeIII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method(*Node=Outfall; +Node=Diversion;
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol cu.ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage cu.ft
EWING CREEK	AREA	2	263640	--	12.5000	38.54		
EWING CREEK	AREA	10	627137		12.4000	100.10		
EWING CREEK	AREA	100	1500420		12.4000	249.14		
*EWING CREEK	JCT	2	263640		12.5000	38.54		
*EWING CREEK	JCT	10	627137		12.4000	100.10		
*EWING CREEK	JCT	100	1500420		12.4000	249.14		
WOOLSEY CREEK	AREA	2	184987		12.5000	27.97		
WOOLSEY CREEK	AREA	10	423437		12.4000	68.32		
WOOLSEY CREEK	AREA	100	983974		12.4000	163.23		
*WOOLSEY CREEK	JCT	2	184987		12.5000	27.97		
*WOOLSEY CREEK	JCT	10	423437		12.4000	68.32		
*WOOLSEY CREEK	JCT	100	983974		12.4000	163.23		

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

:::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
:::::::::::::::::::::::::::::::::::

Segment #1: Tc: TR-55 Sheet

Mannings n .2400
Hydraulic Length 150.00 ft
2yr, 24hr P 3.3100 in
Slope .020000 ft/ft

Avg.Velocity .13 ft/sec

Segment #1 Time: .3235 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 1175.00 ft
Slope .026000 ft/ft
Unpaved

Avg.Velocity 2.60 ft/sec

Segment #2 Time: .1255 hrs

Segment #3: Tc: TR-55 Channel

Flow Area 6.0000 sq.ft
Wetted Perimeter 12.17 ft
Hydraulic Radius .49 ft
Slope .018000 ft/ft
Mannings n .0300
Hydraulic Length 2123.00 ft

Avg.Velocity 4.16 ft/sec

Segment #3 Time: .1418 hrs

=====
Total Tc: .5907 hrs
=====

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

Tc Equations used...

==== SCS TR-55 Sheet Flow =====

$$Tc = (.007 * ((n * Lf)^{0.8})) / ((P^{0.5}) * (Sf^{0.4}))$$

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow =====

Unpaved surface:
 $V = 16.1345 * (Sf^{0.5})$

Paved surface:
 $V = 20.3282 * (Sf^{0.5})$

$$Tc = (Lf / V) / (3600sec/hr)$$

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

Type.... Tc Calcs
Name.... EWING CREEK

Page 2.03

File.... V:\081077 - Deer Vallley - Hopewell Township\081077-01-001 (ENG) - Deer Vallley -

===== SCS Channel Flow =====

$$R = A_q / W_p$$
$$V = (1.49 * (R^{(2/3)}) * (S_f^{(1/2)}) / n$$

$$T_c = (L_f / V) / (3600 \text{sec/hr})$$

Where: R = Hydraulic radius
A_q = Flow area, sq.ft.
W_p = Wetted perimeter, ft
V = Velocity, ft/sec
S_f = Slope, ft/ft
n = Mannings n
T_c = Time of concentration, hrs
L_f = Flow length, ft

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

:::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
:::::::::::::::::::::::::::

Segment #1: Tc: TR-55 Sheet

Mannings n .2400
Hydraulic Length 150.00 ft
2yr, 24hr P 3.3100 in
Slope .020000 ft/ft

Avg.Velocity .13 ft/sec

Segment #1 Time: .3235 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length 1161.00 ft
Slope .014000 ft/ft
Unpaved

Avg.Velocity 1.91 ft/sec

Segment #2 Time: .1689 hrs

Segment #3: Tc: TR-55 Channel

Flow Area 6.0000 sq.ft
Wetted Perimeter 12.17 ft
Hydraulic Radius .49 ft
Slope .016000 ft/ft
Mannings n .0300
Hydraulic Length 1426.00 ft

Avg.Velocity 3.92 ft/sec

Segment #3 Time: .1010 hrs

=====
Total Tc: .5934 hrs
=====

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

Tc Equations used...

===== SCS TR-55 Sheet Flow =====

$$Tc = (.007 * ((n * Lf)^{0.8})) / ((P^{0.5}) * (Sf^{0.4}))$$

Where: Tc = Time of concentration, hrs
n = Mannings n
Lf = Flow length, ft
P = 2yr, 24hr Rain depth, inches
Sf = Slope, %

===== SCS TR-55 Shallow Concentrated Flow =====

Unpaved surface:
 $V = 16.1345 * (Sf^{0.5})$

Paved surface:
 $V = 20.3282 * (Sf^{0.5})$

$$Tc = (Lf / V) / (3600sec/hr)$$

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

Type.... Tc Calcs
Name.... WOOLSEY CREEK

Page 2.06

File.... V:\081077 - Deer Vallley - Hopewell Township\081077-01-001 (ENG) - Deer Vallley -

===== SCS Channel Flow =====

$$R = A_q / W_p$$
$$V = (1.49 * (R^{(2/3)}) * (S_f^{(1/2)}) / n$$

$$T_c = (L_f / V) / (3600 \text{sec/hr})$$

Where: R = Hydraulic radius
A_q = Flow area, sq.ft.
W_p = Wetted perimeter, ft
V = Velocity, ft/sec
S_f = Slope, ft/ft
n = Mannings n
T_c = Time of concentration, hrs
L_f = Flow length, ft

Type.... Runoff CN-Area

Page 3.01

Name.... EWING CREEK

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious		Adjusted CN
			%C	%UC	
Impervious	98	3.760			98.00
Open Space - B soils	61	3.220			61.00
Woods - B soils	55	27.230			55.00
Woods - C soils	70	22.940			70.00
Woods - D soils	77	9.950			77.00
Row crops - (C&T), B soils	71	18.280			71.00
Row crops - (C&T), C soils	78	6.020			78.00
Row crops - (C&T), D soils	81	.160			81.00

COMPOSITE AREA & WEIGHTED CN ---> 91.560 67.88 (68)

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious		Adjusted CN
			%C	%UC	
Impervious	98	.760			98.00
Woods - B soils	55	6.820			55.00
Woods - C soils	70	10.710			70.00
Woods - D soils	77	4.480			77.00
Row crops - (C&T), B soils	71	29.650			71.00
Row crops - (C&T), C soils	78	4.540			78.00
Row crops - (C&T), D soils	81	.120			81.00

COMPOSITE AREA & WEIGHTED CN ---> 57.080 70.31 (70)

Type.... Unit Hyd. Summary

Page 4.01

Name.... EWING CREEK

Tag: 2

Event: 2 yr

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

Storm... TypeIII 24hr Tag: 2

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm

Duration = 24.0000 hrs Rain Depth = 3.3100 in
Rain Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
Rain File -ID = - TypeIII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
HYG File - ID = - EWING CREEK 2
Tc = .5907 hrs
Drainage Area = 91.560 acres Runoff CN= 68

=====

Computational Time Increment = .07876 hrs
Computed Peak Time = 12.5233 hrs
Computed Peak Flow = 38.58 cfs

Time Increment for HYG File = .1000 hrs
Peak Time, Interpolated Output = 12.5000 hrs
Peak Flow, Interpolated Output = 38.54 cfs

=====

DRAINAGE AREA

ID: EWING CREEK
CN = 68
Area = 91.560 acres
S = 4.7059 in
0.2S = .9412 in

Cumulative Runoff

.7932 in
263615 cu.ft

HYG Volume... 263640 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .59072 hrs (ID: EWING CREEK)
Computational Incr, Tm = .07876 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 175.62 cfs
Unit peak time Tp = .39381 hrs
Unit receding limb, Tr = 1.57526 hrs
Total unit time, Tb = 1.96907 hrs

Type.... Unit Hyd. Summary

Page 4.02

Name.... EWING CREEK

Tag: 10

Event: 10 yr

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

Storm... TypeIII 24hr Tag: 10

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm

Duration = 24.0000 hrs Rain Depth = 5.0100 in
Rain Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
Rain File -ID = - TypeIII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
HYG File - ID = - EWING CREEK 10
Tc = .5907 hrs
Drainage Area = 91.560 acres Runoff CN= 68

=====

Computational Time Increment = .07876 hrs
Computed Peak Time = 12.4445 hrs
Computed Peak Flow = 102.19 cfs

Time Increment for HYG File = .1000 hrs
Peak Time, Interpolated Output = 12.4000 hrs
Peak Flow, Interpolated Output = 100.10 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%

=====

DRAINAGE AREA

ID: EWING CREEK
CN = 68
Area = 91.560 acres
S = 4.7059 in
0.2S = .9412 in

Cumulative Runoff

1.8867 in
627072 cu.ft

HYG Volume... 627137 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .59072 hrs (ID: EWING CREEK)
Computational Incr, Tm = .07876 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 175.62 cfs
Unit peak time Tp = .39381 hrs
Unit receding limb, Tr = 1.57526 hrs
Total unit time, Tb = 1.96907 hrs

Type.... Unit Hyd. Summary

Page 4.03

Name.... EWING CREEK

Tag: 100

Event: 100 yr

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

Storm... TypeIII 24hr Tag: 100

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm

Duration = 24.0000 hrs Rain Depth = 8.3300 in
Rain Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
Rain File -ID = - TypeIII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
HYG File - ID = - EWING CREEK 100
Tc = .5907 hrs
Drainage Area = 91.560 acres Runoff CN= 68

=====

Computational Time Increment = .07876 hrs
Computed Peak Time = 12.4445 hrs
Computed Peak Flow = 251.07 cfs

Time Increment for HYG File = .1000 hrs
Peak Time, Interpolated Output = 12.4000 hrs
Peak Flow, Interpolated Output = 249.14 cfs

=====

DRAINAGE AREA

ID: EWING CREEK
CN = 68
Area = 91.560 acres
S = 4.7059 in
0.2S = .9412 in

Cumulative Runoff

4.5139 in
1500264 cu.ft

HYG Volume... 1500420 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .59072 hrs (ID: EWING CREEK)
Computational Incr, Tm = .07876 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 175.62 cfs
Unit peak time Tp = .39381 hrs
Unit receding limb, Tr = 1.57526 hrs
Total unit time, Tb = 1.96907 hrs

Type.... Unit Hyd. Summary

Page 4.04

Name.... WOOLSEY CREEK

Tag: 2

Event: 2 yr

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

Storm... TypeIII 24hr Tag: 2

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm

Duration = 24.0000 hrs Rain Depth = 3.3100 in
Rain Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
Rain File -ID = - TypeIII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
HYG File - ID = - WOOLSEY CREEK 2
Tc = .5934 hrs
Drainage Area = 57.080 acres Runoff CN= 70

=====

Computational Time Increment = .07912 hrs
Computed Peak Time = 12.5013 hrs
Computed Peak Flow = 27.97 cfs

Time Increment for HYG File = .1000 hrs
Peak Time, Interpolated Output = 12.5000 hrs
Peak Flow, Interpolated Output = 27.97 cfs

=====

DRAINAGE AREA

ID: WOOLSEY CREEK
CN = 70
Area = 57.080 acres
S = 4.2857 in
0.2S = .8571 in

Cumulative Runoff

.8928 in
184998 cu.ft

HYG Volume... 184987 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .59342 hrs (ID: WOOLSEY CREEK)
Computational Incr, Tm = .07912 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 108.99 cfs
Unit peak time Tp = .39561 hrs
Unit receding limb, Tr = 1.58245 hrs
Total unit time, Tb = 1.97806 hrs

Type.... Unit Hyd. Summary

Page 4.05

Name.... WOOLSEY CREEK Tag: 10

Event: 10 yr

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

Storm... TypeIII 24hr Tag: 10

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm

Duration = 24.0000 hrs Rain Depth = 5.0100 in
Rain Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
Rain File -ID = - TypeIII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
HYG File - ID = - WOOLSEY CREEK 10
Tc = .5934 hrs
Drainage Area = 57.080 acres Runoff CN= 70

=====

Computational Time Increment = .07912 hrs
Computed Peak Time = 12.4222 hrs
Computed Peak Flow = 69.27 cfs

Time Increment for HYG File = .1000 hrs
Peak Time, Interpolated Output = 12.4000 hrs
Peak Flow, Interpolated Output = 68.32 cfs

=====

DRAINAGE AREA

ID: WOOLSEY CREEK
CN = 70
Area = 57.080 acres
S = 4.2857 in
0.2S = .8571 in

Cumulative Runoff

2.0437 in
423463 cu.ft

HYG Volume... 423437 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .59342 hrs (ID: WOOLSEY CREEK)
Computational Incr, Tm = .07912 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 108.99 cfs
Unit peak time Tp = .39561 hrs
Unit receding limb, Tr = 1.58245 hrs
Total unit time, Tb = 1.97806 hrs

Type.... Unit Hyd. Summary

Page 4.06

Name.... WOOLSEY CREEK Tag: 100

Event: 100 yr

File.... V:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley -

Storm... TypeIII 24hr Tag: 100

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm

Duration = 24.0000 hrs Rain Depth = 8.3300 in
Rain Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
Rain File -ID = - TypeIII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = V:\081077 - Deer Valley - Hopewell Township\081077-01-001 ()
HYG File - ID = - WOOLSEY CREEK 100
Tc = .5934 hrs
Drainage Area = 57.080 acres Runoff CN= 70

=====

Computational Time Increment = .07912 hrs
Computed Peak Time = 12.4222 hrs
Computed Peak Flow = 164.53 cfs

Time Increment for HYG File = .1000 hrs
Peak Time, Interpolated Output = 12.4000 hrs
Peak Flow, Interpolated Output = 163.23 cfs

=====

DRAINAGE AREA

ID: WOOLSEY CREEK
CN = 70
Area = 57.080 acres
S = 4.2857 in
0.2S = .8571 in

Cumulative Runoff

4.7492 in
984032 cu.ft

HYG Volume... 983974 cu.ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .59342 hrs (ID: WOOLSEY CREEK)
Computational Incr, Tm = .07912 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 108.99 cfs
Unit peak time Tp = .39561 hrs
Unit receding limb, Tr = 1.58245 hrs
Total unit time, Tb = 1.97806 hrs

Index of Starting Page Numbers for ID Names

----- E -----

EWING CREEK... 2.01, 3.01, 4.01,
4.02, 4.03

----- W -----

Watershed... 1.01
WOOLSEY CREEK... 2.04, 3.02, 4.04,
4.05, 4.06

APPENDIX B.
STREAM HYDRAULICS
HEC-RAS ANALYSIS

HEC-RAS Plan: ewing_creek River: Ewing Creek Reach: Trib1 Profile: PF 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Trib1	2478	PF 1	311.43	175.30	177.49	177.49	178.28	0.009931	7.41	54.81	42.52	0.96
Trib1	2377	PF 1	311.43	172.70	175.09	175.09	175.87	0.010329	7.23	49.96	39.31	0.97
Trib1	2277	PF 1	311.43	171.20	173.57	173.57	174.37	0.009444	7.54	56.60	43.47	0.95
Trib1	2176	PF 1	311.43	169.30	170.99	170.99	171.62	0.011552	6.46	53.76	48.94	0.98
Trib1	2075	PF 1	311.43	166.60	168.29	168.29	168.80	0.013472	5.71	55.09	59.10	1.01
Trib1	1976	PF 1	311.43	165.10	166.25	166.25	166.61	0.015093	4.81	65.29	96.86	1.01
Trib1	1876	PF 1	311.43	162.80	164.21	164.21	164.62	0.014137	5.12	61.62	83.04	1.00
Trib1	1775	PF 1	311.43	161.70	163.01		163.19	0.004103	3.49	98.32	98.21	0.57
Trib1	1676	PF 1	311.43	159.90	162.80		162.96	0.001350	3.66	149.56	82.98	0.38
Trib1	1580	PF 1	311.43	159.10	162.84		162.88	0.000234	1.68	227.96	90.73	0.16
Trib1	1483	PF 1	311.43	158.00	162.80		162.86	0.000248	1.89	201.06	73.23	0.17
Trib1	1386	PF 1	311.43	158.00	162.82		162.83	0.000061	1.10	389.01	109.51	0.09
Trib1	1290	PF 1	311.43	158.00	162.82		162.83	0.000026	0.72	525.16	133.91	0.06
Trib1	1203	PF 1	311.43	158.00	162.81		162.82	0.000035	0.84	481.91	130.18	0.07
Trib1	1168	PF 1	311.43	161.50	162.44	162.44	162.79	0.014998	4.73	67.05	101.98	1.01
Trib1	1138	PF 1	311.43	152.00	153.92	153.92	154.41	0.013522	5.61	55.56	57.74	1.01
Trib1	1071	PF 1	311.43	150.00	152.55	152.55	153.28	0.010804	6.86	48.25	40.61	0.97
Trib1	956	PF 1	311.43	148.50	152.27		152.38	0.001057	2.56	122.37	66.98	0.32
Trib1	926	PF 1	311.43	151.50	152.10	152.10	152.28	0.019129	3.42	91.26	262.64	1.02
Trib1	903	PF 1	311.43	146.00	148.85	148.85	149.54	0.008578	6.85	62.67	70.04	0.89
Trib1	800	PF 1	311.43	143.90	145.71	145.71	146.21	0.013681	5.66	55.06	56.67	1.01
Trib1	697	PF 1	311.43	142.00	144.21		144.41	0.004196	3.63	86.30	76.70	0.58
Trib1	599	PF 1	311.43	140.20	143.04	143.04	143.79	0.008893	7.18	57.82	54.06	0.91
Trib1	500	PF 1	311.43	139.50	140.89	140.89	141.40	0.011826	5.88	63.91	74.75	0.97

HEC-RAS HEC-RAS 5.0.0 February 2016
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

X	X	XXXXXX	XXXX	XXXX	XX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
XXXXXX	XXXX	X	XXX	XXXX	XXXXXX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	XXXXXX	XXXX	X	X	XXXX

PROJECT DATA

Project Title: ewing_creek

Project File : ewingcreek.prj

Run Date and Time: 12/18/2019 5:22:48 PM

Project in English units

PLAN DATA

Plan Title: ewing_creek

Plan File : v:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley - Hopewell Township\Admin\Reports\FHA\hec ras report\ewing creek\ewingcreek.p01

Geometry Title: ewing creek

Geometry File : v:\081077 - Deer Valley - Hopewell

Township\081077-01-001 (ENG) - Deer Valley - Hopewell
Township\Admin\Reports\FHA\hec ras report\ewing creek\ewingcreek.g01

Flow Title : Flow 01

Flow File : v:\081077 - Deer Valley - Hopewell

Township\081077-01-001 (ENG) - Deer Valley - Hopewell
Township\Admin\Reports\FHA\hec ras report\ewing creek\ewingcreek.f01

Plan Summary Information:

Number of:	Cross Sections	=	24	Multiple Openings	=	0
	Culverts	=	0	Inline Structures	=	0
	Bridges	=	0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Flow 01

Flow File : v:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley - Hopewell Township\Admin\Reports\FHA\hec ras report\ewing creek\ewingcreek.f01

Flow Data (cfs)

River	Reach	RS	PF 1
Ewing Creek	Trib1	2478	311.43

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
Ewing Creek	Trib1	PF 1	
Critical			

GEOMETRY DATA

Geometry Title: ewing creek

Geometry File : v:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley - Hopewell Township\Admin\Reports\FHA\hec ras report\ewing creek\ewingcreek.g01

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 2478

INPUT

Description: 24+78

Station	Elevation	Data	num=	5					
Sta 0	Elev 186	Sta 80	Elev 176	Sta 88	Elev 175.3	Sta 101	Elev 176	Sta 165	Elev 186

Manning's n Values

Sta 0	n Val .08	Sta 80	n Val .03	Sta 101	n Val .08
-------	-----------	--------	-----------	---------	-----------

Bank Sta: 80	Left 101	Lengths: 95	Channel 101	Right 100	Coeff .1	Contr. .3	Expan. .3
--------------	----------	-------------	-------------	-----------	----------	-----------	-----------

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	178.28	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.79	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	177.49	Reach Len. (ft)	95.00	101.00
100.00				
Crit W.S. (ft)	177.49	Flow Area (sq ft)	8.93	38.73
7.15				
E.G. Slope (ft/ft)	0.009931	Area (sq ft)	8.93	38.73
7.15				
Q Total (cfs)	311.43	Flow (cfs)	13.54	287.08
10.80				
Top Width (ft)	42.52	Top Width (ft)	11.96	21.00
9.56				
Vel Total (ft/s)	5.68	Avg. Vel. (ft/s)	1.52	7.41
1.51				
Max Chl Dpth (ft)	2.19	Hydr. Depth (ft)	0.75	1.84
0.75				
Conv. Total (cfs)	3125.1	Conv. (cfs)	135.9	2880.7
108.4				
Length Wtd. (ft)	100.79	Wetted Per. (ft)	12.05	21.05
9.68				
Min Ch El (ft)	175.30	Shear (lb/sq ft)	0.46	1.14
0.46				
Alpha	1.57	Stream Power (lb/ft s)	0.70	8.46
0.69				
Frctn Loss (ft)	1.02	Cum Volume (acre-ft)	0.62	4.73
0.72				

C & E Loss (ft)	0.00	Cum SA (acres)	0.46	2.42
	0.56			

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1 RS: 2377

INPUT

Description: 23+77

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	184	72	174	77	172.7	96	174	165	184

Manning's n Values

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08		72	.03		96	.08	

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	72	96		89		100		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	175.87	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.79	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	175.09	Reach Len. (ft)	89.00	100.00
100.00				
Crit W.S. (ft)	175.09	Flow Area (sq ft)	4.24	41.65
4.07				
E.G. Slope (ft/ft)	0.010329	Area (sq ft)	4.24	41.65
4.07				
Q Total (cfs)	311.43	Flow (cfs)	5.30	301.06

5.07				
Top Width (ft)	39.31	Top Width (ft)	7.82	24.00
7.49				
Vel Total (ft/s)	6.23	Avg. Vel. (ft/s)	1.25	7.23
1.25				
Max Chl Dpth (ft)	2.39	Hydr. Depth (ft)	0.54	1.74
0.54				
Conv. Total (cfs)	3064.3	Conv. (cfs)	52.1	2962.3
49.9				
Length Wtd. (ft)	99.66	Wetted Per. (ft)	7.89	24.21
7.57				
Min Ch El (ft)	172.70	Shear (lb/sq ft)	0.35	1.11
0.35				
Alpha	1.30	Stream Power (lb/ft s)	0.43	8.02
0.43				
Frctn Loss (ft)	0.98	Cum Volume (acre-ft)	0.60	4.64
0.70				
C & E Loss (ft)	0.00	Cum SA (acres)	0.43	2.37
0.54				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 2277

INPUT

Description: 22+77

Station	Elevation	Data	num=	5	Station	Elevation	Station	Elevation	Station	Elevation
0	182	75	172	84	171.2	94	172	175	182	

Manning's n Values

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08		75	.03		94	.08	

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	75	94		100	101	86		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	174.37	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.80	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	173.57	Reach Len. (ft)	100.00	101.00
86.00				
Crit W.S. (ft)	173.57	Flow Area (sq ft)	9.23	37.40
9.97				
E.G. Slope (ft/ft)	0.009444	Area (sq ft)	9.23	37.40
9.97				
Q Total (cfs)	311.43	Flow (cfs)	14.08	282.13
15.22				
Top Width (ft)	43.47	Top Width (ft)	11.76	19.00
12.71				
Vel Total (ft/s)	5.50	Avg. Vel. (ft/s)	1.53	7.54
1.53				
Max Chl Dpth (ft)	2.37	Hydr. Depth (ft)	0.78	1.97
0.78				
Conv. Total (cfs)	3204.7	Conv. (cfs)	144.9	2903.2
156.6				
Length Wtd. (ft)	100.51	Wetted Per. (ft)	11.87	19.07
12.80				
Min Ch El (ft)	171.20	Shear (lb/sq ft)	0.46	1.16
0.46				
Alpha	1.71	Stream Power (lb/ft s)	0.70	8.72
0.70				
Frctn Loss (ft)	1.05	Cum Volume (acre-ft)	0.59	4.55
0.69				
C & E Loss (ft)	0.05	Cum SA (acres)	0.41	2.32
0.51				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 2176

INPUT

Description: 21+76

Station	Elevation	Data	num=	5	Sta	Elev	Sta	Elev	Sta	Elev
0	180	75	170		85	169.3	110	170	176	180

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	75	.03	110	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	75	110		93	101	87		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	171.62	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.63	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	170.99	Reach Len. (ft)	93.00	101.00
87.00				
Crit W.S. (ft)	170.99	Flow Area (sq ft)	3.67	46.86
3.23				
E.G. Slope (ft/ft)	0.011552	Area (sq ft)	3.67	46.86
3.23				
Q Total (cfs)	311.43	Flow (cfs)	4.55	302.88
4.00				
Top Width (ft)	48.94	Top Width (ft)	7.42	35.00
6.53				
Vel Total (ft/s)	5.79	Avg. Vel. (ft/s)	1.24	6.46
1.24				
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)	0.49	1.34
0.49				
Conv. Total (cfs)	2897.6	Conv. (cfs)	42.4	2818.1
37.2				
Length Wtd. (ft)	100.85	Wetted Per. (ft)	7.48	35.03
6.60				
Min Ch El (ft)	169.30	Shear (lb/sq ft)	0.35	0.96
0.35				
Alpha	1.21	Stream Power (lb/ft s)	0.44	6.23
0.44				
Frctn Loss (ft)	1.26	Cum Volume (acre-ft)	0.57	4.45

0.68				
C & E Loss (ft)	0.04	Cum SA (acres)	0.39	2.26
0.49				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 2075

INPUT

Description: 20+75

Station	Elevation	Data	num=	6					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	178	55	172	85	168	107	166.6	140	168
206	178								

Manning's n Values

num= 3

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08		85	.03		140	.08	

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	85	140		126	99	44		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	168.80	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.51	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	168.29	Reach Len. (ft)	126.00	99.00
44.00				
Crit W.S. (ft)	168.29	Flow Area (sq ft)	0.32	54.49
0.28				
E.G. Slope (ft/ft)	0.013472	Area (sq ft)	0.32	54.49

0.28				
Q Total (cfs)	311.43	Flow (cfs)	0.19	311.08
0.17				
Top Width (ft)	59.10	Top Width (ft)	2.18	55.00
1.92				
Vel Total (ft/s)	5.65	Avg. Vel. (ft/s)	0.59	5.71
0.59				
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)	0.15	0.99
0.15				
Conv. Total (cfs)	2683.1	Conv. (cfs)	1.6	2680.1
1.4				
Length Wtd. (ft)	98.99	Wetted Per. (ft)	2.20	55.07
1.94				
Min Ch El (ft)	166.60	Shear (lb/sq ft)	0.12	0.83
0.12				
Alpha	1.02	Stream Power (lb/ft s)	0.07	4.75
0.07				
Frctn Loss (ft)	1.41	Cum Volume (acre-ft)	0.57	4.33
0.67				
C & E Loss (ft)	0.04	Cum SA (acres)	0.38	2.16
0.49				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1976

INPUT

Description: 19+76

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	176	99	166	148	165.1	191	166	284	176

Manning's n Values	num=	3			
Sta	n	Val	Sta	n	Val

0 .08 99 .03 191 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
99 191 95 100 175 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	166.61	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.36	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	166.25	Reach Len. (ft)	95.00	100.00
175.00				
Crit W.S. (ft)	166.25	Flow Area (sq ft)	0.32	64.67
0.30				
E.G. Slope (ft/ft)	0.015093	Area (sq ft)	0.32	64.67
0.30				
Q Total (cfs)	311.43	Flow (cfs)	0.18	311.08
0.17				
Top Width (ft)	96.86	Top Width (ft)	2.50	92.00
2.35				
Vel Total (ft/s)	4.77	Avg. Vel. (ft/s)	0.57	4.81
0.57				
Max Chl Dpth (ft)	1.15	Hydr. Depth (ft)	0.13	0.70
0.13				
Conv. Total (cfs)	2535.0	Conv. (cfs)	1.5	2532.1
1.4				
Length Wtd. (ft)	100.06	Wetted Per. (ft)	2.52	92.02
2.37				
Min Ch El (ft)	165.10	Shear (lb/sq ft)	0.12	0.66
0.12				
Alpha	1.02	Stream Power (lb/ft s)	0.07	3.19
0.07				
Frctn Loss (ft)	1.46	Cum Volume (acre-ft)	0.57	4.19
0.67				
C & E Loss (ft)	0.00	Cum SA (acres)	0.37	1.99
0.48				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is

not a valid subcritical answer. The
program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1876

INPUT

Description: 18+76

Station	Elevation	Data	num=	6					
Sta 0	Elev 174	Sta 72	Elev 164	Sta 104	Elev 162.8	Sta 147	Elev 164	Sta 333	Elev 170
397	174								

Manning's n	Values	num=	3		
Sta 0	n Val .08	Sta 72	n Val .03	Sta 147	n Val .08

Bank Sta:	Left 72	Right 147	Lengths:	Left 93	Channel 101	Right 120	Coeff .1	Contr. .3	Expan. .3
-----------	---------	-----------	----------	---------	-------------	-----------	----------	-----------	-----------

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	164.62	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.41	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	164.21	Reach Len. (ft)	93.00	101.00
120.00				
Crit W.S. (ft)	164.21	Flow Area (sq ft)	0.16	60.78
0.69				
E.G. Slope (ft/ft)	0.014137	Area (sq ft)	0.16	60.78
0.69				
Q Total (cfs)	311.43	Flow (cfs)	0.08	311.01
0.34				
Top Width (ft)	83.04	Top Width (ft)	1.51	75.00
6.52				
Vel Total (ft/s)	5.05	Avg. Vel. (ft/s)	0.49	5.12
0.49				
Max Chl Dpth (ft)	1.41	Hydr. Depth (ft)	0.11	0.81
0.11				
Conv. Total (cfs)	2619.3	Conv. (cfs)	0.7	2615.8
2.8				
Length Wtd. (ft)	101.16	Wetted Per. (ft)	1.53	75.04
6.53				
Min Ch El (ft)	162.80	Shear (lb/sq ft)	0.09	0.71
0.09				

Alpha	1.02	Stream Power (lb/ft s)	0.04	3.66
0.05				
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	0.57	4.05
0.67				
C & E Loss (ft)	0.07	Cum SA (acres)	0.37	1.80
0.47				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1775

INPUT

Description: 17+75

Station	Elevation	Data	num=	6					
Sta 0	Elev 174	Sta 85	Elev 162	Sta 112	Elev 161.7	Sta 160	Elev 162	Sta 224	Elev 166
270	174								

Manning's n Values

Sta 0	n Val .08	Sta 85	n Val .03	Sta 160	n Val .08
-------	-----------	--------	-----------	---------	-----------

Bank Sta:	Left 85	Right 160	Lengths: Left 101	Channel 99	Right 121	Coeff .1	Contr. .3	Expan.
-----------	---------	-----------	-------------------	------------	-----------	----------	-----------	--------

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	163.19	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.18	Wt. n-Val.	0.080	0.030

0.080					
W.S. Elev (ft)	163.01	Reach Len. (ft)	101.00	99.00	
121.00					
Crit W.S. (ft)		Flow Area (sq ft)	3.58	86.65	
8.09					
E.G. Slope (ft/ft)	0.004103	Area (sq ft)	3.58	86.65	
8.09					
Q Total (cfs)	311.43	Flow (cfs)	2.67	302.68	
6.07					
Top Width (ft)	98.21	Top Width (ft)	7.12	75.00	
16.09					
Vel Total (ft/s)	3.17	Avg. Vel. (ft/s)	0.75	3.49	
0.75					
Max Chl Dpth (ft)	1.31	Hydr. Depth (ft)	0.50	1.16	
0.50					
Conv. Total (cfs)	4862.0	Conv. (cfs)	41.8	4725.4	
94.8					
Length Wtd. (ft)	100.81	Wetted Per. (ft)	7.19	75.00	
16.12					
Min Ch El (ft)	161.70	Shear (lb/sq ft)	0.13	0.30	
0.13					
Alpha	1.18	Stream Power (lb/ft s)	0.10	1.03	
0.10					
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	0.56	3.88	
0.66					
C & E Loss (ft)	0.01	Cum SA (acres)	0.36	1.62	
0.44					

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1676

INPUT

Description: 16+76

Station	Elevation	Data	num=	7	Sta	Elev	Sta	Elev	Sta	Elev
0	174	60			95	160	104	159.9	118	160
194	166	249								

Manning's n Values

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08		95	.03		118	.08	

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	95	118		95	96	99	.1		.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	162.96	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.16	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	162.80	Reach Len. (ft)	95.00	96.00
99.00				
Crit W.S. (ft)		Flow Area (sq ft)	34.32	65.57
49.68				
E.G. Slope (ft/ft)	0.001350	Area (sq ft)	34.32	65.57
49.68				
Q Total (cfs)	311.43	Flow (cfs)	29.19	239.89
42.35				
Top Width (ft)	82.98	Top Width (ft)	24.51	23.00
35.48				
Vel Total (ft/s)	2.08	Avg. Vel. (ft/s)	0.85	3.66
0.85				
Max Chl Dpth (ft)	2.90	Hydr. Depth (ft)	1.40	2.85
1.40				
Conv. Total (cfs)	8475.8	Conv. (cfs)	794.4	6528.9
1152.5				
Length Wtd. (ft)	96.21	Wetted Per. (ft)	24.67	23.00
35.59				
Min Ch El (ft)	159.90	Shear (lb/sq ft)	0.12	0.24
0.12				
Alpha	2.42	Stream Power (lb/ft s)	0.10	0.88
0.10				
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.52	3.71
0.58				
C & E Loss (ft)	0.04	Cum SA (acres)	0.32	1.51
0.36				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1580

INPUT

Description: 15+80

Station Elevation Data		num=	6						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	174	60	160	84	159.1	113	160	149	164
234	174								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	60	.03	113	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	60	113		100	103	91		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	162.88	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.04	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	162.84	Reach Len. (ft)	100.00	103.00
91.00				
Crit W.S. (ft)		Flow Area (sq ft)	17.28	174.38
36.30				
E.G. Slope (ft/ft)	0.000234	Area (sq ft)	17.28	174.38
36.30				
Q Total (cfs)	311.43	Flow (cfs)	6.10	292.35
12.99				
Top Width (ft)	90.73	Top Width (ft)	12.17	53.00
25.56				
Vel Total (ft/s)	1.37	Avg. Vel. (ft/s)	0.35	1.68
0.36				
Max Chl Dpth (ft)	3.74	Hydr. Depth (ft)	1.42	3.29
1.42				
Conv. Total (cfs)	20345.2	Conv. (cfs)	398.5	19098.4
848.3				
Length Wtd. (ft)	102.52	Wetted Per. (ft)	12.50	53.03
25.72				
Min Ch El (ft)	159.10	Shear (lb/sq ft)	0.02	0.05
0.02				
Alpha	1.42	Stream Power (lb/ft s)	0.01	0.08
0.01				
Frcrn Loss (ft)	0.02	Cum Volume (acre-ft)	0.46	3.44
0.48				
C & E Loss (ft)	0.00	Cum SA (acres)	0.28	1.43
0.29				

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1483

INPUT

Description: 14+83

Station	Elevation	Data	num=	6					
Sta 0	Elev 174	Sta 77	Elev 160	Sta 91	Elev 158	Sta 118	Elev 160	Sta 142	Elev 164
240	174								

Manning's n	Values	num=	3		
Sta 0	n Val .08	Sta 77	n Val .03	Sta 118	n Val .08

Bank Sta:	Left 77	Right 118	Lengths:	Left 96	Channel 97	Right 57	Coeff .1	Contr. .3	Expan. .3
-----------	---------	-----------	----------	---------	------------	----------	----------	-----------	-----------

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	162.86	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.05	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	162.80	Reach Len. (ft)	96.00	97.00
57.00				
Crit W.S. (ft)		Flow Area (sq ft)	21.60	155.90
23.56				
E.G. Slope (ft/ft)	0.000248	Area (sq ft)	21.60	155.90
23.56				
Q Total (cfs)	311.43	Flow (cfs)	7.82	295.06
8.55				
Top Width (ft)	73.23	Top Width (ft)	15.41	41.00
16.81				
Vel Total (ft/s)	1.55	Avg. Vel. (ft/s)	0.36	1.89
0.36				
Max Chl Dpth (ft)	4.80	Hydr. Depth (ft)	1.40	3.80
1.40				
Conv. Total (cfs)	19786.1	Conv. (cfs)	496.9	18746.2
543.0				
Length Wtd. (ft)	95.08	Wetted Per. (ft)	15.67	41.22
17.05				
Min Ch El (ft)	158.00	Shear (lb/sq ft)	0.02	0.06
0.02				
Alpha	1.42	Stream Power (lb/ft s)	0.01	0.11
0.01				
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.42	3.05

0.42				
C & E Loss (ft)	0.01	Cum SA (acres)	0.25	1.32
0.25				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1386

INPUT

Description: 13+86

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	174	80	158	110	158	132	158	243	174

Manning's n Values

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08		80	.03		132	.08	

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	80	132		113	96	108	.1		.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	162.83	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.02	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	162.82	Reach Len. (ft)	113.00	96.00
108.00				
Crit W.S. (ft)		Flow Area (sq ft)	58.02	250.50
80.50				
E.G. Slope (ft/ft)	0.000061	Area (sq ft)	58.02	250.50
80.50				
Q Total (cfs)	311.43	Flow (cfs)	14.89	275.75
20.79				
Top Width (ft)	109.51	Top Width (ft)	24.09	52.00
33.42				
Vel Total (ft/s)	0.80	Avg. Vel. (ft/s)	0.26	1.10
0.26				
Max Chl Dpth (ft)	4.82	Hydr. Depth (ft)	2.41	4.82
2.41				

Conv. Total (cfs)	39969.3	Conv. (cfs)	1911.1	35390.0
2668.2				
Length Wtd. (ft)	97.29	Wetted Per. (ft)	24.56	52.00
33.77				
Min Ch El (ft)	158.00	Shear (lb/sq ft)	0.01	0.02
0.01				
Alpha	1.69	Stream Power (lb/ft s)	0.00	0.02
0.00				
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.33	2.60
0.35				
C & E Loss (ft)	0.00	Cum SA (acres)	0.21	1.21
0.22				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1290

INPUT

Description: 12+90

Station Elevation Data		num=		5							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	174	91	158	175	158	231	170	289	174		

Manning's n Values

num=		3			
Sta	n Val	Sta	n Val	Sta	n Val
0	.08	91	.03	175	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	91	175		82	87	76		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	162.83	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.01	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	162.82	Reach Len. (ft)	82.00	87.00
76.00				
Crit W.S. (ft)		Flow Area (sq ft)	66.07	404.88
54.21				
E.G. Slope (ft/ft)	0.000026	Area (sq ft)	66.07	404.88

54.21				
Q Total (cfs)	311.43	Flow (cfs)	11.11	291.24
9.07				
Top Width (ft)	133.91	Top Width (ft)	27.41	84.00
22.49				
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.17	0.72
0.17				
Max Chl Dpth (ft)	4.82	Hydr. Depth (ft)	2.41	4.82
2.41				
Conv. Total (cfs)	61189.3	Conv. (cfs)	2183.6	57222.7
1783.0				
Length Wtd. (ft)	86.35	Wetted Per. (ft)	27.83	84.00
23.00				
Min Ch El (ft)	158.00	Shear (lb/sq ft)	0.00	0.01
0.00				
Alpha	1.38	Stream Power (lb/ft s)	0.00	0.01
0.00				
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.17	1.88
0.18				
C & E Loss (ft)	0.00	Cum SA (acres)	0.14	1.06
0.15				

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1203

INPUT

Description: 12+03

Station	Elevation	Data	num=	4	Sta	Elev	Sta	Elev
0	174	75		158	145	158	270	174

Manning's n Values

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08		75	.03		145	.08	

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	75	145		30	35	25		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	162.82	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.01	Wt. n-Val.	0.080	0.030
0.080				

W.S. Elev (ft)	162.81	Reach Len. (ft)	30.00	35.00
25.00				
Crit W.S. (ft)		Flow Area (sq ft)	54.33	337.03
90.55				
E.G. Slope (ft/ft)	0.000035	Area (sq ft)	54.33	337.03
90.55				
Q Total (cfs)	311.43	Flow (cfs)	10.62	282.95
17.86				
Top Width (ft)	130.18	Top Width (ft)	22.57	70.00
37.61				
Vel Total (ft/s)	0.65	Avg. Vel. (ft/s)	0.20	0.84
0.20				
Max Chl Dpth (ft)	4.81	Hydr. Depth (ft)	2.41	4.81
2.41				
Conv. Total (cfs)	52388.9	Conv. (cfs)	1786.0	47598.1
3004.8				
Length Wtd. (ft)	34.61	Wetted Per. (ft)	23.08	70.00
37.92				
Min Ch El (ft)	158.00	Shear (lb/sq ft)	0.01	0.01
0.01				
Alpha	1.54	Stream Power (lb/ft s)	0.00	0.01
0.00				
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.06	1.14
0.06				
C & E Loss (ft)	0.03	Cum SA (acres)	0.10	0.91
0.10				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1168

INPUT

Description: 11+68

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	170	65	162	110	161.5	160	162	222	170

Manning's n Values

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08		65	.03		160	.08	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

65	160	35	30	46	.1	.3
----	-----	----	----	----	----	----

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	162.79	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.35	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	162.44	Reach Len. (ft)	35.00	30.00
46.00				
Crit W.S. (ft)	162.44	Flow Area (sq ft)	0.79	65.51
0.75				
E.G. Slope (ft/ft)	0.014998	Area (sq ft)	0.79	65.51
0.75				
Q Total (cfs)	311.43	Flow (cfs)	0.65	310.17
0.62				
Top Width (ft)	101.98	Top Width (ft)	3.57	95.00
3.41				
Vel Total (ft/s)	4.64	Avg. Vel. (ft/s)	0.82	4.73
0.82				
Max Chl Dpth (ft)	0.94	Hydr. Depth (ft)	0.22	0.69
0.22				
Conv. Total (cfs)	2543.0	Conv. (cfs)	5.3	2532.7
5.0				
Length Wtd. (ft)	30.02	Wetted Per. (ft)	3.60	95.01
3.44				
Min Ch El (ft)	161.50	Shear (lb/sq ft)	0.20	0.65
0.20				
Alpha	1.03	Stream Power (lb/ft s)	0.17	3.06
0.17				
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	0.04	0.97
0.03				
C & E Loss (ft)	0.01	Cum SA (acres)	0.09	0.84
0.08				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1138

INPUT

Description: 11+38

Station	Elevation	Data	num=	5					
Sta 0	Elev 166	Sta 50	Elev 154	Sta 78	Elev 152	Sta 110	Elev 154	Sta 180	Elev 166

Manning's n Values

Sta 0	n .08	Sta 50	n .03	Sta 110	n .08
-------	-------	--------	-------	---------	-------

Bank Sta: 50	Left 110	Right	Lengths: 35	Channel 67	Right 95	Coeff .1	Contr. .3	Expan. .3
--------------	----------	-------	-------------	------------	----------	----------	-----------	-----------

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	154.41	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.49	Wt. n-Val.		0.030
W.S. Elev (ft)	153.92	Reach Len. (ft)	35.00	67.00
95.00				
Crit W.S. (ft)	153.92	Flow Area (sq ft)		55.56
E.G. Slope (ft/ft)	0.013522	Area (sq ft)		55.56
Q Total (cfs)	311.43	Flow (cfs)		311.43
Top Width (ft)	57.74	Top Width (ft)		57.74
Vel Total (ft/s)	5.61	Avg. Vel. (ft/s)		5.61
Max Chl Dpth (ft)	1.92	Hydr. Depth (ft)		0.96
Conv. Total (cfs)	2678.2	Conv. (cfs)		2678.2
Length Wtd. (ft)	67.04	Wetted Per. (ft)		57.87
Min Ch El (ft)	152.00	Shear (lb/sq ft)		0.81
Alpha	1.00	Stream Power (lb/ft s)		4.54
Frctn Loss (ft)	0.81	Cum Volume (acre-ft)	0.04	0.93
0.03				

C & E Loss (ft)	0.02	Cum SA (acres)	0.09	0.79
	0.08			

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 1071

INPUT

Description: 10+71

Station	Elevation	Data	num=	7					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	162	70	156	95	152	105	150	124	152
183	156	235	164						

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	95	.03	124	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	95	124		7	115	104		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	153.28	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.72	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	152.55	Reach Len. (ft)	7.00	115.00
104.00				
Crit W.S. (ft)	152.55	Flow Area (sq ft)	0.96	45.04
2.26				
E.G. Slope (ft/ft)	0.010804	Area (sq ft)	0.96	45.04
2.26				

Q Total (cfs)	311.43	Flow (cfs)	0.78	308.81
1.85				
Top Width (ft)	40.61	Top Width (ft)	3.46	29.00
8.16				
Vel Total (ft/s)	6.45	Avg. Vel. (ft/s)	0.81	6.86
0.82				
Max Chl Dpth (ft)	2.55	Hydr. Depth (ft)	0.28	1.55
0.28				
Conv. Total (cfs)	2996.2	Conv. (cfs)	7.5	2970.9
17.8				
Length Wtd. (ft)	114.82	Wetted Per. (ft)	3.50	29.30
8.18				
Min Ch El (ft)	150.00	Shear (lb/sq ft)	0.18	1.04
0.19				
Alpha	1.12	Stream Power (lb/ft s)	0.15	7.11
0.15				
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	0.04	0.86
0.03				
C & E Loss (ft)	0.19	Cum SA (acres)	0.08	0.72
0.07				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 956

INPUT

Description: 9+56

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	162	160	152	200	148.5	220	152	315	162

Manning's n Values			num=	3	
Sta	n	Val	Sta	n	Val
0	.08		160	.03	
			220		.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	160	220		17	30	150		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	152.38	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.10	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	152.27	Reach Len. (ft)	17.00	30.00
150.00				
Crit W.S. (ft)		Flow Area (sq ft)	0.60	121.42
0.36				
E.G. Slope (ft/ft)	0.001057	Area (sq ft)	0.60	121.42
0.36				
Q Total (cfs)	311.43	Flow (cfs)	0.10	311.28
0.06				
Top Width (ft)	66.98	Top Width (ft)	4.38	60.00
2.60				
Vel Total (ft/s)	2.54	Avg. Vel. (ft/s)	0.16	2.56
0.16				
Max Chl Dpth (ft)	3.77	Hydr. Depth (ft)	0.14	2.02
0.14				
Conv. Total (cfs)	9578.0	Conv. (cfs)	3.0	9573.3
1.7				
Length Wtd. (ft)	30.02	Wetted Per. (ft)	4.39	60.46
2.61				
Min Ch El (ft)	148.50	Shear (lb/sq ft)	0.01	0.13
0.01				
Alpha	1.01	Stream Power (lb/ft s)	0.00	0.34
0.00				
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.04	0.64
0.02				
C & E Loss (ft)	0.01	Cum SA (acres)	0.08	0.61
0.06				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 926

INPUT

Description: 9+26

Station	Elevation	Data	num=	5	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	Elev 158	Sta 95	Elev 152		Sta 167	Elev 151.5	Sta 353	Elev 152	Sta 529	Elev 158

Manning's n	Values	num=	3	Sta	n	Val	Sta	n	Val
Sta 0	n .08	Sta 95	n .03	Sta 353	n .08				

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	95	353		140	23	13		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	152.28	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.18	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	152.10	Reach Len. (ft)	140.00	23.00
13.00				
Crit W.S. (ft)	152.10	Flow Area (sq ft)	0.08	91.03
0.16				
E.G. Slope (ft/ft)	0.019129	Area (sq ft)	0.08	91.03
0.16				
Q Total (cfs)	311.43	Flow (cfs)	0.03	311.35
0.06				
Top Width (ft)	262.64	Top Width (ft)	1.63	258.00
3.02				
Vel Total (ft/s)	3.41	Avg. Vel. (ft/s)	0.35	3.42
0.36				
Max Chl Dpth (ft)	0.60	Hydr. Depth (ft)	0.05	0.35
0.05				
Conv. Total (cfs)	2251.7	Conv. (cfs)	0.2	2251.1
0.4				
Length Wtd. (ft)	23.41	Wetted Per. (ft)	1.63	258.00
3.02				
Min Ch El (ft)	151.50	Shear (lb/sq ft)	0.06	0.42
0.06				
Alpha	1.00	Stream Power (lb/ft s)	0.02	1.44
0.02				
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	0.04	0.56
0.02				
C & E Loss (ft)	0.05	Cum SA (acres)	0.08	0.50
0.05				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 903

INPUT

Description: 9+03

Station	Elevation	Data	num=	5	Station	Elevation	Station	Elevation	Station	Elevation
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	154	60	148	70	146	83	148	354	154	

Manning's n	Values	num=	3	Sta	n	Val	Sta	n	Val
Sta	n	Val	Sta	n	Val	Sta	n	Val	
0	.08		60	.03		83	.08		

Bank	Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
		60	83		120	103	18	.1		.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	149.54	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.68	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	148.85	Reach Len. (ft)	120.00	103.00
18.00				
Crit W.S. (ft)	148.85	Flow Area (sq ft)	3.64	42.61
16.42				

E.G. Slope (ft/ft)	0.008578	Area (sq ft)	3.64	42.61
16.42				
Q Total (cfs)	311.43	Flow (cfs)	3.53	291.90
16.00				
Top Width (ft)	70.04	Top Width (ft)	8.53	23.00
38.51				
Vel Total (ft/s)	4.97	Avg. Vel. (ft/s)	0.97	6.85
0.97				
Max Chl Dpth (ft)	2.85	Hydr. Depth (ft)	0.43	1.85
0.43				
Conv. Total (cfs)	3362.6	Conv. (cfs)	38.1	3151.8
172.7				
Length Wtd. (ft)	100.91	Wetted Per. (ft)	8.57	23.35
38.52				
Min Ch El (ft)	146.00	Shear (lb/sq ft)	0.23	0.98
0.23				
Alpha	1.78	Stream Power (lb/ft s)	0.22	6.69
0.22				
Frctn Loss (ft)	1.08	Cum Volume (acre-ft)	0.03	0.53
0.02				
C & E Loss (ft)	0.06	Cum SA (acres)	0.07	0.42
0.04				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1 RS: 800

INPUT

Description: 8+00

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
0 .08	55 .03	120 .08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	55	120		80	103	19		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	146.21	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.50	Wt. n-Val.		0.030
W.S. Elev (ft)	145.71	Reach Len. (ft)	80.00	103.00
19.00				
Crit W.S. (ft)	145.71	Flow Area (sq ft)		55.06
E.G. Slope (ft/ft)	0.013681	Area (sq ft)		55.06
Q Total (cfs)	311.43	Flow (cfs)		311.43
Top Width (ft)	56.67	Top Width (ft)		56.67
Vel Total (ft/s)	5.66	Avg. Vel. (ft/s)		5.66
Max Chl Dpth (ft)	1.81	Hydr. Depth (ft)		0.97
Conv. Total (cfs)	2662.5	Conv. (cfs)		2662.5
Length Wtd. (ft)	102.98	Wetted Per. (ft)		57.07
Min Ch El (ft)	143.90	Shear (lb/sq ft)		0.82
Alpha	1.00	Stream Power (lb/ft s)		4.66
Frctn Loss (ft)	0.72	Cum Volume (acre-ft)	0.03	0.41
0.02				
C & E Loss (ft)	0.09	Cum SA (acres)	0.05	0.33
0.04				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and

previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 697

INPUT

Description: 6+97

Station	Elevation	Data	num=	5	Station	Elevation	Station	Elevation	Station	Elevation
Sta 0	Elev 150	Sta 58	Elev 144	Sta 114	Elev 142	Sta 129	Elev 144	Sta 236	Elev 150	

Manning's n Values

num= 3

Sta 0	n Val .08	Sta 58	n Val .03	Sta 129	n Val .08
-------	-----------	--------	-----------	---------	-----------

Bank Sta: Left 58	Right 129	Lengths: Left 68	Channel 98	Right 27	Coeff .1	Contr. .3	Expan. .3
-------------------	-----------	------------------	------------	----------	----------	-----------	-----------

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	144.41	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.20	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	144.21	Reach Len. (ft)	68.00	98.00
27.00				
Crit W.S. (ft)		Flow Area (sq ft)	0.21	85.71
0.38				
E.G. Slope (ft/ft)	0.004196	Area (sq ft)	0.21	85.71
0.38				
Q Total (cfs)	311.43	Flow (cfs)	0.05	311.27
0.10				
Top Width (ft)	76.70	Top Width (ft)	2.00	71.00
3.70				
Vel Total (ft/s)	3.61	Avg. Vel. (ft/s)	0.26	3.63
0.27				
Max Chl Dpth (ft)	2.21	Hydr. Depth (ft)	0.10	1.21
0.10				
Conv. Total (cfs)	4808.0	Conv. (cfs)	0.8	4805.6
1.6				

Length Wtd. (ft)	96.54	Wetted Per. (ft)	2.01	71.17
3.70				
Min Ch El (ft)	142.00	Shear (lb/sq ft)	0.03	0.32
0.03				
Alpha	1.01	Stream Power (lb/ft s)	0.01	1.15
0.01				
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)	0.03	0.25
0.02				
C & E Loss (ft)	0.05	Cum SA (acres)	0.05	0.18
0.04				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1

RS: 599

INPUT

Description: 5+99

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	150	153	142	167	140.2	174	142	276	150

Manning's n Values	num=	3			
Sta	n Val	Sta	n Val	Sta	n Val
0	.08	153	.03	174	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	153	174		80	99	103	.1		.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	143.79	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.75	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	143.04	Reach Len. (ft)	80.00	99.00
103.00				
Crit W.S. (ft)	143.04	Flow Area (sq ft)	10.28	40.68
6.86				

E.G. Slope (ft/ft)	0.008893	Area (sq ft)	10.28	40.68
6.86				
Q Total (cfs)	311.43	Flow (cfs)	11.62	292.08
7.74				
Top Width (ft)	54.06	Top Width (ft)	19.83	21.00
13.22				
Vel Total (ft/s)	5.39	Avg. Vel. (ft/s)	1.13	7.18
1.13				
Max Chl Dpth (ft)	2.84	Hydr. Depth (ft)	0.52	1.94
0.52				
Conv. Total (cfs)	3302.5	Conv. (cfs)	123.2	3097.3
82.0				
Length Wtd. (ft)	98.44	Wetted Per. (ft)	19.86	21.34
13.26				
Min Ch El (ft)	140.20	Shear (lb/sq ft)	0.29	1.06
0.29				
Alpha	1.67	Stream Power (lb/ft s)	0.32	7.60
0.32				
Frctn Loss (ft)	1.00	Cum Volume (acre-ft)	0.02	0.10
0.01				
C & E Loss (ft)	0.07	Cum SA (acres)	0.03	0.07
0.03				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Ewing Creek

REACH: Trib1 RS: 500

INPUT

Description: 500

Station	Elevation	Data	num=	5					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev		
0	148	164	140	177	139.5	208	140	320	148

Manning's n Values num= 3

Sta 0	n .08	Sta 164	n .03	Sta 208	n .08
-------	-------	---------	-------	---------	-------

Bank Sta: 164	Left 208	Right	Lengths: 0	Channel 0	Right 0	Coeff .1	Contr. .3	Expan. .3
---------------	----------	-------	------------	-----------	---------	----------	-----------	-----------

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft) Right OB	141.40	Element	Left OB	Channel
Vel Head (ft) 0.080	0.51	Wt. n-Val.	0.080	0.030
W.S. Elev (ft)	140.89	Reach Len. (ft)		
Crit W.S. (ft) 5.56	140.89	Flow Area (sq ft)	8.14	50.21
E.G. Slope (ft/ft) 5.56	0.011826	Area (sq ft)	8.14	50.21
Q Total (cfs) 6.54	311.43	Flow (cfs)	9.59	295.30
Top Width (ft) 12.48	74.75	Top Width (ft)	18.27	44.00
Vel Total (ft/s) 1.18	4.87	Avg. Vel. (ft/s)	1.18	5.88
Max Chl Dpth (ft) 0.45	1.39	Hydr. Depth (ft)	0.45	1.14
Conv. Total (cfs) 60.1	2863.8	Conv. (cfs)	88.2	2715.5
Length Wtd. (ft) 12.51		Wetted Per. (ft)	18.29	44.01
Min Ch El (ft) 0.33	139.50	Shear (lb/sq ft)	0.33	0.84
Alpha 0.39	1.38	Stream Power (lb/ft s)	0.39	4.95
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

SUMMARY OF MANNING'S N VALUES

River: Ewing Creek

Reach	River Sta.	n1	n2	n3
-------	------------	----	----	----

Trib1	2478	.08	.03	.08
Trib1	2377	.08	.03	.08
Trib1	2277	.08	.03	.08
Trib1	2176	.08	.03	.08
Trib1	2075	.08	.03	.08
Trib1	1976	.08	.03	.08
Trib1	1876	.08	.03	.08
Trib1	1775	.08	.03	.08
Trib1	1676	.08	.03	.08
Trib1	1580	.08	.03	.08
Trib1	1483	.08	.03	.08
Trib1	1386	.08	.03	.08
Trib1	1290	.08	.03	.08
Trib1	1203	.08	.03	.08
Trib1	1168	.08	.03	.08
Trib1	1138	.08	.03	.08
Trib1	1071	.08	.03	.08
Trib1	956	.08	.03	.08
Trib1	926	.08	.03	.08
Trib1	903	.08	.03	.08
Trib1	800	.08	.03	.08
Trib1	697	.08	.03	.08
Trib1	599	.08	.03	.08
Trib1	500	.08	.03	.08

SUMMARY OF REACH LENGTHS

River: Ewing Creek

Reach	River Sta.	Left	Channel	Right
Trib1	2478	95	101	100
Trib1	2377	89	100	100
Trib1	2277	100	101	86
Trib1	2176	93	101	87
Trib1	2075	126	99	44
Trib1	1976	95	100	175
Trib1	1876	93	101	120
Trib1	1775	101	99	121
Trib1	1676	95	96	99
Trib1	1580	100	103	91
Trib1	1483	96	97	57
Trib1	1386	113	96	108
Trib1	1290	82	87	76
Trib1	1203	30	35	25
Trib1	1168	35	30	46
Trib1	1138	35	67	95

Trib1	1071	7	115	104
Trib1	956	17	30	150
Trib1	926	140	23	13
Trib1	903	120	103	18
Trib1	800	80	103	19
Trib1	697	68	98	27
Trib1	599	80	99	103
Trib1	500	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
 River: Ewing Creek

Reach	River Sta.	Contr.	Expan.
Trib1	2478	.1	.3
Trib1	2377	.1	.3
Trib1	2277	.1	.3
Trib1	2176	.1	.3
Trib1	2075	.1	.3
Trib1	1976	.1	.3
Trib1	1876	.1	.3
Trib1	1775	.1	.3
Trib1	1676	.1	.3
Trib1	1580	.1	.3
Trib1	1483	.1	.3
Trib1	1386	.1	.3
Trib1	1290	.1	.3
Trib1	1203	.1	.3
Trib1	1168	.1	.3
Trib1	1138	.1	.3
Trib1	1071	.1	.3
Trib1	956	.1	.3
Trib1	926	.1	.3
Trib1	903	.1	.3
Trib1	800	.1	.3
Trib1	697	.1	.3
Trib1	599	.1	.3
Trib1	500	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.
E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude #	Chl
			(cfs)	(ft)	(ft)	(ft)

(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	(ft)	(ft)
Trib1 178.28	2478 0.009931	PF 1 7.41	311.43 54.81	175.30 42.52	177.49 0.96	177.49
Trib1 175.87	2377 0.010329	PF 1 7.23	311.43 49.96	172.70 39.31	175.09 0.97	175.09
Trib1 174.37	2277 0.009444	PF 1 7.54	311.43 56.60	171.20 43.47	173.57 0.95	173.57
Trib1 171.62	2176 0.011552	PF 1 6.46	311.43 53.76	169.30 48.94	170.99 0.98	170.99
Trib1 168.80	2075 0.013472	PF 1 5.71	311.43 55.09	166.60 59.10	168.29 1.01	168.29
Trib1 166.61	1976 0.015093	PF 1 4.81	311.43 65.29	165.10 96.86	166.25 1.01	166.25
Trib1 164.62	1876 0.014137	PF 1 5.12	311.43 61.62	162.80 83.04	164.21 1.00	164.21
Trib1 163.19	1775 0.004103	PF 1 3.49	311.43 98.32	161.70 98.21	163.01 0.57	163.01
Trib1 162.96	1676 0.001350	PF 1 3.66	311.43 149.56	159.90 82.98	162.80 0.38	162.80
Trib1 162.88	1580 0.000234	PF 1 1.68	311.43 227.96	159.10 90.73	162.84 0.16	162.84
Trib1 162.86	1483 0.000248	PF 1 1.89	311.43 201.06	158.00 73.23	162.80 0.17	162.80
Trib1 162.83	1386 0.000061	PF 1 1.10	311.43 389.01	158.00 109.51	162.82 0.09	162.82
Trib1 162.83	1290 0.000026	PF 1 0.72	311.43 525.16	158.00 133.91	162.82 0.06	162.82
Trib1 162.82	1203 0.000035	PF 1 0.84	311.43 481.91	158.00 130.18	162.81 0.07	162.81
Trib1 162.79	1168 0.014998	PF 1 4.73	311.43 67.05	158.00 101.98	162.82 1.01	162.82
Trib1 154.41	1138 0.013522	PF 1 5.61	311.43 55.56	152.00 57.74	153.92 1.01	153.92
Trib1 153.28	1071 0.010804	PF 1 6.86	311.43 48.25	150.00 40.61	152.55 0.97	152.55
Trib1 152.38	956 0.001057	PF 1 2.56	311.43 122.37	150.00 66.98	152.27 0.32	152.27
Trib1 152.28	926 0.019129	PF 1 3.42	311.43 91.26	151.50 262.64	152.10 1.02	152.10
Trib1 149.54	903 0.008578	PF 1 6.85	311.43 62.67	146.00 70.04	148.85 0.89	148.85
Trib1 146.21	800 0.013681	PF 1 5.66	311.43 55.06	143.90 56.67	145.71 1.01	145.71
Trib1 144.41	697 0.004196	PF 1 3.63	311.43 86.30	142.00 76.70	144.21 0.58	144.21
Trib1 143.79	599 0.008893	PF 1 7.18	311.43 57.82	140.20 54.06	143.04 0.91	143.04
Trib1	500	PF 1	311.43	139.50	140.89	140.89

141.40	0.011826	5.88	63.91	74.75	0.97
--------	----------	------	-------	-------	------

ERRORS WARNINGS AND NOTES

Errors Warnings and Notes for Plan : ewing_creek

River: Ewing Creek Reach: Trib1 RS: 2478 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 2377 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 2277 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 2176 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current

and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 2075 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 1976 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 1876 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 1775 Profile: PF 1

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

River: Ewing Creek Reach: Trib1 RS: 1676 Profile: PF 1

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

River: Ewing Creek Reach: Trib1 RS: 1483 Profile: PF 1

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

River: Ewing Creek Reach: Trib1 RS: 1386 Profile: PF 1

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

River: Ewing Creek Reach: Trib1 RS: 1203 Profile: PF 1

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

River: Ewing Creek Reach: Trib1 RS: 1168 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 1138 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 1071 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was

set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 956 Profile: PF 1

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

River: Ewing Creek Reach: Trib1 RS: 926 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 903 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 800 Profile: PF 1

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that

there is not a valid subcritical answer. The program defaulted to critical depth.

River: Ewing Creek Reach: Trib1 RS: 697 Profile: PF 1

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

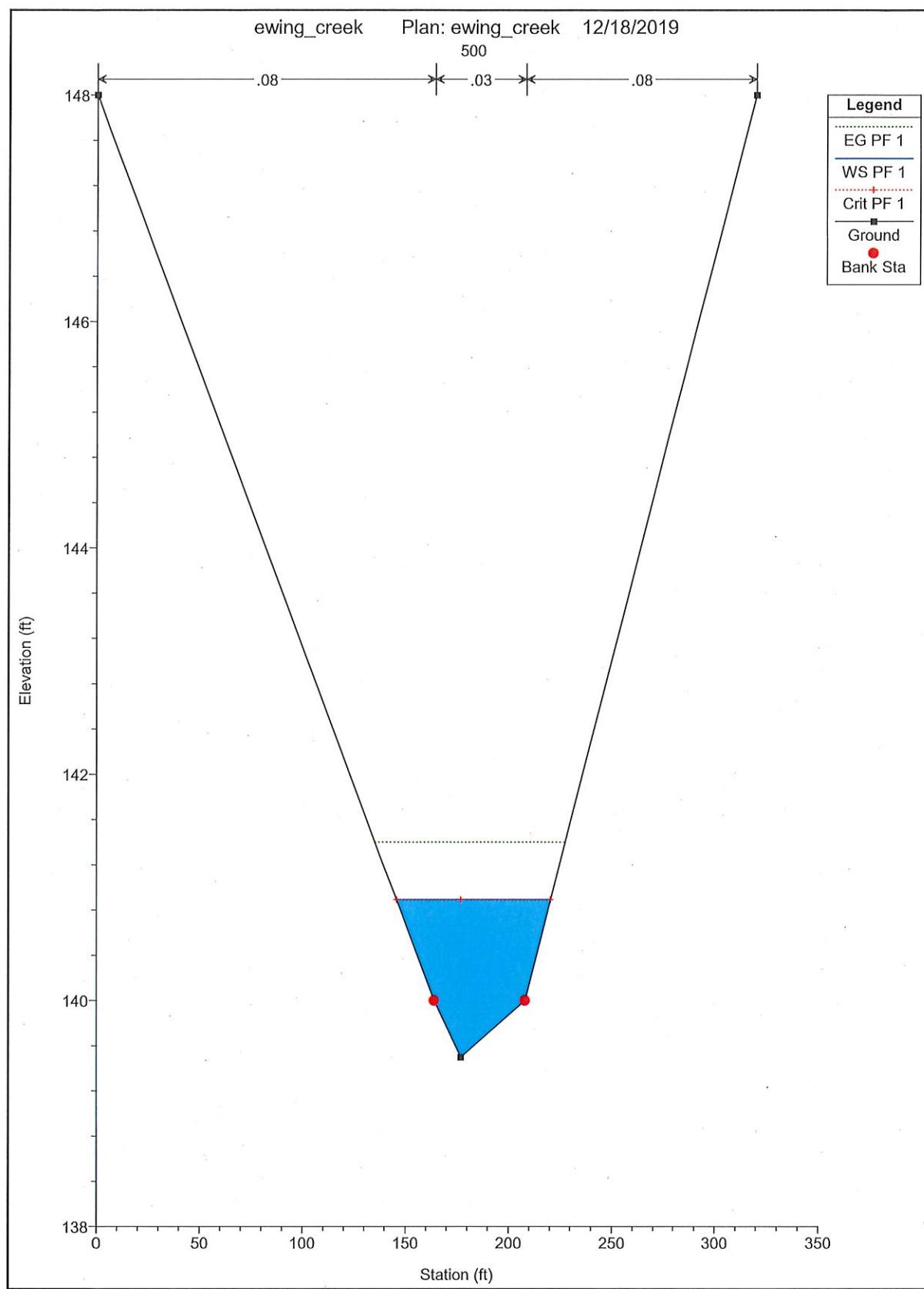
This may indicate the need for additional cross sections.

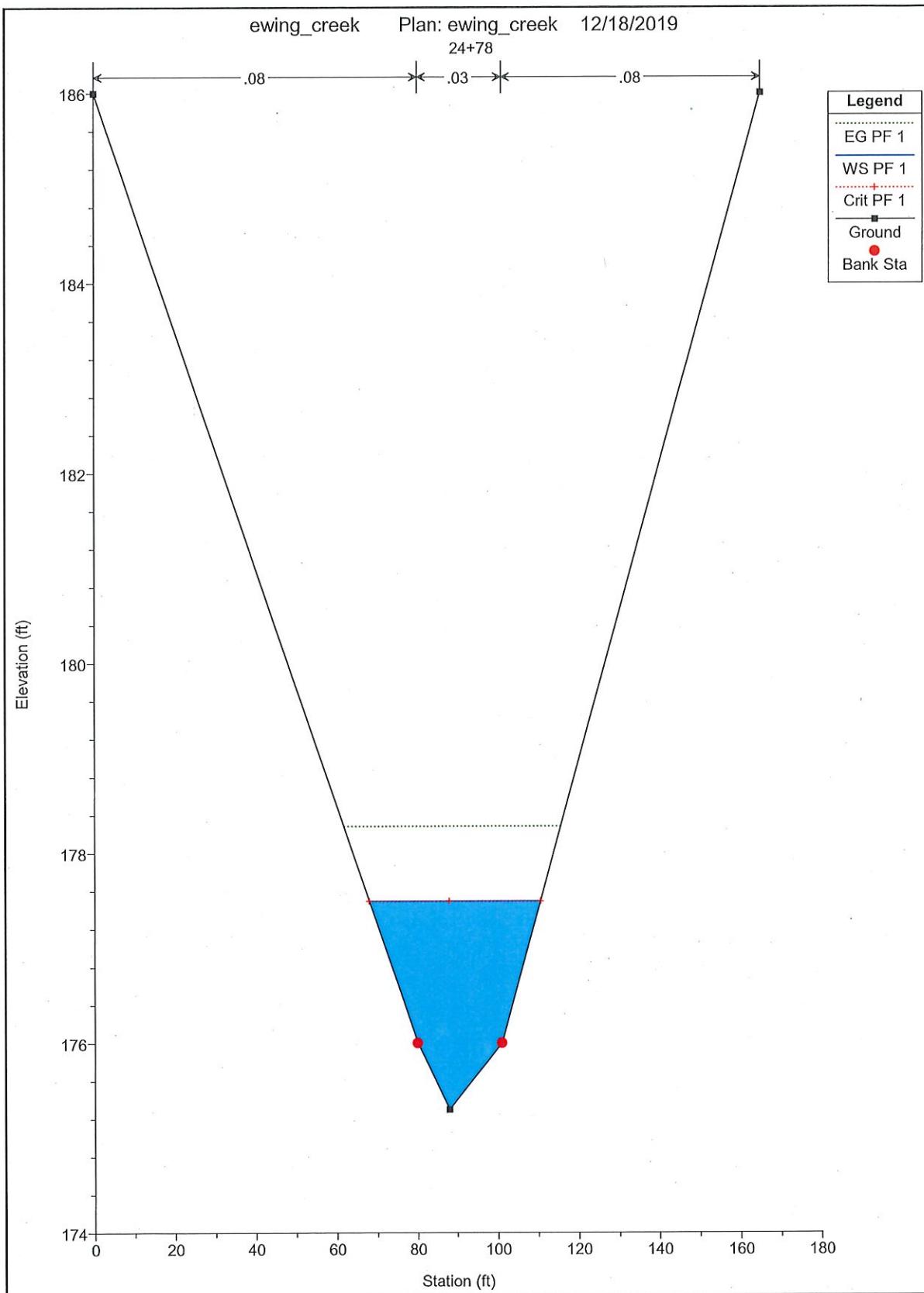
River: Ewing Creek Reach: Trib1 RS: 599 Profile: PF 1

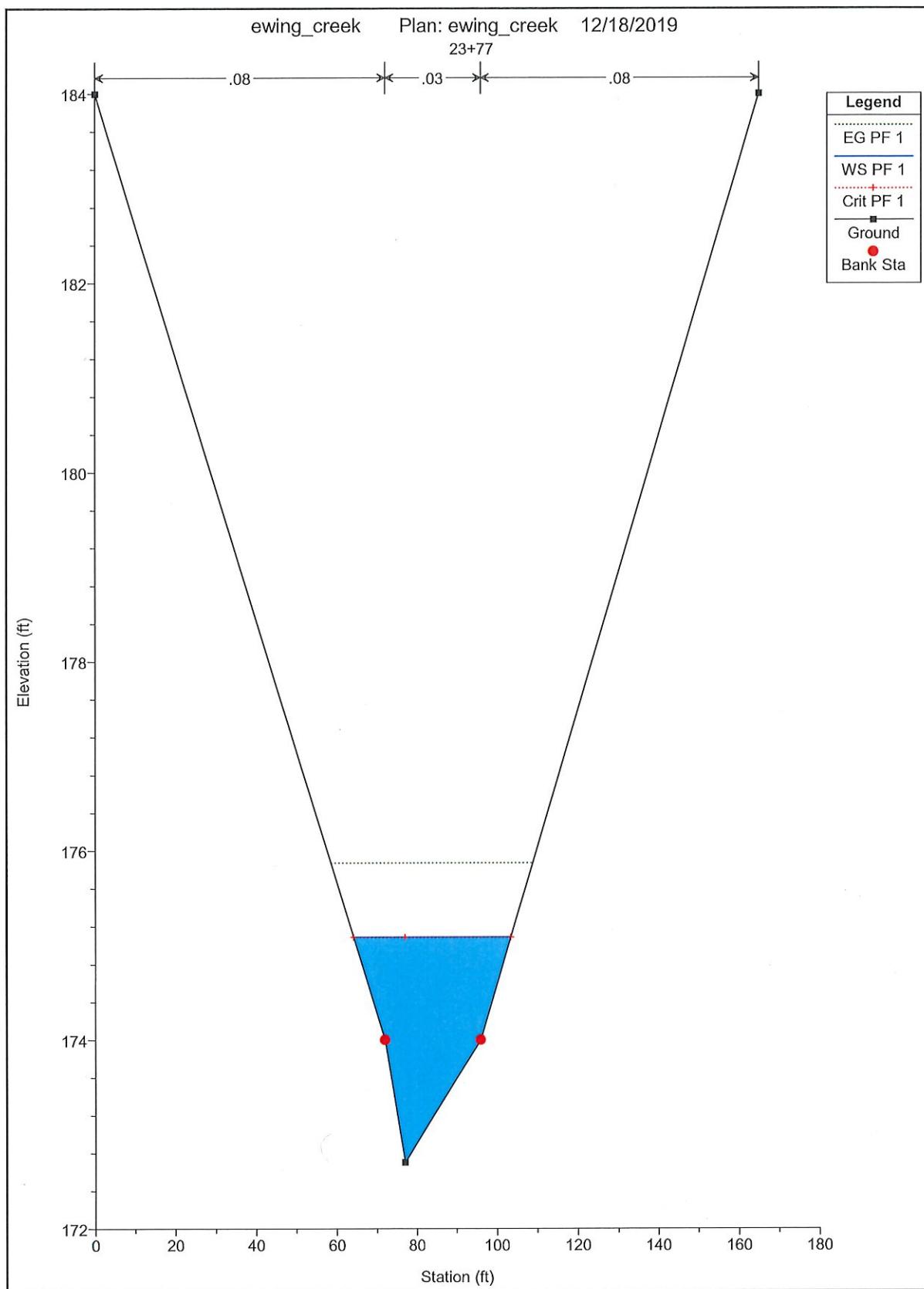
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

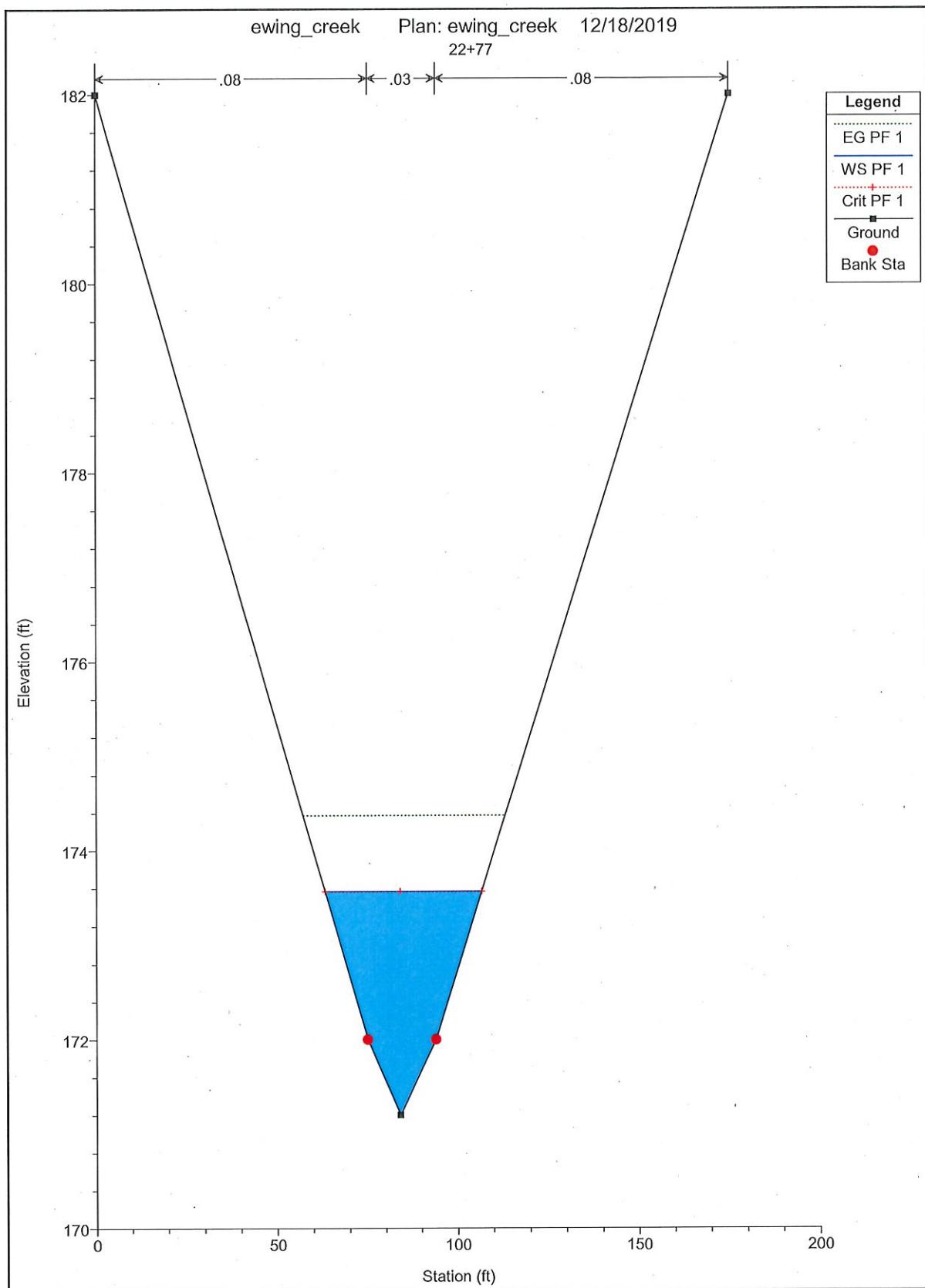
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

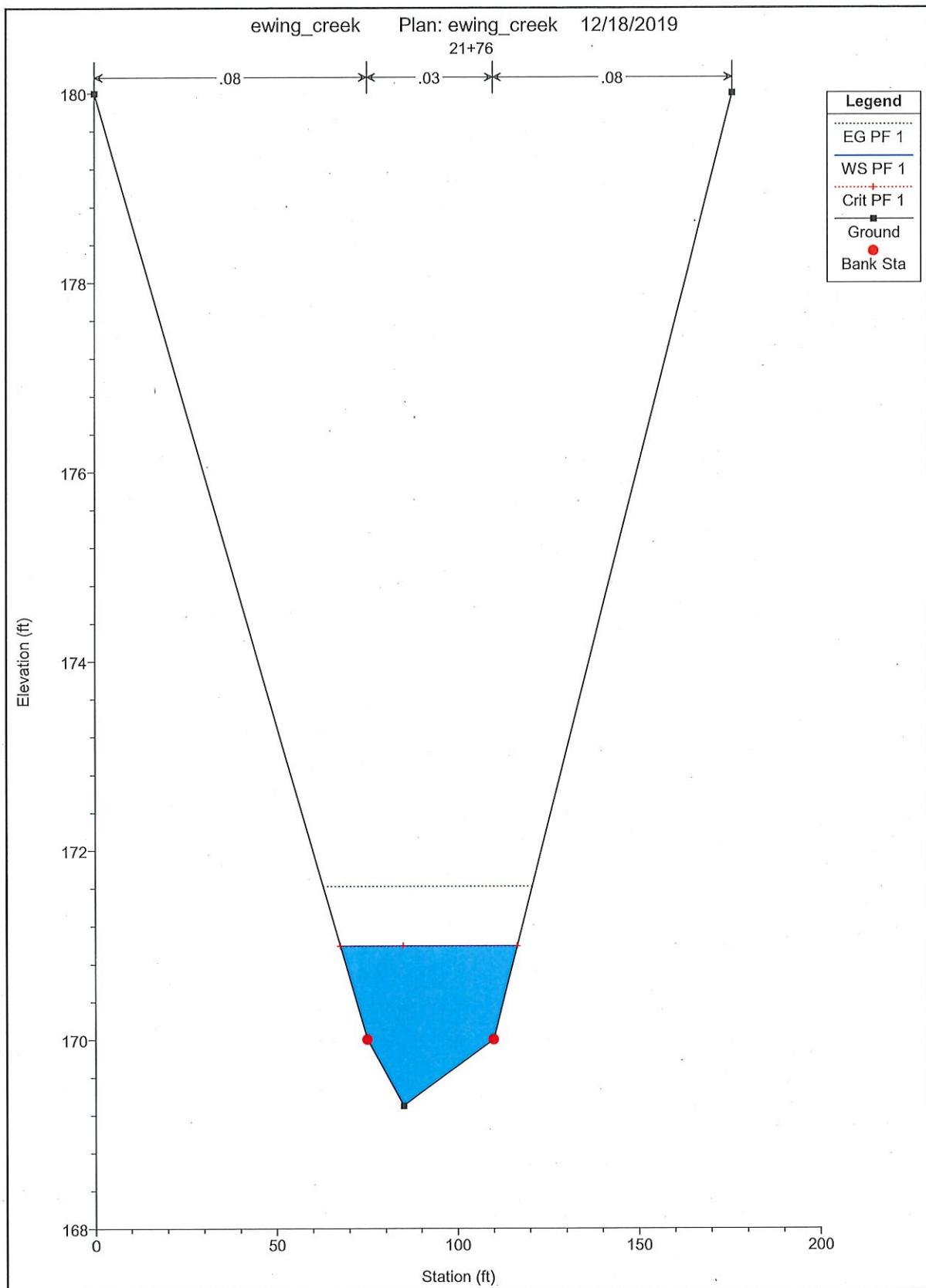
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

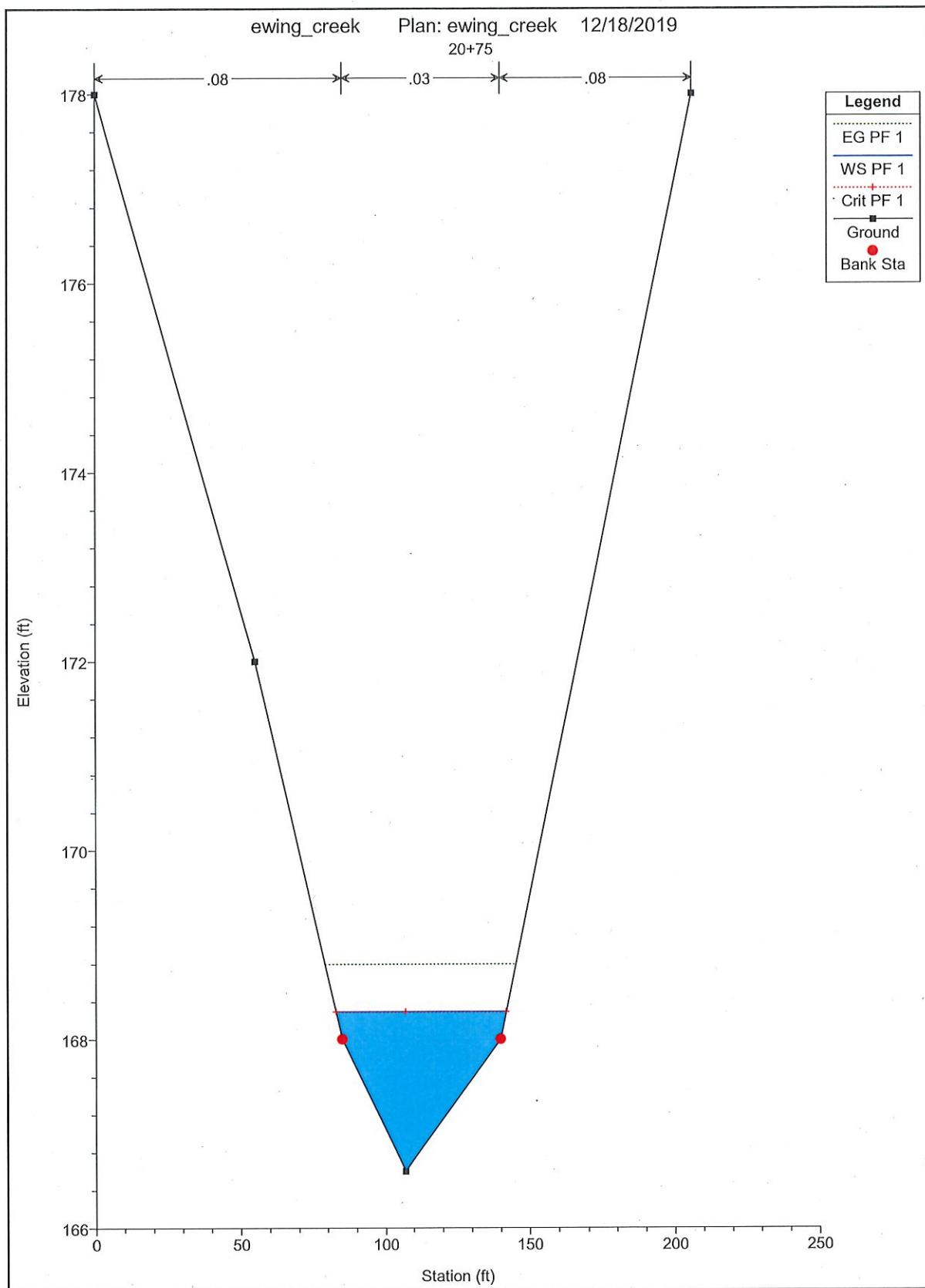


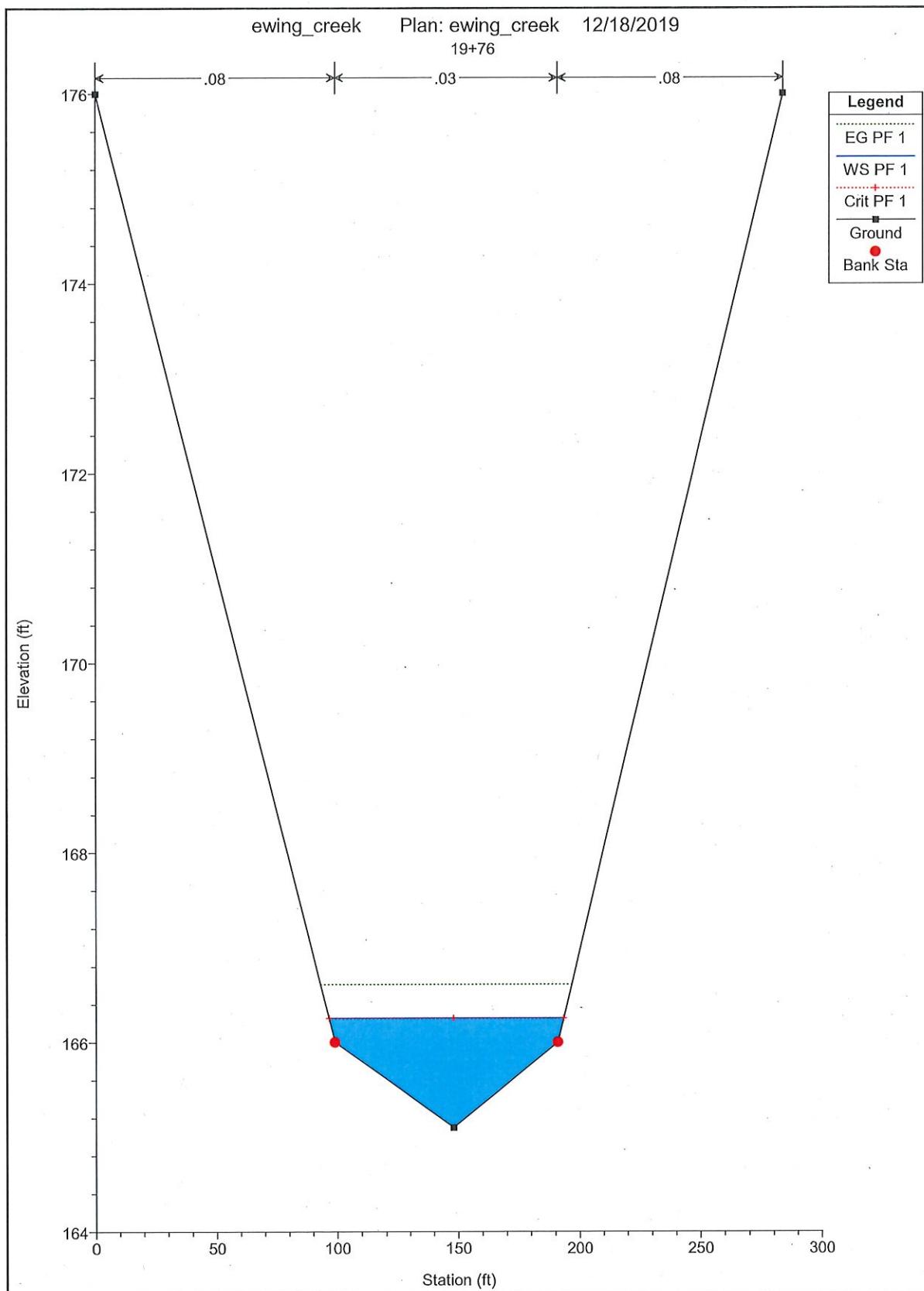


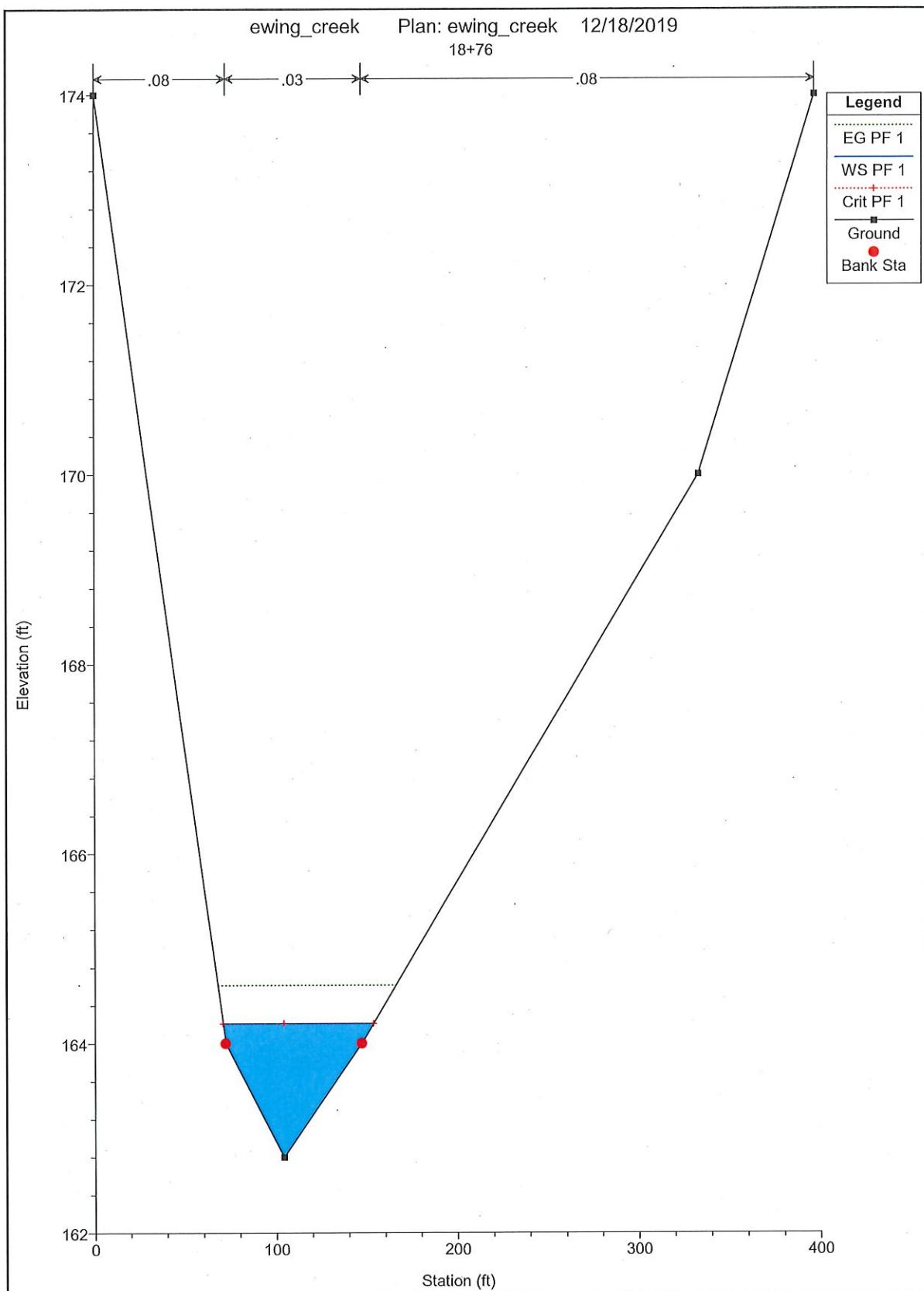


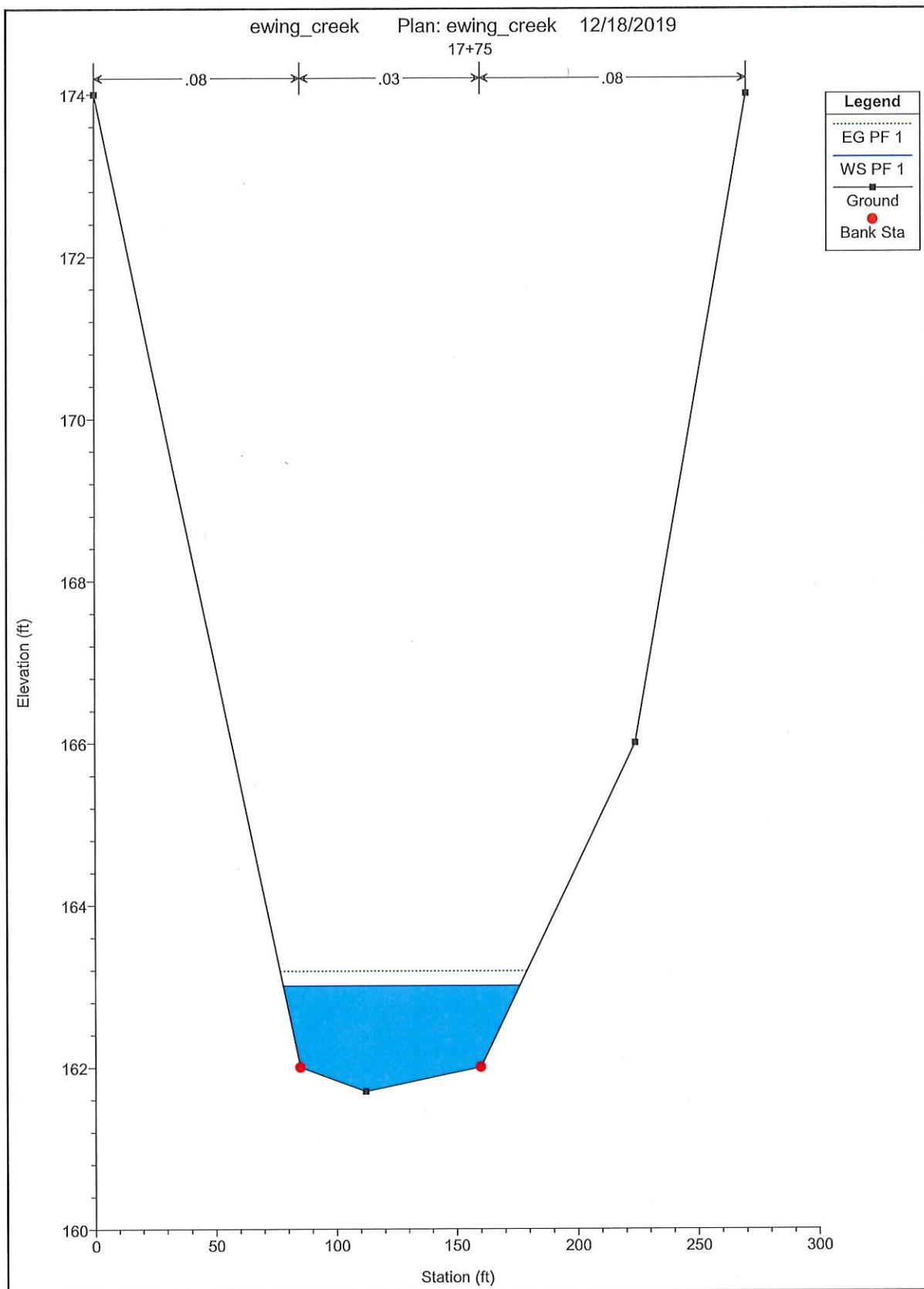


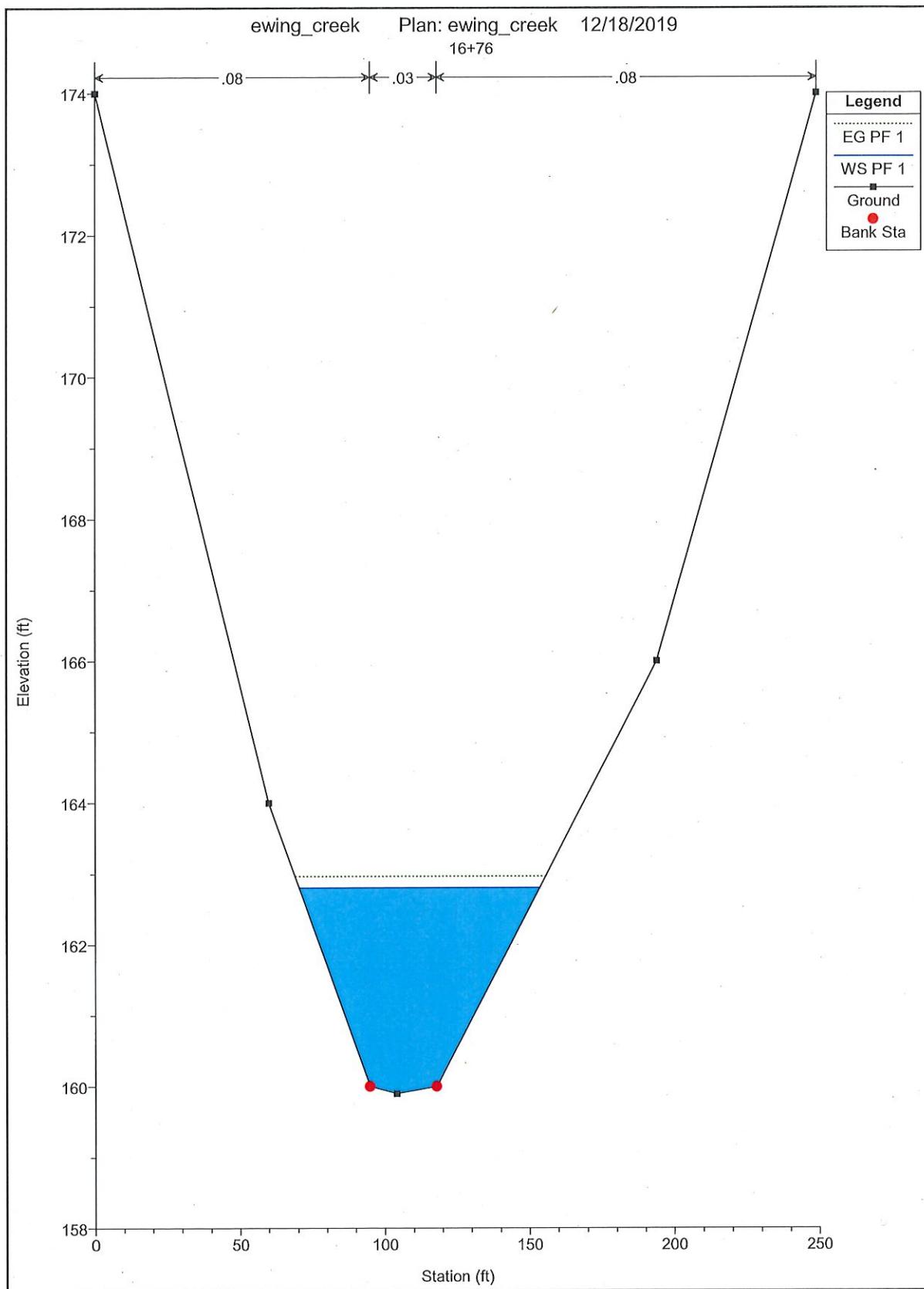


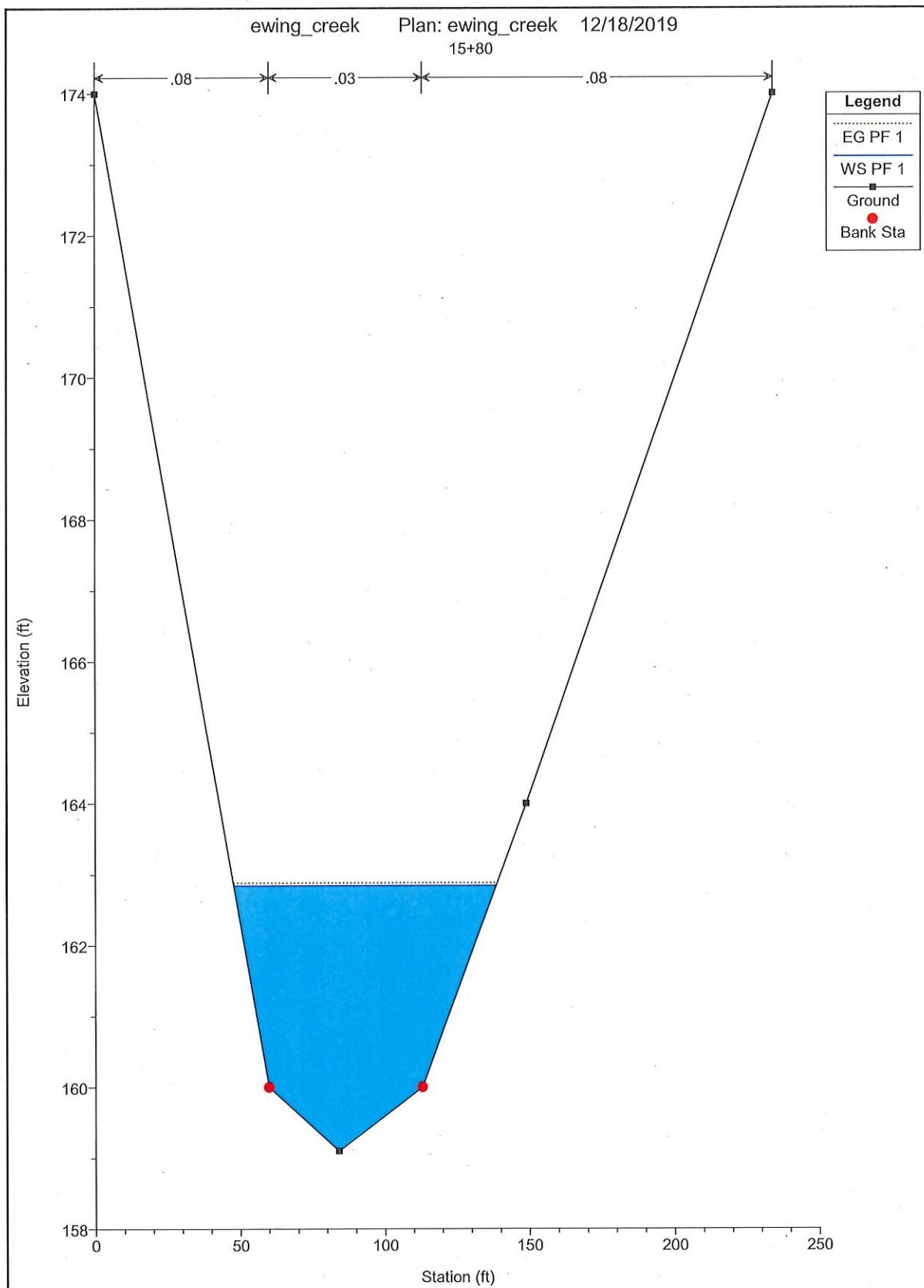


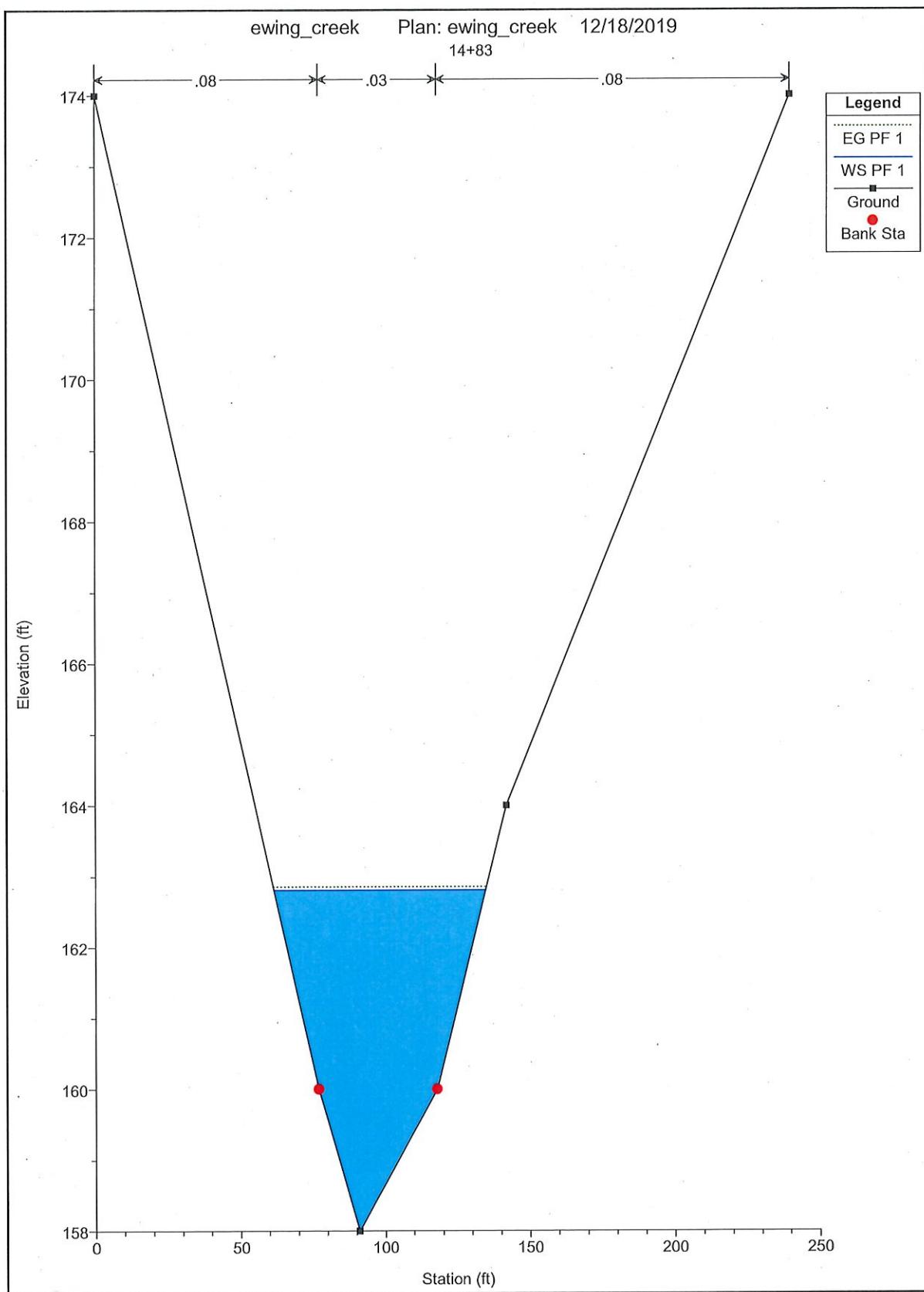


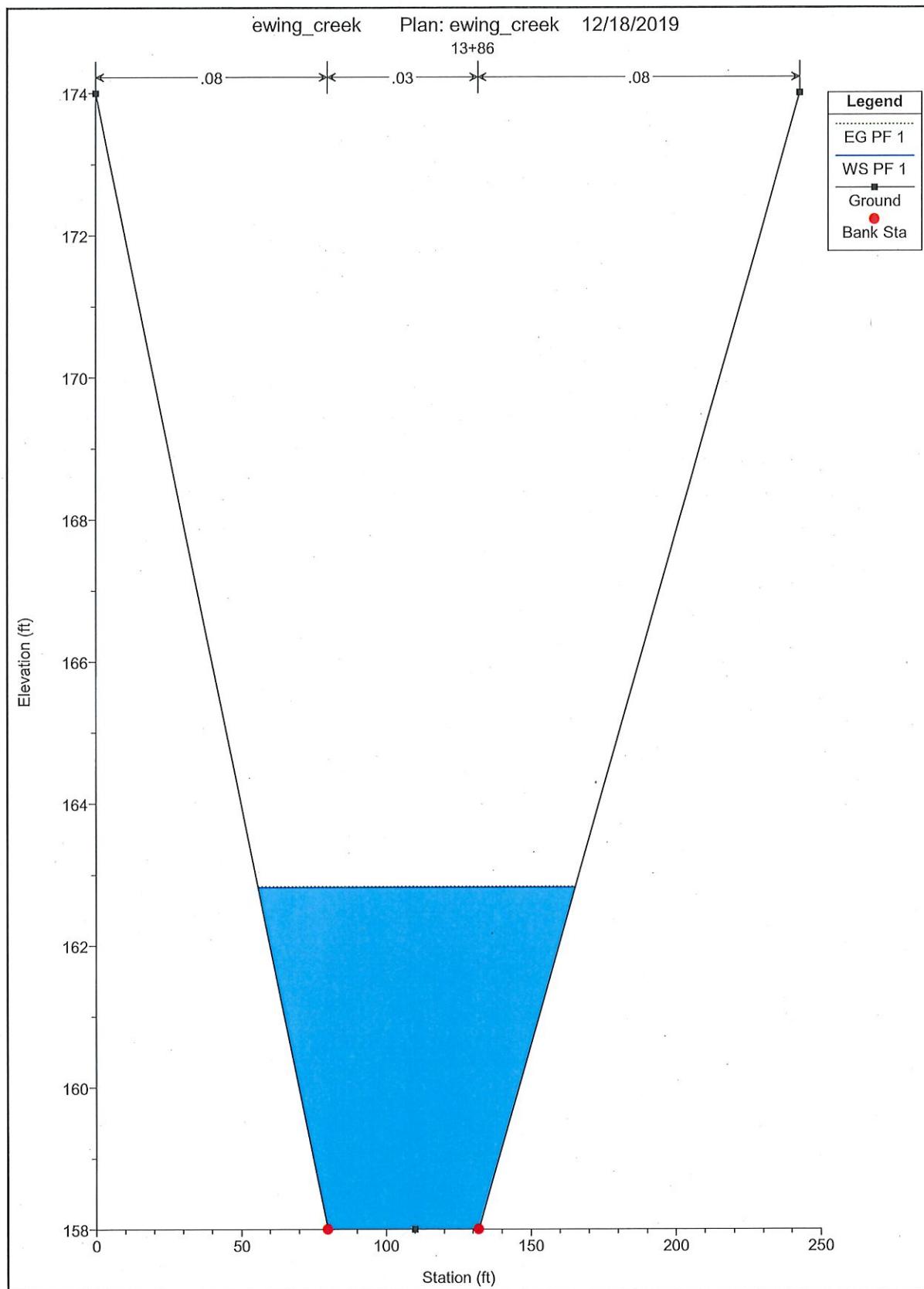


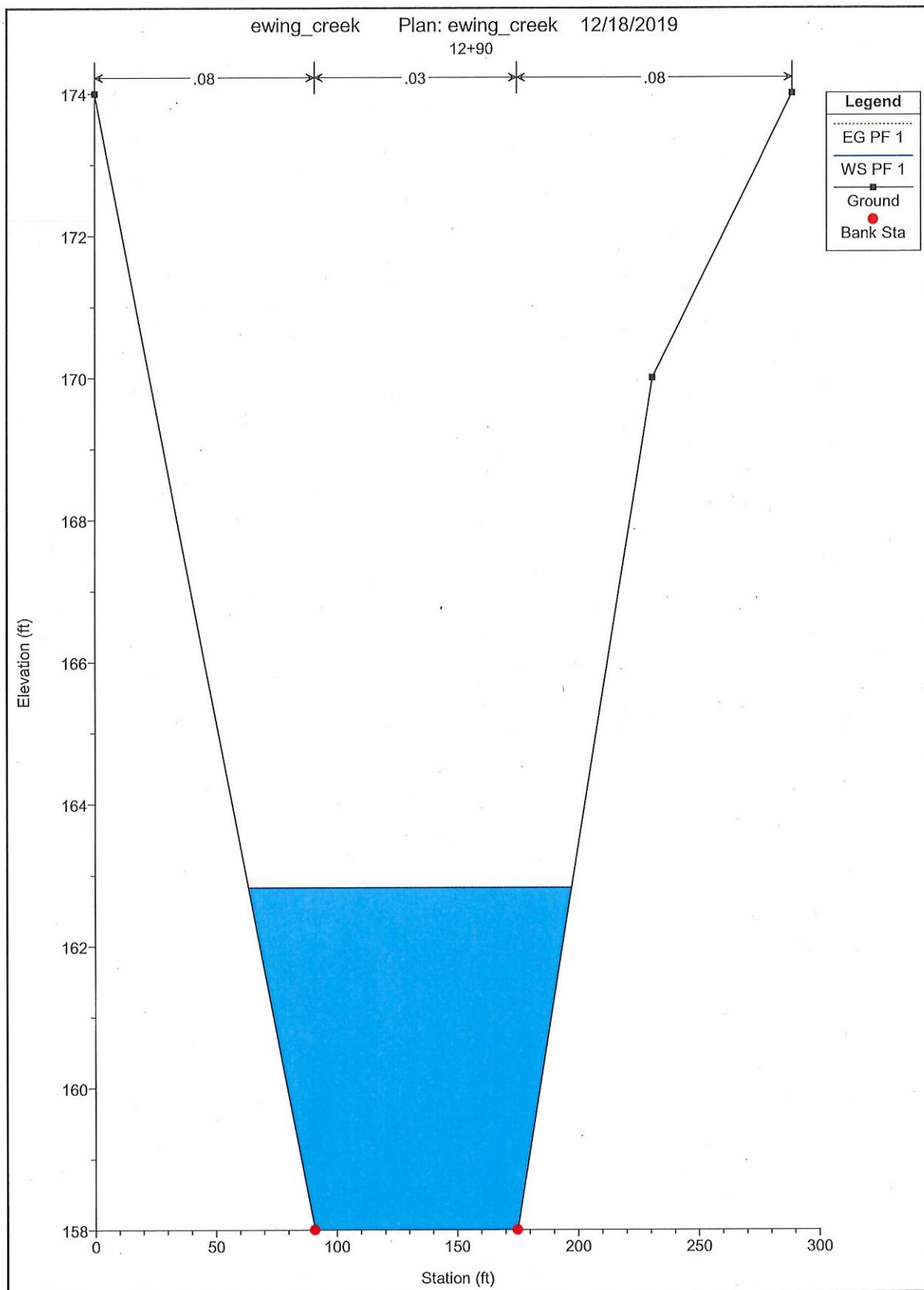


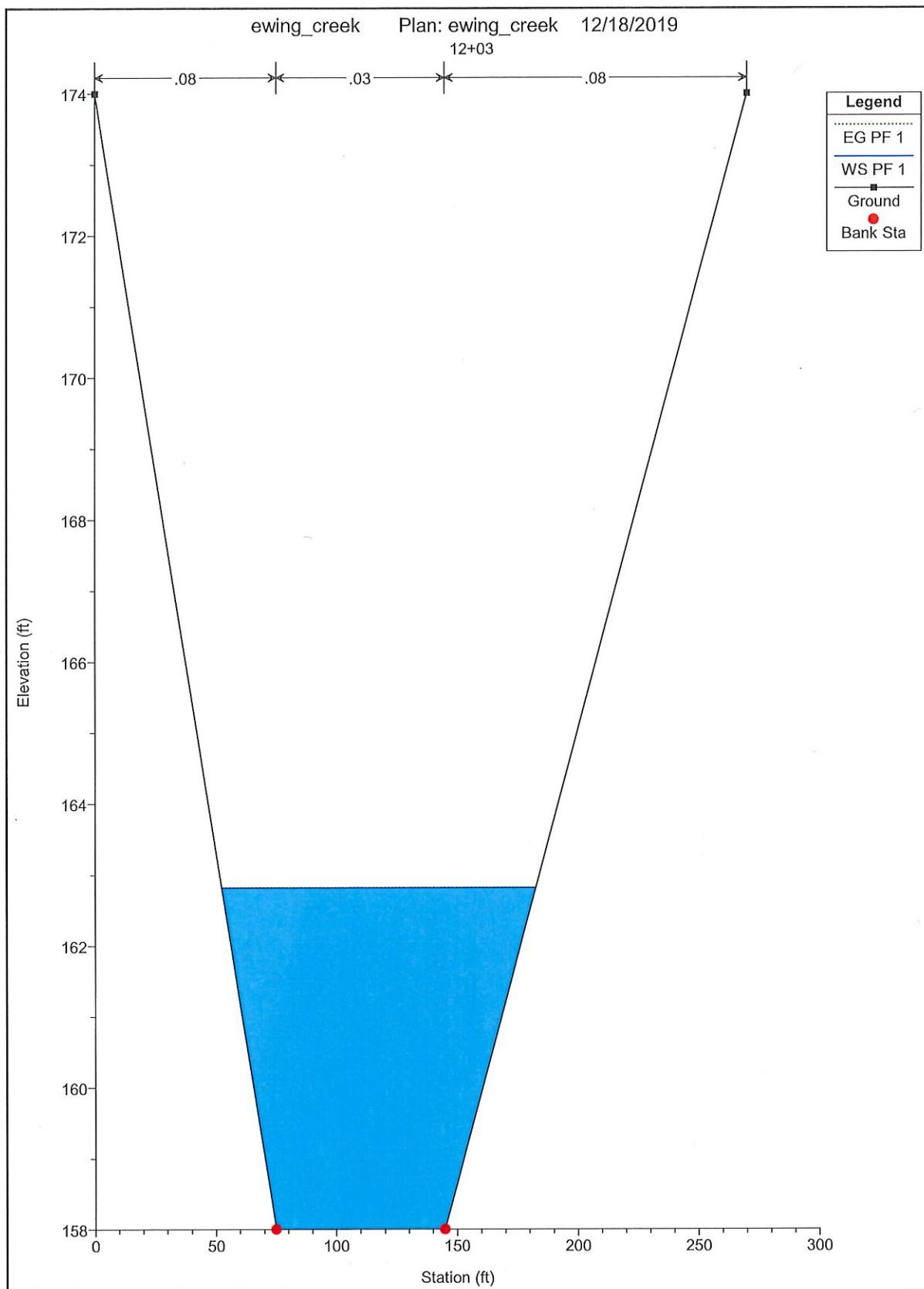


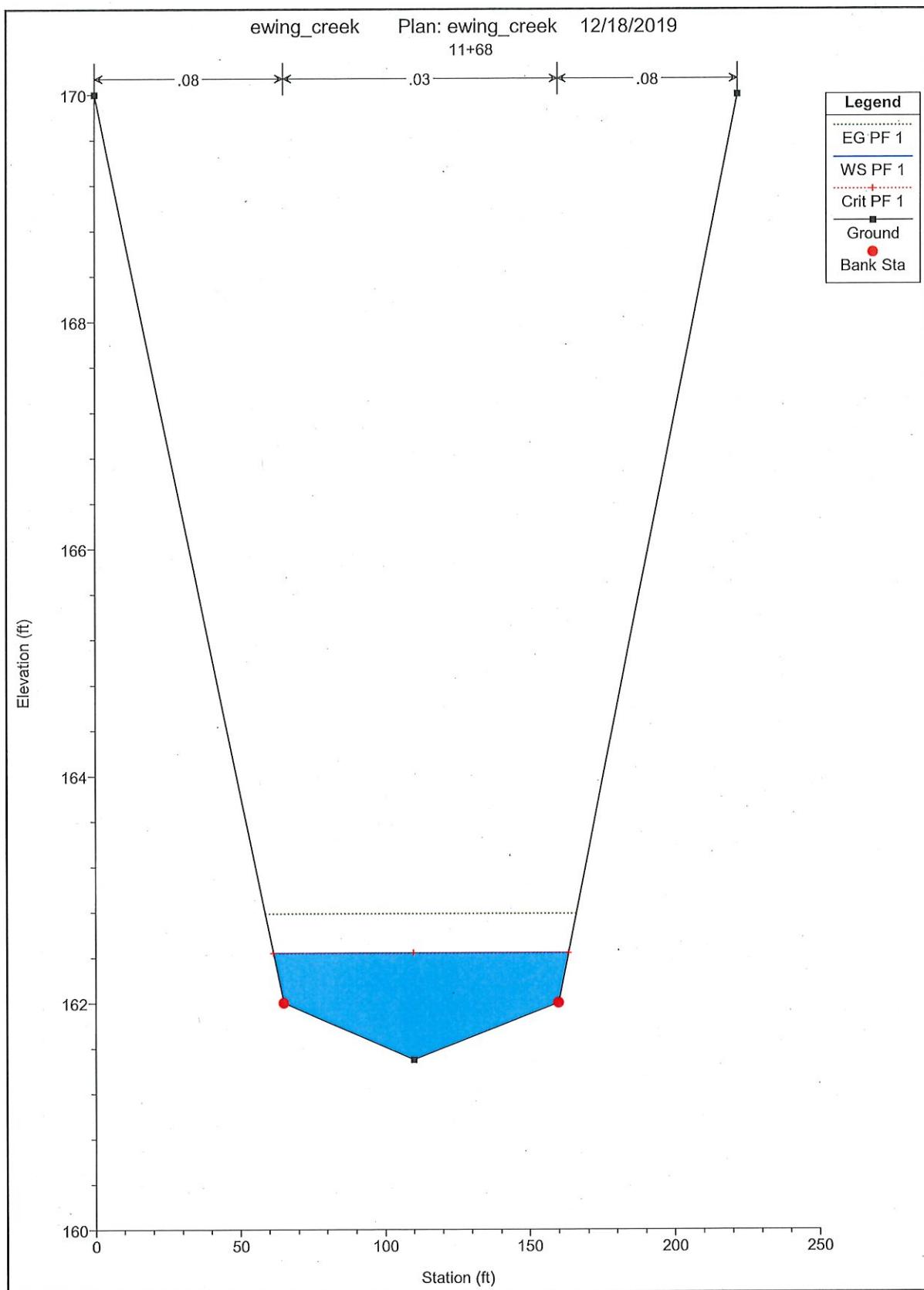


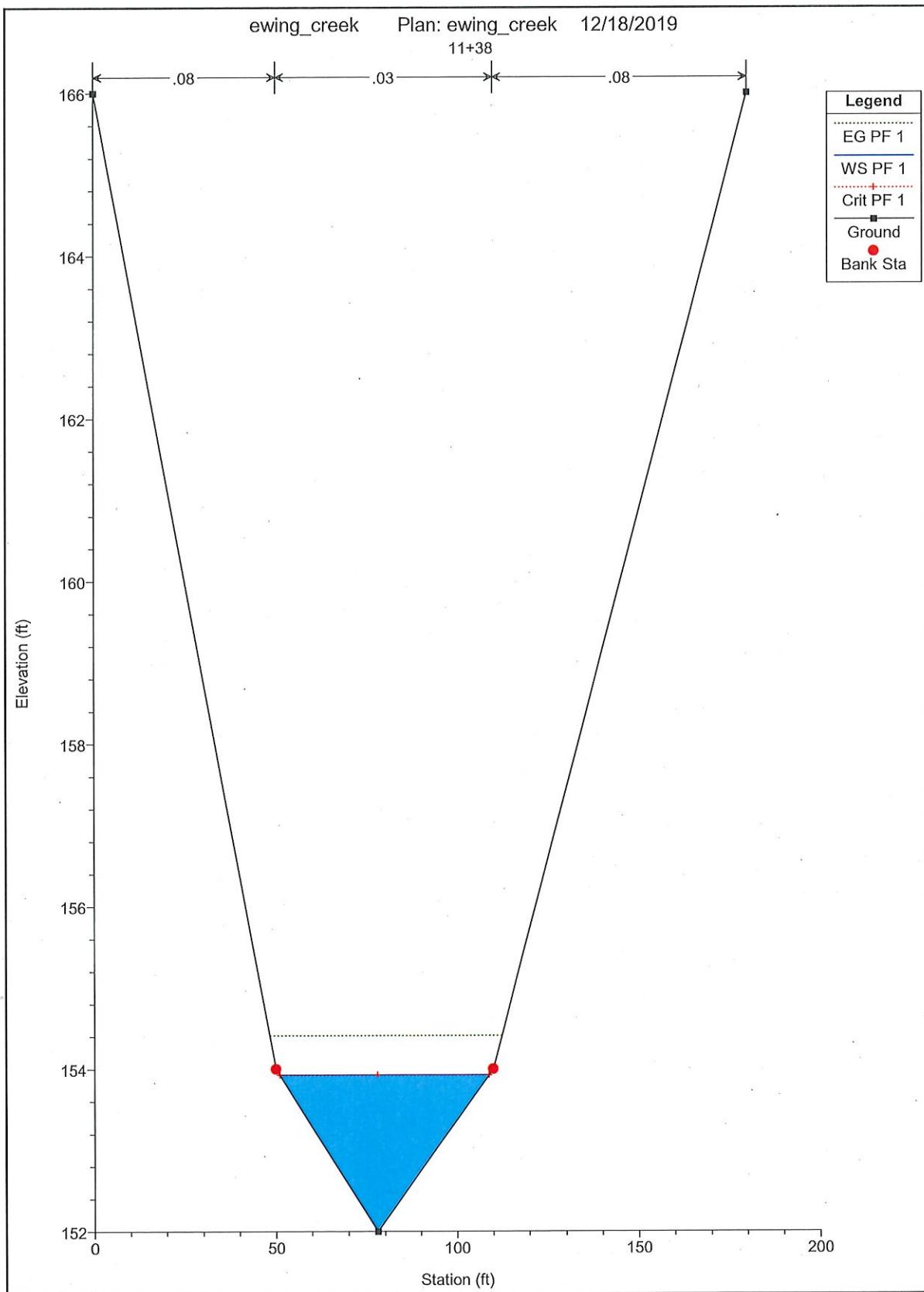


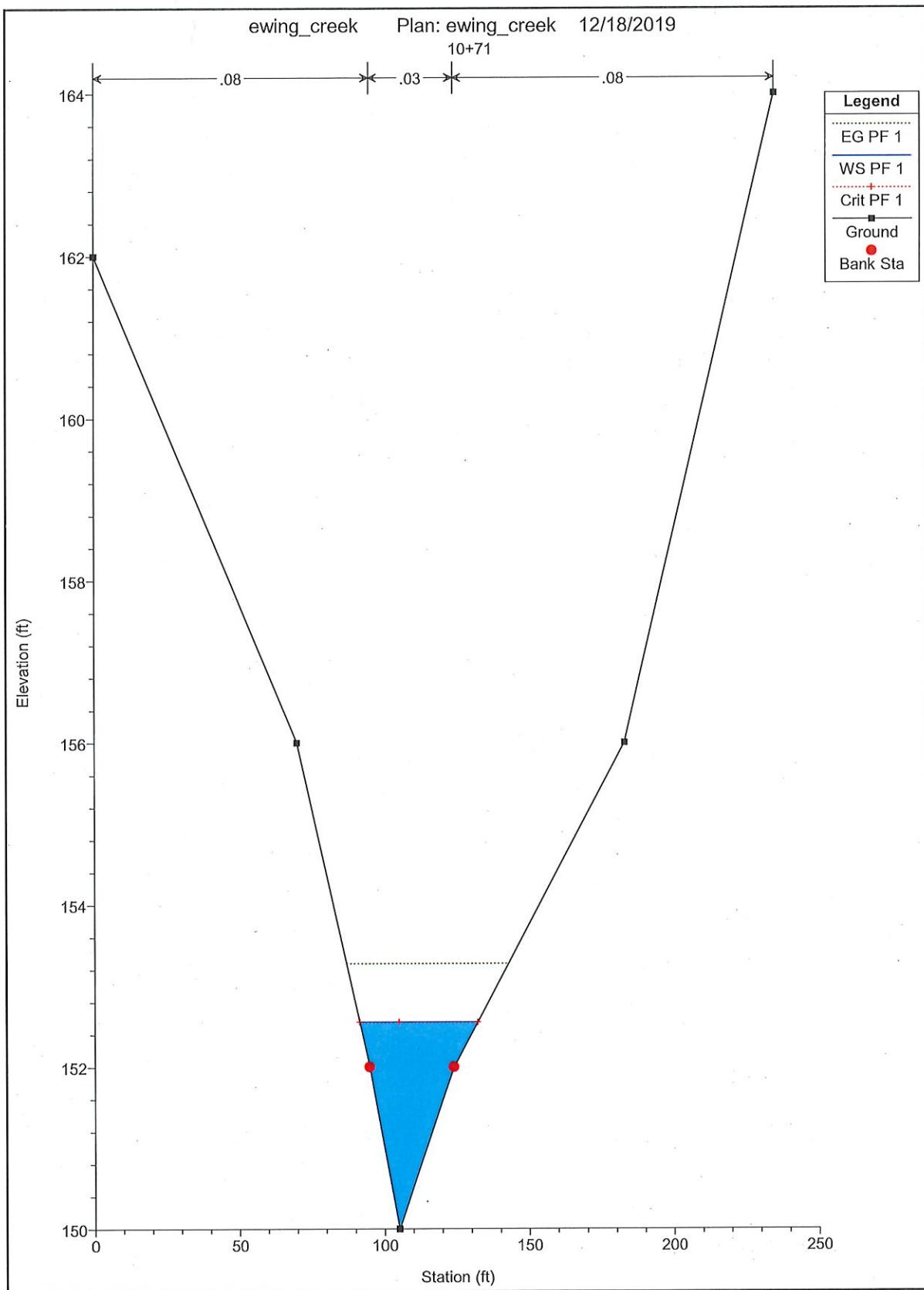


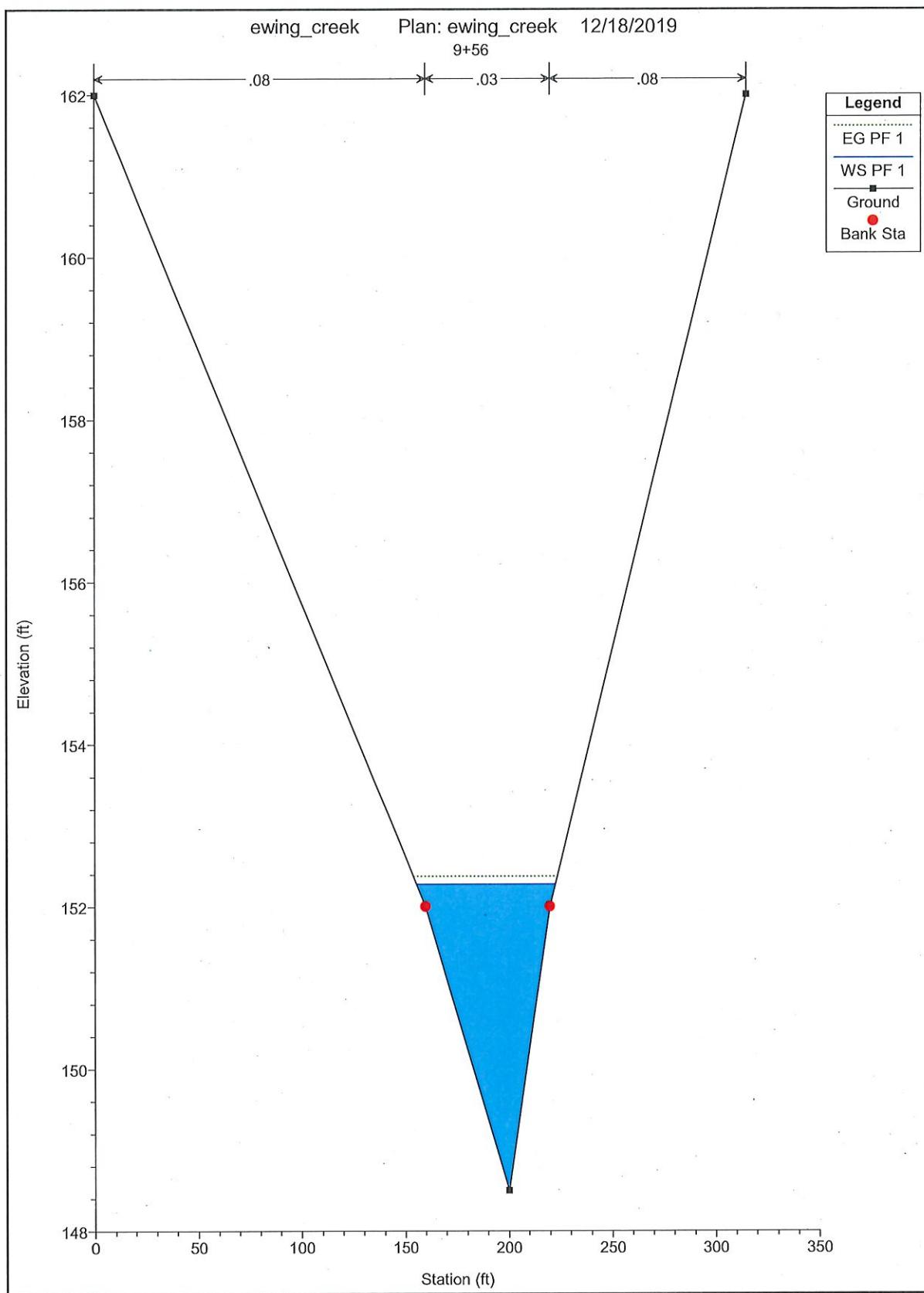


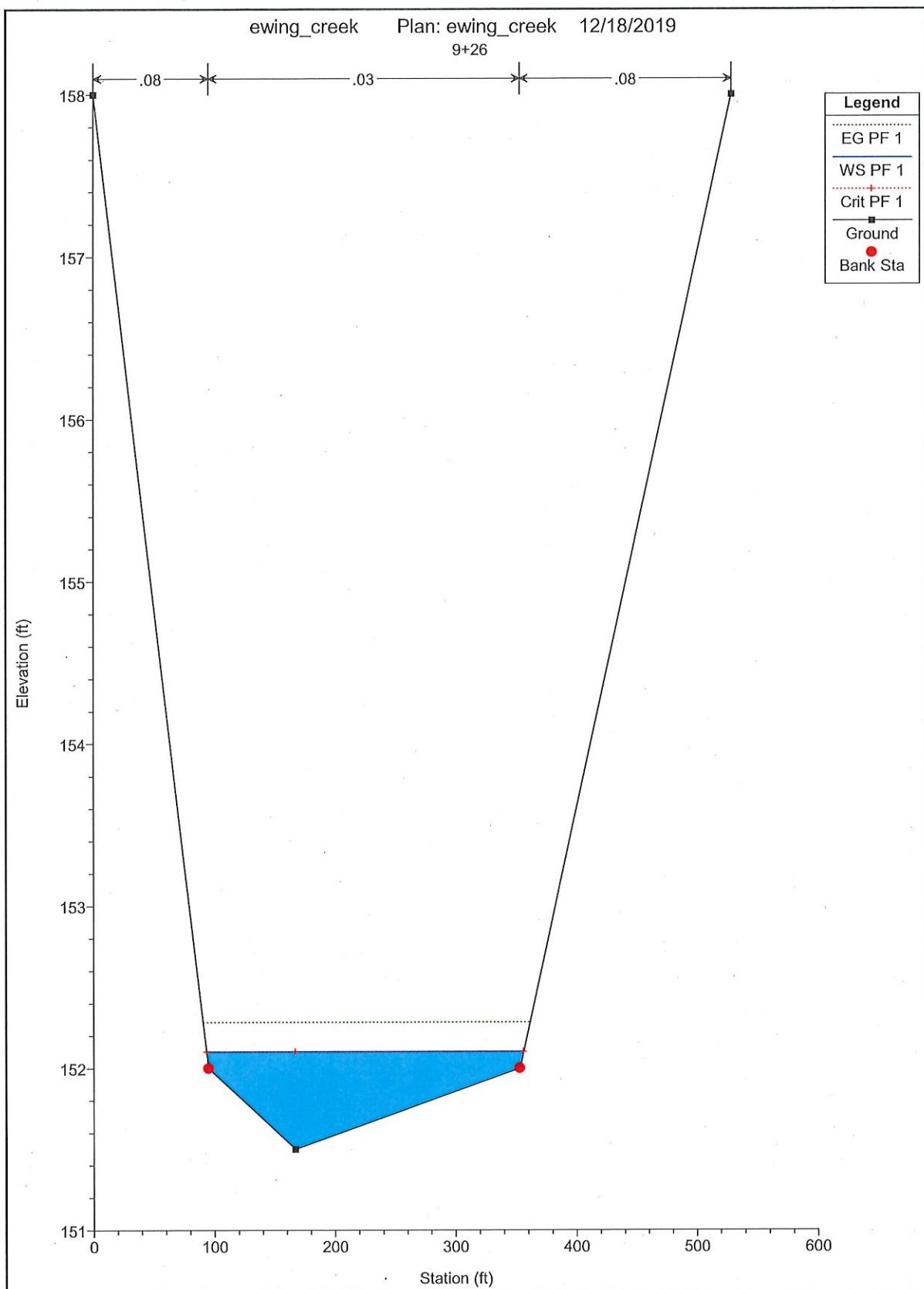


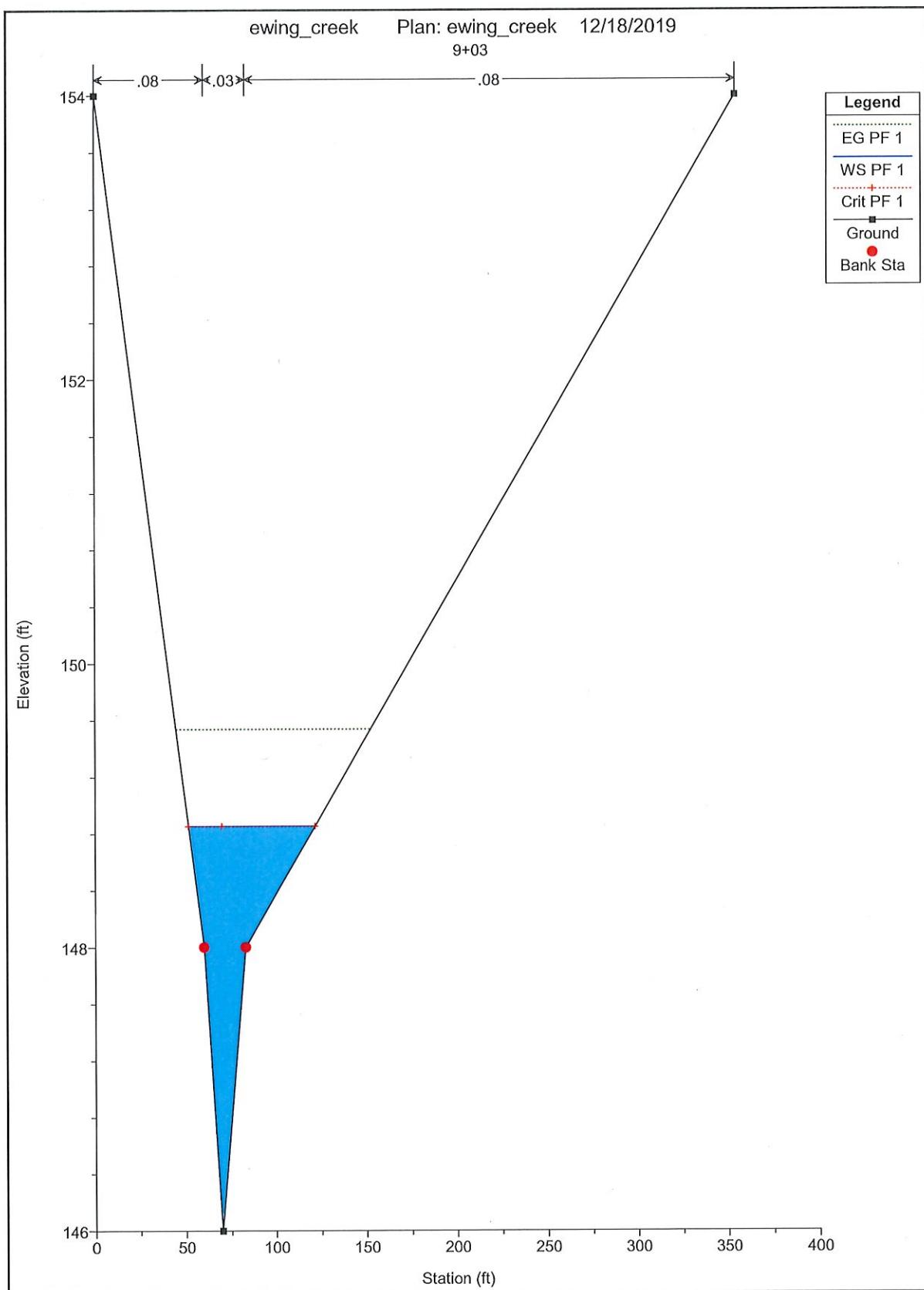


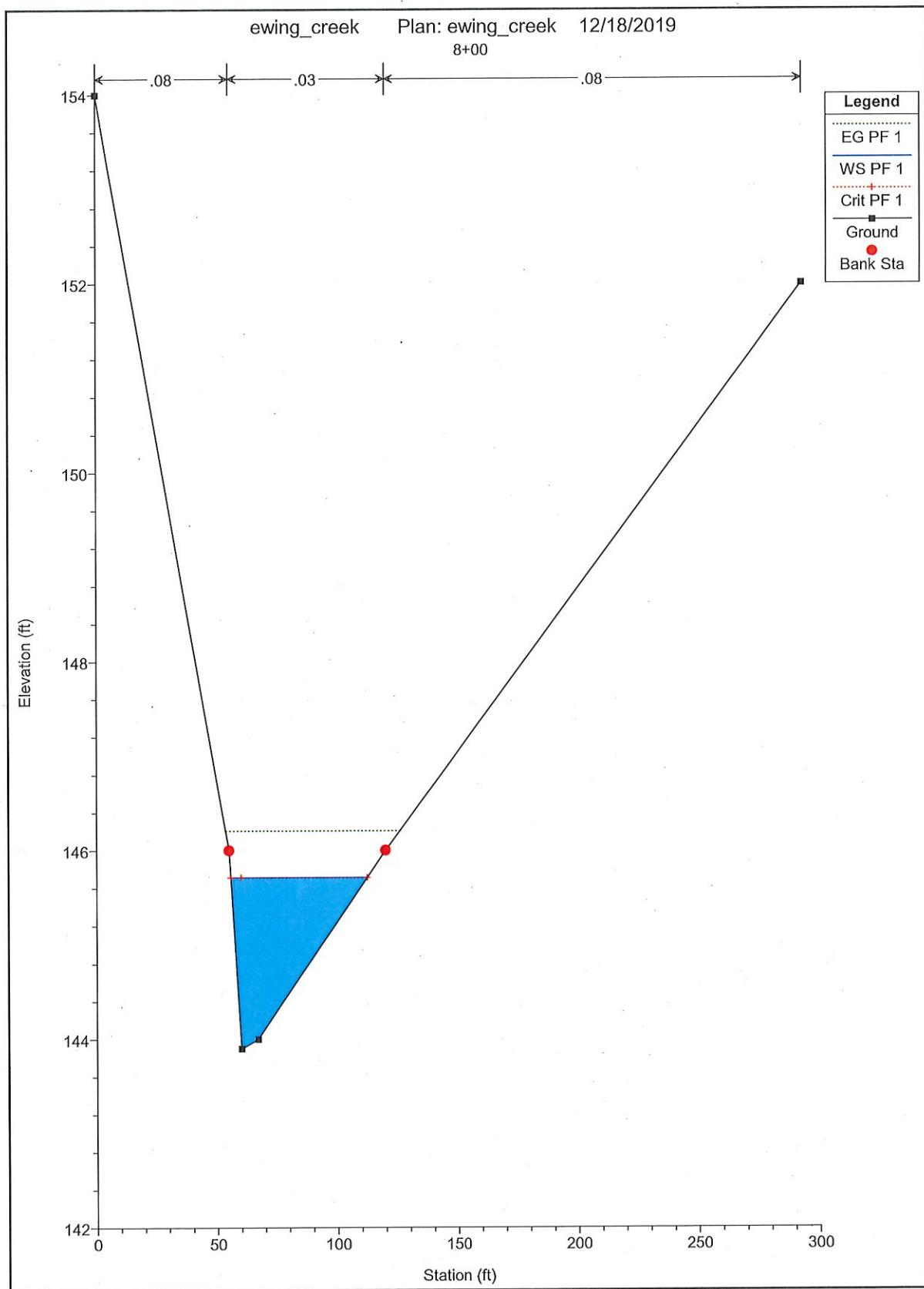


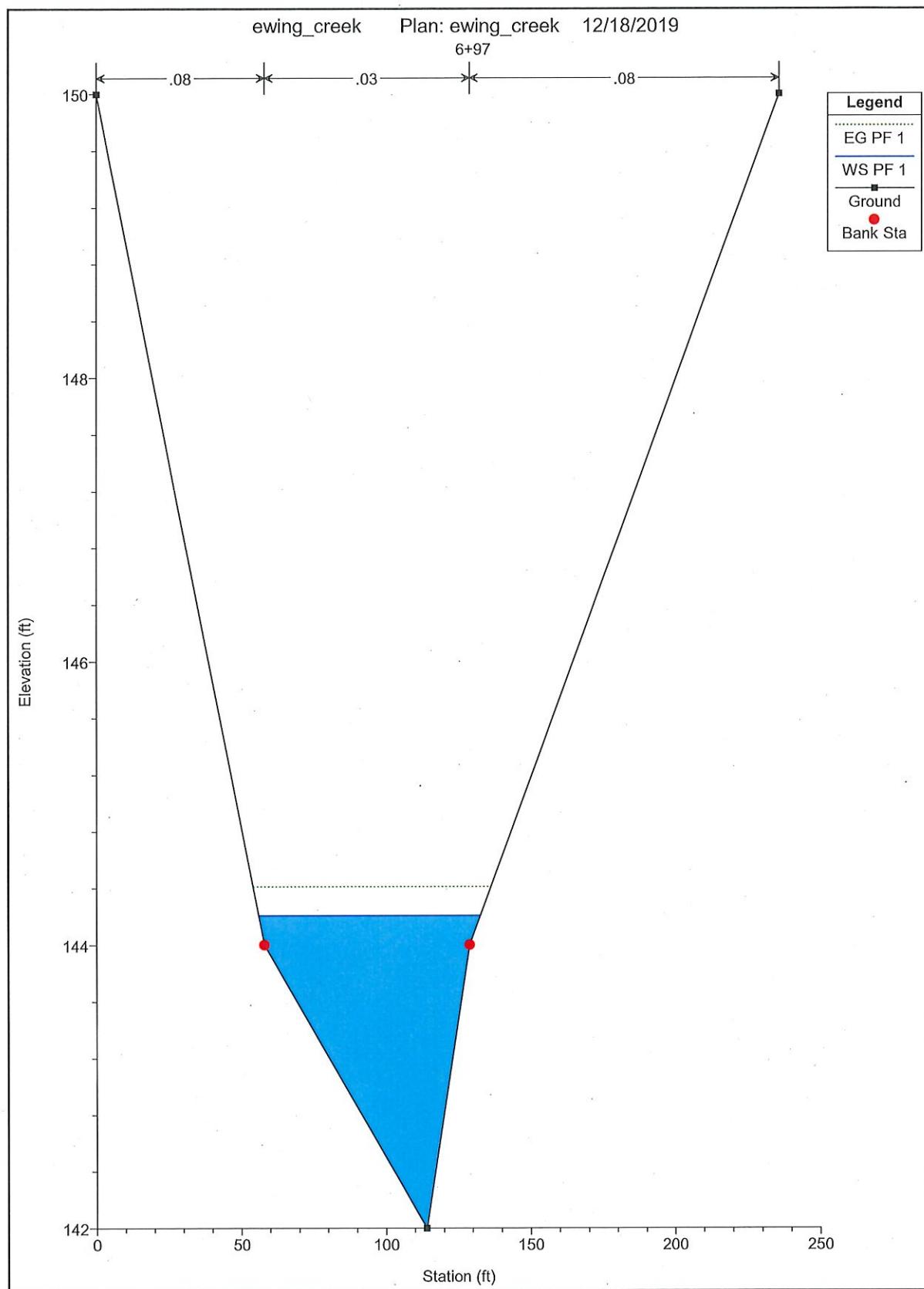


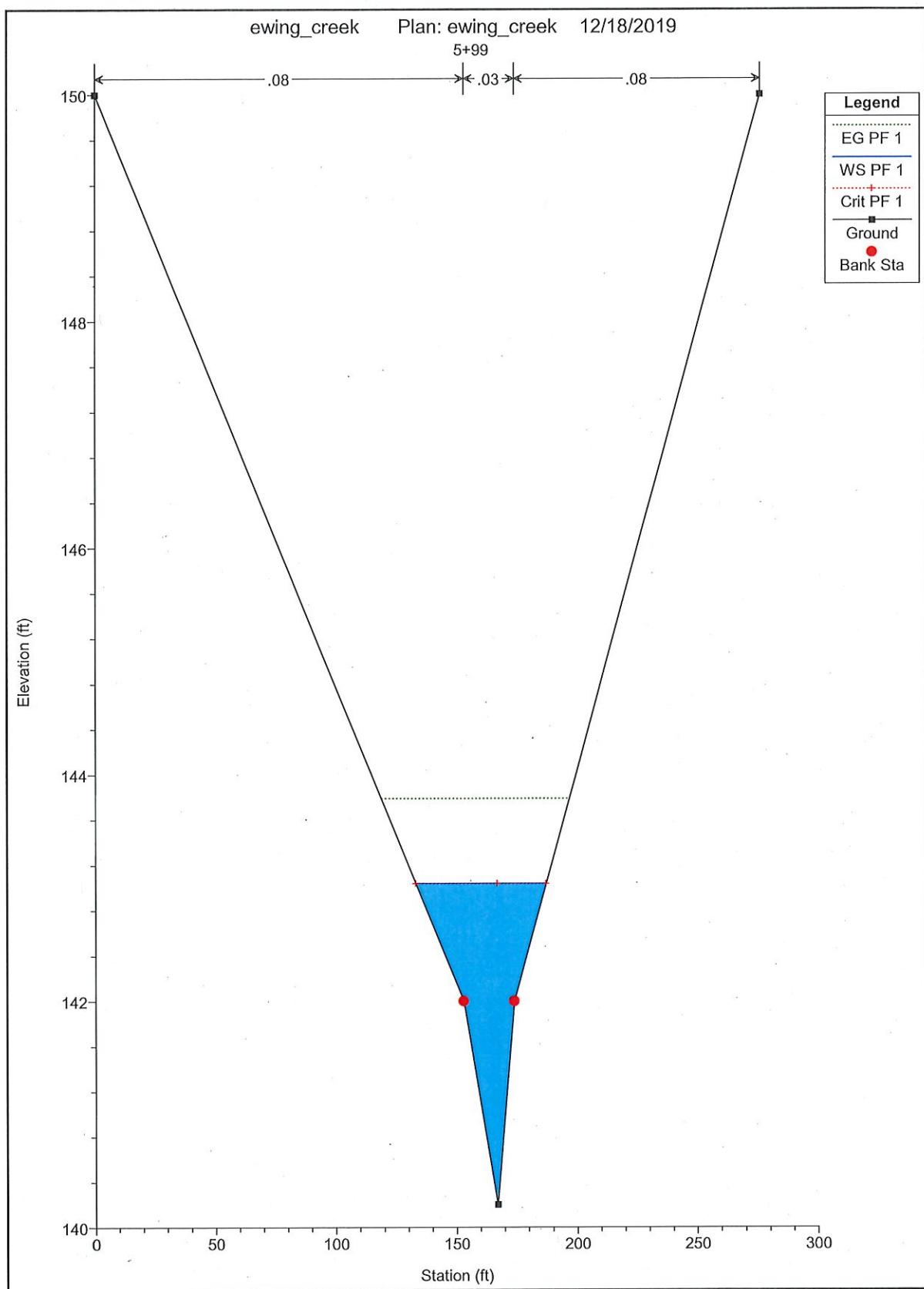


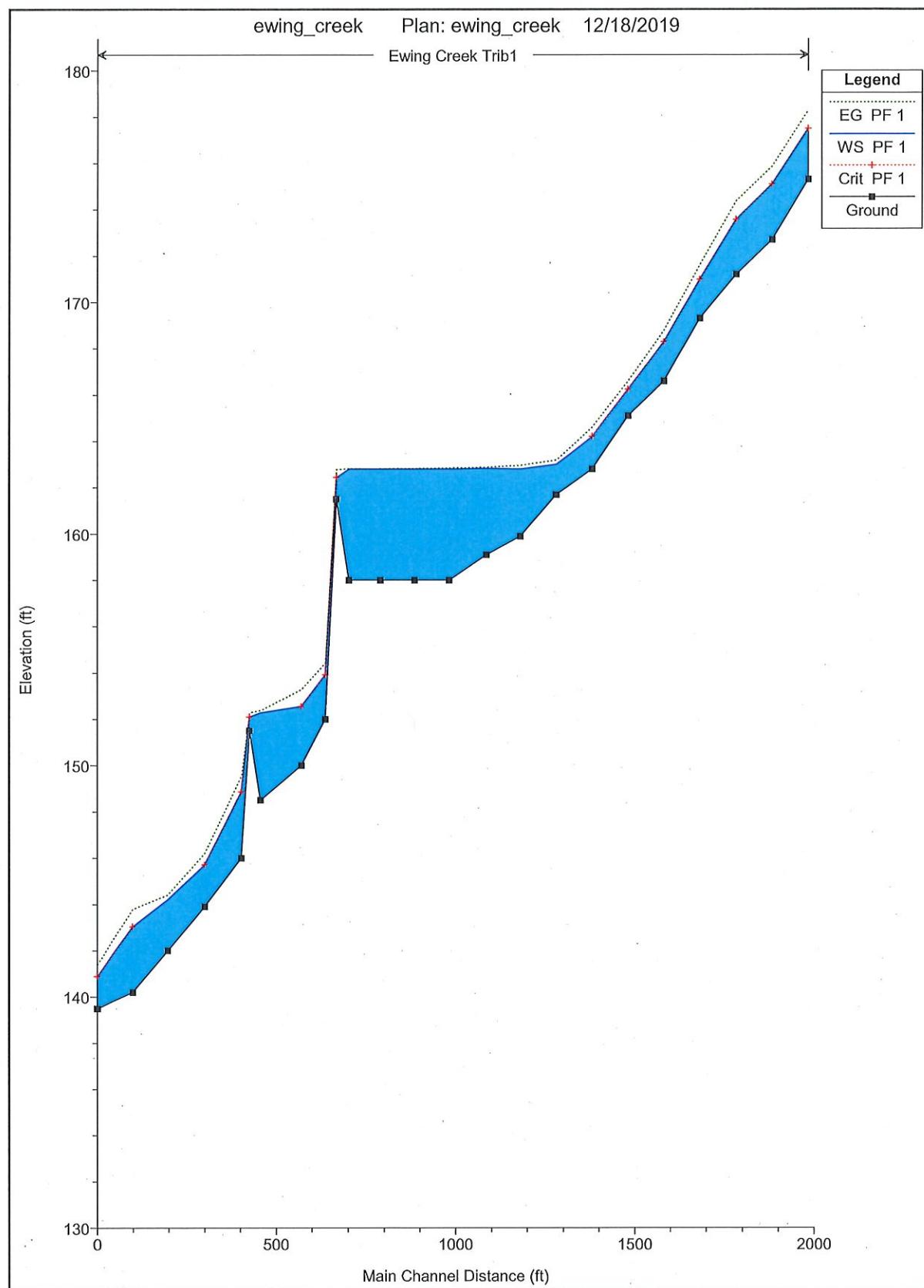












HEC-RAS Plan: Plan 01 River: Woolsey Creek Reach: Trib1 Profile: FHE

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Trib1	1616	FHE	204.03	187.60	189.47		189.58	0.001695	2.87	110.08	103.74	0.39
Trib1	1517	FHE	204.03	187.60	188.77	188.77	189.19	0.012255	5.39	48.86	71.62	0.96
Trib1	1417	FHE	204.03	186.70	188.08		188.24	0.006527	3.25	62.97	88.97	0.67
Trib1	1316	FHE	204.03	185.80	186.91	186.91	187.35	0.012360	5.54	49.08	67.59	0.97
Trib1	1209	FHE	204.03	184.10	185.49	185.44	185.79	0.013085	4.43	46.01	66.39	0.94
Trib1	1112	FHE	204.03	182.40	183.92	183.92	184.30	0.014688	4.98	40.94	54.01	1.01
Trib1	1007	FHE	204.03	179.70	181.20	181.20	181.80	0.011338	6.43	39.30	38.16	0.98
Trib1	901	FHE	204.03	178.20	179.89	179.89	180.32	0.014248	5.27	38.73	45.92	1.01
Trib1	804	FHE	204.03	176.30	178.09	178.09	178.57	0.013856	5.57	36.80	43.59	1.01
Trib1	704	FHE	204.03	173.80	174.80	174.80	175.22	0.013251	5.30	44.56	60.53	0.99
Trib1	603	FHE	204.03	171.20	172.37	172.37	172.72	0.013584	4.85	49.54	81.33	0.97
Trib1	500	FHE	204.03	169.20	170.45	170.45	170.86	0.013526	5.16	42.15	59.84	0.99

HEC-RAS HEC-RAS 5.0.0 February 2016
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

X	X	XXXXXX	XXXX	XXXX	XX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
XXXXXX	XXXX	X	XXX	XXXX	XXXXXX	XXXX
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	XXXXXX	XXXX	X	X	XXXX

PROJECT DATA

Project Title: WoolseyCreek

Project File : WoolseyCreek.prj

Run Date and Time: 11/21/2019 4:39:14 PM

Project in English units

PLAN DATA

Plan Title: Plan 01

Plan File : v:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley - Hopewell Township\Admin\Reports\FHA\WoolseyCreek.p01

Geometry Title: trib 1

Geometry File : v:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley - Hopewell Township\Admin\Reports\FHA\WoolseyCreek.g01

Flow Title : Flow 01

Flow File : v:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley - Hopewell Township\Admin\Reports\FHA\WoolseyCreek.f01

Plan Summary Information:

Number of:	Cross Sections	=	12	Multiple Openings	=	0
	Culverts	=	0	Inline Structures	=	0
	Bridges	=	0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Flow 01

Flow File : v:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley - Hopewell Township\Admin\Reports\FHA\WoolseyCreek.f01

Flow Data (cfs)

River	Reach	RS	FHE
Woolsey Creek	Trib1	1616	204.03

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
Woolsey Creek	Trib1	FHE	
	Critical		

GEOMETRY DATA

Geometry Title: trib 1

Geometry File : v:\081077 - Deer Valley - Hopewell Township\081077-01-001 (ENG) - Deer Valley - Hopewell Township\Admin\Reports\FHA\WoolseyCreek.g01

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 1616

INPUT

Description: 16+16

Station	Elevation	Data	num=	7	Station	Elevation	Station	Elevation	Station	Elevation
0	194	101	190		142	188	154	187.6	178	188
229	190	267	194							

Manning's n Values

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08		142	.03		178	.08	

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	142	178		105	99	98		.1	.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	189.58	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.11	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	189.47	Reach Len. (ft)	105.00	99.00
98.00				
Crit W.S. (ft)		Flow Area (sq ft)	22.23	60.21
27.65				
E.G. Slope (ft/ft)	0.001695	Area (sq ft)	22.23	60.21
27.65				
Q Total (cfs)	204.03	Flow (cfs)	13.85	172.96
17.23				
Top Width (ft)	103.74	Top Width (ft)	30.19	36.00
37.55				
Vel Total (ft/s)	1.85	Avg. Vel. (ft/s)	0.62	2.87
0.62				
Max Chl Dpth (ft)	1.87	Hydr. Depth (ft)	0.74	1.67
0.74				
Conv. Total (cfs)	4956.2	Conv. (cfs)	336.3	4201.3
418.5				
Length Wtd. (ft)	99.24	Wetted Per. (ft)	30.22	36.01
37.58				
Min Ch El (ft)	187.60	Shear (lb/sq ft)	0.08	0.18
0.08				
Alpha	2.05	Stream Power (lb/ft s)	0.05	0.51
0.05				
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	0.07	1.05
0.11				
C & E Loss (ft)	0.03	Cum SA (acres)	0.15	1.21
0.24				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 1517

INPUT

Description: 15+17

Station	Elevation	Data	num=	7	Station	Elevation	Station	Elevation	Station	Elevation
0	194	101	190	142	188	154	187.6	178	188	
229	190	267	194							

Manning's n Values

num=

3

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08		142	.03		178	.08	

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	142	178		98	100	89		.1	.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	189.19	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.42	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	188.77	Reach Len. (ft)	98.00	100.00
89.00				
Crit W.S. (ft)	188.77	Flow Area (sq ft)	6.15	35.07
7.64				
E.G. Slope (ft/ft)	0.012255	Area (sq ft)	6.15	35.07
7.64				
Q Total (cfs)	204.03	Flow (cfs)	6.71	188.98
8.35				
Top Width (ft)	71.62	Top Width (ft)	15.87	36.00
19.74				
Vel Total (ft/s)	4.18	Avg. Vel. (ft/s)	1.09	5.39
1.09				
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)	0.39	0.97
0.39				
Conv. Total (cfs)	1843.0	Conv. (cfs)	60.6	1707.1
75.4				

Length Wtd. (ft)	99.74	Wetted Per. (ft)	15.89	36.01
19.76				
Min Ch El (ft)	187.60	Shear (lb/sq ft)	0.30	0.75
0.30				
Alpha	1.55	Stream Power (lb/ft s)	0.32	4.02
0.32				
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.04	0.94
0.07				
C & E Loss (ft)	0.08	Cum SA (acres)	0.10	1.13
0.17				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 1417

INPUT

Description: 14+17

Station	Elevation								
0	194	142	188	173	186.7	228	188	306	194

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	142	.03	228	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	142	228		95	100	95		.1	.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	188.24	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.16	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	188.08	Reach Len. (ft)	95.00	100.00
95.00				

Crit W.S. (ft)		Flow Area (sq ft)	0.08	62.86
0.04				
E.G. Slope (ft/ft)	0.006527	Area (sq ft)	0.08	62.86
0.04				
Q Total (cfs)	204.03	Flow (cfs)	0.01	204.01
0.01				
Top Width (ft)	88.97	Top Width (ft)	1.91	86.00
1.05				
Vel Total (ft/s)	3.24	Avg. Vel. (ft/s)	0.18	3.25
0.18				
Max Chl Dpth (ft)	1.38	Hydr. Depth (ft)	0.04	0.73
0.04				
Conv. Total (cfs)	2525.5	Conv. (cfs)	0.2	2525.2
0.1				
Length Wtd. (ft)	99.76	Wetted Per. (ft)	1.92	86.04
1.05				
Min Ch El (ft)	186.70	Shear (lb/sq ft)	0.02	0.30
0.02				
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.97
0.00				
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.03	0.83
0.06				
C & E Loss (ft)	0.03	Cum SA (acres)	0.08	0.99
0.15				

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 1316

INPUT

Description: 13+16

Station	Elevation	Data	num=	8			
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	192	45	190	109	188	131	186
164	186	218	188	271	192		146

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	131	.03	164	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	131	164		102	107	65		.1	.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	187.35	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.43	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	186.91	Reach Len. (ft)	102.00	107.00
65.00				
Crit W.S. (ft)	186.91	Flow Area (sq ft)	4.56	33.34
11.19				
E.G. Slope (ft/ft)	0.012360	Area (sq ft)	4.56	33.34
11.19				
Q Total (cfs)	204.03	Flow (cfs)	5.55	184.82
13.66				
Top Width (ft)	67.59	Top Width (ft)	10.01	33.00
24.58				
Vel Total (ft/s)	4.16	Avg. Vel. (ft/s)	1.22	5.54
1.22				
Max Chl Dpth (ft)	1.11	Hydr. Depth (ft)	0.46	1.01
0.46				
Conv. Total (cfs)	1835.2	Conv. (cfs)	49.9	1662.4
122.9				
Length Wtd. (ft)	105.53	Wetted Per. (ft)	10.05	33.00
24.59				
Min Ch El (ft)	185.80	Shear (lb/sq ft)	0.35	0.78
0.35				
Alpha	1.62	Stream Power (lb/ft s)	0.43	4.32
0.43				
Frcrn Loss (ft)	1.34	Cum Volume (acre-ft)	0.02	0.72
0.05				
C & E Loss (ft)	0.04	Cum SA (acres)	0.06	0.85
0.12				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is
not a valid subcritical answer. The
program defaulted to critical depth.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 1209

INPUT

Description: 12+09

Station		Elevation		Data		num=		6	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	192	115	188	143	186	179	184.1	234	186
360	192								

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.08	143	.03	234	.08

Bank Sta:		Left	Right	Lengths:		Left	Channel	Right	Coeff	Contr.	Expan.
		143	234			100	107	55	.1		.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	185.79	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.31	Wt. n-Val.		0.030
W.S. Elev (ft)	185.49	Reach Len. (ft)	100.00	107.00
55.00				
Crit W.S. (ft)	185.44	Flow Area (sq ft)		46.01
E.G. Slope (ft/ft)	0.013085	Area (sq ft)		46.01
Q Total (cfs)	204.03	Flow (cfs)		204.03
Top Width (ft)	66.39	Top Width (ft)		66.39
Vel Total (ft/s)	4.43	Avg. Vel. (ft/s)		4.43
Max Chl Dpth (ft)	1.39	Hydr. Depth (ft)		0.69
Conv. Total (cfs)	1783.6	Conv. (cfs)		1783.6
Length Wtd. (ft)	107.00	Wetted Per. (ft)		66.45
Min Ch El (ft)	184.10	Shear (lb/sq ft)		0.57
Alpha	1.00	Stream Power (lb/ft s)		2.51
Frctn Loss (ft)	1.48	Cum Volume (acre-ft)	0.02	0.62
0.04				
C & E Loss (ft)	0.01	Cum SA (acres)	0.05	0.73
0.10				

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 1112

INPUT

Description: 11+12

Station	Elevation	Data	num=	6					
Sta 0	Elev 190	Sta 75	Elev 186	Sta 124	Elev 184	Sta 139	Elev 182.4	Sta 181	Elev 184
330	190								

Manning's n Values

num=

3

Sta 0	n Val .08	Sta 124	n Val .03	Sta 181	n Val .08
-------	-----------	---------	-----------	---------	-----------

Bank Sta: 124	Left 181	Right	Lengths: 95	Channel 97	Right 78	Coeff .1	Contr. .1	Expan. .3
---------------	----------	-------	-------------	------------	----------	----------	-----------	-----------

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	184.30	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.39	Wt. n-Val.		0.030
W.S. Elev (ft)	183.92	Reach Len. (ft)	95.00	97.00
78.00				
Crit W.S. (ft)	183.92	Flow Area (sq ft)		40.94
E.G. Slope (ft/ft)	0.014688	Area (sq ft)		40.94
Q Total (cfs)	204.03	Flow (cfs)		204.03
Top Width (ft)	54.01	Top Width (ft)		54.01
Vel Total (ft/s)	4.98	Avg. Vel. (ft/s)		4.98
Max Chl Dpth (ft)	1.52	Hydr. Depth (ft)		0.76
Conv. Total (cfs)	1683.5	Conv. (cfs)		1683.5
Length Wtd. (ft)	96.64	Wetted Per. (ft)		54.12

Min Ch El (ft)	182.40	Shear (lb/sq ft)	0.69
Alpha	1.00	Stream Power (lb/ft s)	3.46
Frctn Loss (ft) 0.04	1.24	Cum Volume (acre-ft)	0.02
C & E Loss (ft) 0.10	0.02	Cum SA (acres)	0.05

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 1007

INPUT

Description: 10+07

Station	Elevation	Data	num=	8					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	188	80	186	112	184	138	180	152	179.7
160	180	174	182	348	188				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	138	.03	160	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	138	160		60	106	92	.1		.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	181.80	Element	Left OB	Channel
Right OB				
Vel Head (ft) 0.080	0.60	Wt. n-Val.	0.080	0.030

W.S. Elev (ft)	181.20	Reach Len. (ft)	60.00	106.00
92.00				
Crit W.S. (ft)	181.20	Flow Area (sq ft)	4.66	29.63
5.01				
E.G. Slope (ft/ft)	0.011338	Area (sq ft)	4.66	29.63
5.01				
Q Total (cfs)	204.03	Flow (cfs)	6.49	190.55
6.99				
Top Width (ft)	38.16	Top Width (ft)	7.78	22.00
8.38				
Vel Total (ft/s)	5.19	Avg. Vel. (ft/s)	1.39	6.43
1.40				
Max Chl Dpth (ft)	1.50	Hydr. Depth (ft)	0.60	1.35
0.60				
Conv. Total (cfs)	1916.2	Conv. (cfs)	60.9	1789.5
65.7				
Length Wtd. (ft)	105.03	Wetted Per. (ft)	7.87	22.01
8.46				
Min Ch El (ft)	179.70	Shear (lb/sq ft)	0.42	0.95
0.42				
Alpha	1.44	Stream Power (lb/ft s)	0.58	6.13
0.58				
Frctn Loss (ft)	1.33	Cum Volume (acre-ft)	0.01	0.44
0.04				
C & E Loss (ft)	0.05	Cum SA (acres)	0.04	0.50
0.10				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is
not a valid subcritical answer. The
program defaulted to critical depth.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 901

INPUT

Description: 9+01

Station Elevation Data num= 5

Sta 0	Elev 186	Sta 101	Elev 180	Sta 132	Elev 178.2	Sta 150	Elev 180	Sta 253	Elev 188
Manning's n Values		num= 3							
Sta 0	n Val .08	Sta 101	n Val .03	Sta 150	n Val .08				
Bank Sta: Left 101 Right 150		Lengths: Left 60 Channel 106		Right 92		Coeff .1	Contr. .3	Expan. .3	

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	180.32	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.43	Wt. n-Val.		0.030
W.S. Elev (ft)	179.89	Reach Len. (ft)	60.00	106.00
92.00				
Crit W.S. (ft)	179.89	Flow Area (sq ft)		38.73
E.G. Slope (ft/ft)	0.014248	Area (sq ft)		38.73
Q Total (cfs)	204.03	Flow (cfs)		204.03
Top Width (ft)	45.92	Top Width (ft)		45.92
Vel Total (ft/s)	5.27	Avg. Vel. (ft/s)		5.27
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)		0.84
Conv. Total (cfs)	1709.3	Conv. (cfs)		1709.3
Length Wtd. (ft)	105.99	Wetted Per. (ft)		46.05
Min Ch El (ft)	178.20	Shear (lb/sq ft)		0.75
Alpha	1.00	Stream Power (lb/ft s)		3.94
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)	0.01	0.36
0.03				
C & E Loss (ft)	0.01	Cum SA (acres)	0.04	0.42
0.09				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and

previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1 RS: 804

INPUT

Description: 8+04

Station	Elevation	Data	num=	6	Sta	Elev	Sta	Elev	Sta	Elev
0	186				142	178	160	176.3	181	178
269	186									

Manning's	n	Values	num=	3	Sta	n	Val	Sta	n	Val
0	.08				142	.03		181	.08	

Bank	Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
		142	181		85	97	100		.1	.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	178.57	Element	Left	OB	Channel
Right OB					
Vel Head (ft)	0.48	Wt. n-Val.	0.080		0.030
0.080					
W.S. Elev (ft)	178.09	Reach Len. (ft)	85.00		97.00
100.00					
Crit W.S. (ft)	178.09	Flow Area (sq ft)	0.16		36.59
0.04					
E.G. Slope (ft/ft)	0.013856	Area (sq ft)	0.16		36.59
0.04					
Q Total (cfs)	204.03	Flow (cfs)	0.04		203.97
0.01					
Top Width (ft)	43.59	Top Width (ft)	3.62		39.00
0.97					
Vel Total (ft/s)	5.54	Avg. Vel. (ft/s)	0.27		5.57
0.27					
Max Chl Dpth (ft)	1.79	Hydr. Depth (ft)	0.04		0.94
0.04					
Conv. Total (cfs)	1733.3	Conv. (cfs)	0.4		1732.9

0.1				
Length Wtd. (ft)	96.88	Wetted Per. (ft)	3.62	39.15
0.98				
Min Ch El (ft)	176.30	Shear (lb/sq ft)	0.04	0.81
0.04				
Alpha	1.01	Stream Power (lb/ft s)	0.01	4.51
0.01				
Frcnt Loss (ft)	1.31	Cum Volume (acre-ft)	0.01	0.26
0.03				
C & E Loss (ft)	0.02	Cum SA (acres)	0.04	0.31
0.09				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is
not a valid subcritical answer. The
program defaulted to critical depth.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 704

INPUT

Description: 7+04

Station	Elevation	Data	num=	7	Sta	Elev	Sta	Elev	Sta	Elev
0	184	115	176	142	174	160	173.8	183	174	
205	176	266	184							

Manning's n Values

num=

3

Sta	n	Val	Sta	n	Val	Sta	n	Val
0	.08	142	.03	183	.08			

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	142	183		88	100	112		.1	.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	175.22	Element	Left OB	Channel
----------------	--------	---------	---------	---------

Right OB				
Vel Head (ft)	0.42	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	174.80	Reach Len. (ft)	88.00	100.00
112.00				
Crit W.S. (ft)	174.80	Flow Area (sq ft)	4.29	36.78
3.49				
E.G. Slope (ft/ft)	0.013251	Area (sq ft)	4.29	36.78
3.49				
Q Total (cfs)	204.03	Flow (cfs)	4.96	195.04
4.03				
Top Width (ft)	60.53	Top Width (ft)	10.76	41.00
8.77				
Vel Total (ft/s)	4.58	Avg. Vel. (ft/s)	1.16	5.30
1.15				
Max Chl Dpth (ft)	1.00	Hydr. Depth (ft)	0.40	0.90
0.40				
Conv. Total (cfs)	1772.4	Conv. (cfs)	43.1	1694.3
35.0				
Length Wtd. (ft)	100.22	Wetted Per. (ft)	10.79	41.00
8.80				
Min Ch El (ft)	173.80	Shear (lb/sq ft)	0.33	0.74
0.33				
Alpha	1.29	Stream Power (lb/ft s)	0.38	3.94
0.38				
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	0.01	0.18
0.03				
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	0.22
0.08				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1

RS: 603

INPUT

Description: 6+03

Station	Elevation								
0	182	140	172	165	171.2	192	172	214	172
272	182								

Manning's n Values

Station	n Val	Station	n Val	Station	n Val
0	.08	140	.03	192	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	140	192		46	103	92		.1	.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	172.72	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.35	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	172.37	Reach Len. (ft)	46.00	103.00
92.00				
Crit W.S. (ft)	172.37	Flow Area (sq ft)	0.96	40.04
8.54				
E.G. Slope (ft/ft)	0.013584	Area (sq ft)	0.96	40.04
8.54				
Q Total (cfs)	204.03	Flow (cfs)	0.67	194.12
9.23				
Top Width (ft)	81.33	Top Width (ft)	5.18	52.00
24.15				
Vel Total (ft/s)	4.12	Avg. Vel. (ft/s)	0.70	4.85
1.08				
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)	0.19	0.77
0.35				
Conv. Total (cfs)	1750.6	Conv. (cfs)	5.8	1665.6
79.2				
Length Wtd. (ft)	102.47	Wetted Per. (ft)	5.19	52.02
24.18				
Min Ch El (ft)	171.20	Shear (lb/sq ft)	0.16	0.65
0.30				
Alpha	1.32	Stream Power (lb/ft s)	0.11	3.16
0.32				
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	0.00	0.09
0.01				
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.12
0.03				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Woolsey Creek

REACH: Trib1 RS: 500

INPUT

Description: 5+00

Station	Elevation	Data	num=	6					
Sta 0	Elev 182	Sta 160	Elev 170	Sta 182	Elev 169.2	Sta 206	Elev 170	Sta 241	Elev 172
311	182								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	160	.03	206	.08

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	160	206		45	103	94		.1	.3

CROSS SECTION OUTPUT Profile #FHE

E.G. Elev (ft)	170.86	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.41	Wt. n-Val.	0.080	0.030
0.080				
W.S. Elev (ft)	170.45	Reach Len. (ft)		
Crit W.S. (ft)	170.45	Flow Area (sq ft)	1.34	39.05
1.76				
E.G. Slope (ft/ft)	0.013526	Area (sq ft)	1.34	39.05
1.76				
Q Total (cfs)	204.03	Flow (cfs)	1.07	201.56
1.40				
Top Width (ft)	59.84	Top Width (ft)	5.98	46.00
7.85				
Vel Total (ft/s)	4.84	Avg. Vel. (ft/s)	0.80	5.16

0.80				
Max Chl Dpth (ft)	1.25	Hydr. Depth (ft)	0.22	0.85
0.22				
Conv. Total (cfs)	1754.3	Conv. (cfs)	9.2	1733.0
12.1				
Length Wtd. (ft)		Wetted Per. (ft)	6.00	46.03
7.87				
Min Ch El (ft)	169.20	Shear (lb/sq ft)	0.19	0.72
0.19				
Alpha	1.12	Stream Power (lb/ft s)	0.15	3.70
0.15				
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

SUMMARY OF MANNING'S N VALUES

River: Woolsey Creek

Reach	River Sta.	n1	n2	n3
Trib1	1616	.08	.03	.08
Trib1	1517	.08	.03	.08
Trib1	1417	.08	.03	.08
Trib1	1316	.08	.03	.08
Trib1	1209	.08	.03	.08
Trib1	1112	.08	.03	.08
Trib1	1007	.08	.03	.08
Trib1	901	.08	.03	.08
Trib1	804	.08	.03	.08
Trib1	704	.08	.03	.08
Trib1	603	.08	.03	.08
Trib1	500	.08	.03	.08

SUMMARY OF REACH LENGTHS

River: Woolsey Creek

Reach	River Sta.	Left	Channel	Right
Trib1	1616	105	99	98
Trib1	1517	98	100	89

Trib1	1417	95	100	95
Trib1	1316	102	107	65
Trib1	1209	100	107	55
Trib1	1112	95	97	78
Trib1	1007	60	106	92
Trib1	901	60	106	92
Trib1	804	85	97	100
Trib1	704	88	100	112
Trib1	603	46	103	92
Trib1	500	45	103	94

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Woolsey Creek

Reach	River Sta.	Contr.	Expan.
Trib1	1616	.1	.3
Trib1	1517	.1	.3
Trib1	1417	.1	.3
Trib1	1316	.1	.3
Trib1	1209	.1	.3
Trib1	1112	.1	.3
Trib1	1007	.1	.3
Trib1	901	.1	.3
Trib1	804	.1	.3
Trib1	704	.1	.3
Trib1	603	.1	.3
Trib1	500	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.
E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	
(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	(ft)	(ft)
Trib1	1616	FHE	204.03	187.60	189.47	
189.58	0.001695	2.87	110.08	103.74	0.39	
Trib1	1517	FHE	204.03	187.60	188.77	188.77
189.19	0.012255	5.39	48.86	71.62	0.96	
Trib1	1417	FHE	204.03	186.70	188.08	
188.24	0.006527	3.25	62.97	88.97	0.67	
Trib1	1316	FHE	204.03	185.80	186.91	186.91

187.35	0.012360	5.54	49.08	67.59	0.97	
Trib1	1209	FHE	204.03	184.10	185.49	185.44
185.79	0.013085	4.43	46.01	66.39	0.94	
Trib1	1112	FHE	204.03	182.40	183.92	183.92
184.30	0.014688	4.98	40.94	54.01	1.01	
Trib1	1007	FHE	204.03	179.70	181.20	181.20
181.80	0.011338	6.43	39.30	38.16	0.98	
Trib1	901	FHE	204.03	178.20	179.89	179.89
180.32	0.014248	5.27	38.73	45.92	1.01	
Trib1	804	FHE	204.03	176.30	178.09	178.09
178.57	0.013856	5.57	36.80	43.59	1.01	
Trib1	704	FHE	204.03	173.80	174.80	174.80
175.22	0.013251	5.30	44.56	60.53	0.99	
Trib1	603	FHE	204.03	171.20	172.37	172.37
172.72	0.013584	4.85	49.54	81.33	0.97	
Trib1	500	FHE	204.03	169.20	170.45	170.45
170.86	0.013526	5.16	42.15	59.84	0.99	

Profile Output Table - Standard Table 2

Reach Loss (ft)	River Sta C & E Loss (ft)	River Sta Q Left (cfs)	Profile Q Channel (cfs)	E.G. Elev Q Right (ft) (cfs)	W.S. Elev Top Width (ft) (ft)	Vel Head (ft)	Frctn (ft)
Trib1 0.36	1616 0.03	13.85 172.96	FHE	189.58 17.23	189.47 103.74	0.11	
Trib1 0.87	1517 0.08	6.71 188.98	FHE	189.19 8.35	188.77 71.62	0.42	
Trib1 0.87	1417 0.03	0.01 204.01	FHE	188.24 0.01	188.08 88.97	0.16	
Trib1 1.34	1316 0.04	5.55 184.82	FHE	187.35 13.66	186.91 67.59	0.43	
Trib1 1.48	1209 0.01		FHE	185.79 13.66	185.49 67.59	0.31	
Trib1 1.24	1112 0.02		FHE	184.30 181.80	183.92 181.20	0.39	
Trib1 1.33	1007 0.05	6.49 190.55	FHE	181.80 6.99	181.20 38.16	0.60	
Trib1 1.49	901 0.01		FHE	180.32 180.32	179.89 45.92	0.43	
Trib1 1.31	804 0.02	0.04 203.97	FHE	178.57 0.01	178.09 43.59	0.48	
Trib1 1.34	704 0.02	4.96 195.04	FHE	175.22 4.03	174.80 60.53	0.42	
Trib1 603			FHE	172.72 172.72	172.37 172.37	0.35	

1.39	0.01	0.67	194.12	9.23	81.33	
Trib1	500		FHE	170.86	170.45	0.41
	1.07		201.56	1.40	59.84	

ERRORS WARNINGS AND NOTES

Errors Warnings and Notes for Plan : Plan 01

River: Woolsey Creek Reach: Trib1 RS: 1616 Profile: FHE

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

River: Woolsey Creek Reach: Trib1 RS: 1517 Profile: FHE

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Woolsey Creek Reach: Trib1 RS: 1316 Profile: FHE

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: Woolsey Creek Reach: Trib1 RS: 1209 Profile: FHE

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

River: Woolsey Creek Reach: Trib1 RS: 1112 Profile: FHE

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that

there is not a valid subcritical answer. The
program defaulted to critical depth.

River: Woolsey Creek Reach: Trib1 RS: 1007 Profile: FHE

Warning: The energy equation could not be balanced within the specified number
of iterations. The program used critical depth
for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current
and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was
set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that
there is not a valid subcritical answer. The
program defaulted to critical depth.

River: Woolsey Creek Reach: Trib1 RS: 901 Profile: FHE

Warning: The energy equation could not be balanced within the specified number
of iterations. The program used critical depth
for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current
and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was
set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that
there is not a valid subcritical answer. The
program defaulted to critical depth.

River: Woolsey Creek Reach: Trib1 RS: 804 Profile: FHE

Warning: The energy equation could not be balanced within the specified number
of iterations. The program used critical depth
for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current
and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was
set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that
there is not a valid subcritical answer. The
program defaulted to critical depth.

River: Woolsey Creek Reach: Trib1 RS: 704 Profile: FHE

Warning: The energy equation could not be balanced within the specified number
of iterations. The program used critical depth
for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current
and previous cross section. This may indicate
the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was
set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that
there is not a valid subcritical answer. The
program defaulted to critical depth.

River: Woolsey Creek Reach: Trib1 RS: 603 Profile: FHE

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Plan: Plan 01 Woolsey Creek Trib1 RS: 1616 Profile: FHE

E.G. Elev (ft)	189.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.080	0.030	0.080
W.S. Elev (ft)	189.47	Reach Len. (ft)	105.00	99.00	98.00
Crit W.S. (ft)		Flow Area (sq ft)	22.23	60.21	27.65
E.G. Slope (ft/ft)	0.001695	Area (sq ft)	22.23	60.21	27.65
Q Total (cfs)	204.03	Flow (cfs)	13.85	172.96	17.23
Top Width (ft)	103.74	Top Width (ft)	30.19	36.00	37.55
Vel Total (ft/s)	1.85	Avg. Vel. (ft/s)	0.62	2.87	0.62
Max Chl Dpth (ft)	1.87	Hydr. Depth (ft)	0.74	1.67	0.74
Conv. Total (cfs)	4956.2	Conv. (cfs)	336.3	4201.3	418.5
Length Wtd. (ft)	99.24	Wetted Per. (ft)	30.22	36.01	37.58
Min Ch El (ft)	187.60	Shear (lb/sq ft)	0.08	0.18	0.08
Alpha	2.05	Stream Power (lb/ft s)	0.05	0.51	0.05
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	0.07	1.05	0.11
C & E Loss (ft)	0.03	Cum SA (acres)	0.15	1.21	0.24

Plan: Plan 01 Woolsey Creek Trib1 RS: 1517 Profile: FHE

E.G. Elev (ft)	189.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.42	Wt. n-Val.	0.080	0.030	0.080
W.S. Elev (ft)	188.77	Reach Len. (ft)	98.00	100.00	89.00
Crit W.S. (ft)	188.77	Flow Area (sq ft)	6.15	35.07	7.64
E.G. Slope (ft/ft)	0.012255	Area (sq ft)	6.15	35.07	7.64
Q Total (cfs)	204.03	Flow (cfs)	6.71	188.98	8.35
Top Width (ft)	71.62	Top Width (ft)	15.87	36.00	19.74
Vel Total (ft/s)	4.18	Avg. Vel. (ft/s)	1.09	5.39	1.09
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)	0.39	0.97	0.39
Conv. Total (cfs)	1843.0	Conv. (cfs)	60.6	1707.1	75.4
Length Wtd. (ft)	99.74	Wetted Per. (ft)	15.89	36.01	19.76
Min Ch El (ft)	187.60	Shear (lb/sq ft)	0.30	0.75	0.30
Alpha	1.55	Stream Power (lb/ft s)	0.32	4.02	0.32
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.04	0.94	0.07
C & E Loss (ft)	0.08	Cum SA (acres)	0.10	1.13	0.17

Plan: Plan 01 Woolsey Creek Trib1 RS: 1417 Profile: FHE

E.G. Elev (ft)	188.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.080	0.030	0.080
W.S. Elev (ft)	188.08	Reach Len. (ft)	95.00	100.00	95.00
Crit W.S. (ft)		Flow Area (sq ft)	0.08	62.86	0.04
E.G. Slope (ft/ft)	0.006527	Area (sq ft)	0.08	62.86	0.04
Q Total (cfs)	204.03	Flow (cfs)	0.01	204.01	0.01
Top Width (ft)	88.97	Top Width (ft)	1.91	86.00	1.05
Vel Total (ft/s)	3.24	Avg. Vel. (ft/s)	0.18	3.25	0.18
Max Chl Dpth (ft)	1.38	Hydr. Depth (ft)	0.04	0.73	0.04
Conv. Total (cfs)	2525.5	Conv. (cfs)	0.2	2525.2	0.1
Length Wtd. (ft)	99.76	Wetted Per. (ft)	1.92	86.04	1.05
Min Ch El (ft)	186.70	Shear (lb/sq ft)	0.02	0.30	0.02
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.97	0.00
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.03	0.83	0.06
C & E Loss (ft)	0.03	Cum SA (acres)	0.08	0.99	0.15

Plan: Plan 01 Woolsey Creek Trib1 RS: 1316 Profile: FHE

E.G. Elev (ft)	187.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.	0.080	0.030	0.080
W.S. Elev (ft)	186.91	Reach Len. (ft)	102.00	107.00	65.00
Crit W.S. (ft)	186.91	Flow Area (sq ft)	4.56	33.34	11.19
E.G. Slope (ft/ft)	0.012360	Area (sq ft)	4.56	33.34	11.19
Q Total (cfs)	204.03	Flow (cfs)	5.55	184.82	13.66
Top Width (ft)	67.59	Top Width (ft)	10.01	33.00	24.58
Vel Total (ft/s)	4.16	Avg. Vel. (ft/s)	1.22	5.54	1.22
Max Chl Dpth (ft)	1.11	Hydr. Depth (ft)	0.46	1.01	0.46
Conv. Total (cfs)	1835.2	Conv. (cfs)	49.9	1662.4	122.9
Length Wtd. (ft)	105.53	Wetted Per. (ft)	10.05	33.00	24.59
Min Ch El (ft)	185.80	Shear (lb/sq ft)	0.35	0.78	0.35
Alpha	1.62	Stream Power (lb/ft s)	0.43	4.32	0.43
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	0.02	0.72	0.05
C & E Loss (ft)	0.04	Cum SA (acres)	0.06	0.85	0.12

Plan: Plan 01 Woolsey Creek Trib1 RS: 1209 Profile: FHE

E.G. Elev (ft)	185.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.030	
W.S. Elev (ft)	185.49	Reach Len. (ft)	100.00	107.00	55.00
Crit W.S. (ft)	185.44	Flow Area (sq ft)		46.01	
E.G. Slope (ft/ft)	0.013085	Area (sq ft)		46.01	
Q Total (cfs)	204.03	Flow (cfs)		204.03	
Top Width (ft)	66.39	Top Width (ft)		66.39	
Vel Total (ft/s)	4.43	Avg. Vel. (ft/s)		4.43	
Max Chl Dpth (ft)	1.39	Hydr. Depth (ft)		0.69	
Conv. Total (cfs)	1783.6	Conv. (cfs)		1783.6	
Length Wtd. (ft)	107.00	Wetted Per. (ft)		66.45	
Min Ch El (ft)	184.10	Shear (lb/sq ft)		0.57	
Alpha	1.00	Stream Power (lb/ft s)		2.51	
Frctn Loss (ft)	1.48	Cum Volume (acre-ft)	0.02	0.62	0.04
C & E Loss (ft)	0.01	Cum SA (acres)	0.05	0.73	0.10

Plan: Plan 01 Woolsey Creek Trib1 RS: 1112 Profile: FHE

E.G. Elev (ft)	184.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.		0.030	
W.S. Elev (ft)	183.92	Reach Len. (ft)	95.00	97.00	78.00
Crit W.S. (ft)	183.92	Flow Area (sq ft)		40.94	
E.G. Slope (ft/ft)	0.014688	Area (sq ft)		40.94	
Q Total (cfs)	204.03	Flow (cfs)		204.03	
Top Width (ft)	54.01	Top Width (ft)		54.01	
Vel Total (ft/s)	4.98	Avg. Vel. (ft/s)		4.98	
Max Chl Dpth (ft)	1.52	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	1683.5	Conv. (cfs)		1683.5	
Length Wtd. (ft)	96.64	Wetted Per. (ft)		54.12	
Min Ch El (ft)	182.40	Shear (lb/sq ft)		0.69	
Alpha	1.00	Stream Power (lb/ft s)		3.46	
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	0.02	0.52	0.04
C & E Loss (ft)	0.02	Cum SA (acres)	0.05	0.58	0.10

Plan: Plan 01 Woolsey Creek Trib1 RS: 1007 Profile: FHE

E.G. Elev (ft)	181.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.	0.080	0.030	0.080
W.S. Elev (ft)	181.20	Reach Len. (ft)	60.00	106.00	92.00
Crit W.S. (ft)	181.20	Flow Area (sq ft)	4.66	29.63	5.01
E.G. Slope (ft/ft)	0.011338	Area (sq ft)	4.66	29.63	5.01
Q Total (cfs)	204.03	Flow (cfs)	6.49	190.55	6.99
Top Width (ft)	38.16	Top Width (ft)	7.78	22.00	8.38
Vel Total (ft/s)	5.19	Avg. Vel. (ft/s)	1.39	6.43	1.40
Max Chl Dpth (ft)	1.50	Hydr. Depth (ft)	0.60	1.35	0.60
Conv. Total (cfs)	1916.2	Conv. (cfs)	60.9	1789.5	65.7
Length Wtd. (ft)	105.03	Wetted Per. (ft)	7.87	22.01	8.46
Min Ch El (ft)	179.70	Shear (lb/sq ft)	0.42	0.95	0.42
Alpha	1.44	Stream Power (lb/ft s)	0.58	6.13	0.58
Frctn Loss (ft)	1.33	Cum Volume (acre-ft)	0.01	0.44	0.04
C & E Loss (ft)	0.05	Cum SA (acres)	0.04	0.50	0.10

Plan: Plan 01 Woolsey Creek Trib1 RS: 901 Profile: FHE

E.G. Elev (ft)	180.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.		0.030	
W.S. Elev (ft)	179.89	Reach Len. (ft)	60.00	106.00	92.00
Crit W.S. (ft)	179.89	Flow Area (sq ft)		38.73	
E.G. Slope (ft/ft)	0.014248	Area (sq ft)		38.73	
Q Total (cfs)	204.03	Flow (cfs)		204.03	
Top Width (ft)	45.92	Top Width (ft)		45.92	
Vel Total (ft/s)	5.27	Avg. Vel. (ft/s)		5.27	
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)		0.84	
Conv. Total (cfs)	1709.3	Conv. (cfs)		1709.3	
Length Wtd. (ft)	105.99	Wetted Per. (ft)		46.05	
Min Ch El (ft)	178.20	Shear (lb/sq ft)		0.75	
Alpha	1.00	Stream Power (lb/ft s)		3.94	
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)	0.01	0.36	0.03
C & E Loss (ft)	0.01	Cum SA (acres)	0.04	0.42	0.09

Plan: Plan 01 Woolsey Creek Trib1 RS: 804 Profile: FHE

E.G. Elev (ft)	178.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.	0.080	0.030	0.080
W.S. Elev (ft)	178.09	Reach Len. (ft)	85.00	97.00	100.00
Crit W.S. (ft)	178.09	Flow Area (sq ft)	0.16	36.59	0.04
E.G. Slope (ft/ft)	0.013856	Area (sq ft)	0.16	36.59	0.04
Q Total (cfs)	204.03	Flow (cfs)	0.04	203.97	0.01
Top Width (ft)	43.59	Top Width (ft)	3.62	39.00	0.97
Vel Total (ft/s)	5.54	Avg. Vel. (ft/s)	0.27	5.57	0.27
Max Chl Dpth (ft)	1.79	Hydr. Depth (ft)	0.04	0.94	0.04
Conv. Total (cfs)	1733.3	Conv. (cfs)	0.4	1732.9	0.1
Length Wtd. (ft)	96.88	Wetted Per. (ft)	3.62	39.15	0.98
Min Ch El (ft)	176.30	Shear (lb/sq ft)	0.04	0.81	0.04
Alpha	1.01	Stream Power (lb/ft s)	0.01	4.51	0.01
Frctn Loss (ft)	1.31	Cum Volume (acre-ft)	0.01	0.26	0.03
C & E Loss (ft)	0.02	Cum SA (acres)	0.04	0.31	0.09

Plan: Plan 01 Woolsey Creek Trib1 RS: 704 Profile: FHE

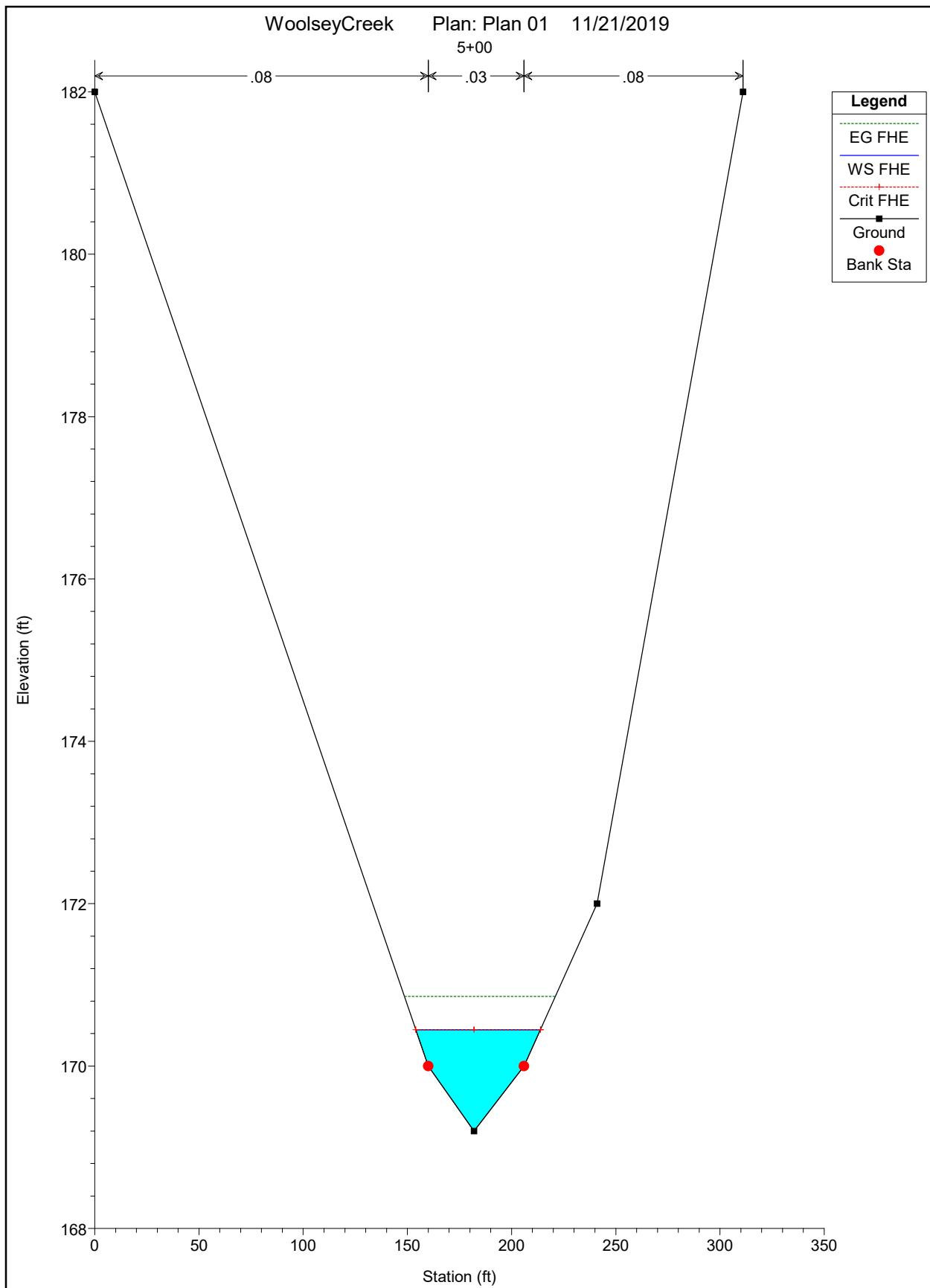
E.G. Elev (ft)	175.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.42	Wt. n-Val.	0.080	0.030	0.080
W.S. Elev (ft)	174.80	Reach Len. (ft)	88.00	100.00	112.00
Crit W.S. (ft)	174.80	Flow Area (sq ft)	4.29	36.78	3.49
E.G. Slope (ft/ft)	0.013251	Area (sq ft)	4.29	36.78	3.49
Q Total (cfs)	204.03	Flow (cfs)	4.96	195.04	4.03
Top Width (ft)	60.53	Top Width (ft)	10.76	41.00	8.77
Vel Total (ft/s)	4.58	Avg. Vel. (ft/s)	1.16	5.30	1.15
Max Chl Dpth (ft)	1.00	Hydr. Depth (ft)	0.40	0.90	0.40
Conv. Total (cfs)	1772.4	Conv. (cfs)	43.1	1694.3	35.0
Length Wtd. (ft)	100.22	Wetted Per. (ft)	10.79	41.00	8.80
Min Ch El (ft)	173.80	Shear (lb/sq ft)	0.33	0.74	0.33
Alpha	1.29	Stream Power (lb/ft s)	0.38	3.94	0.38
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	0.01	0.18	0.03
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	0.22	0.08

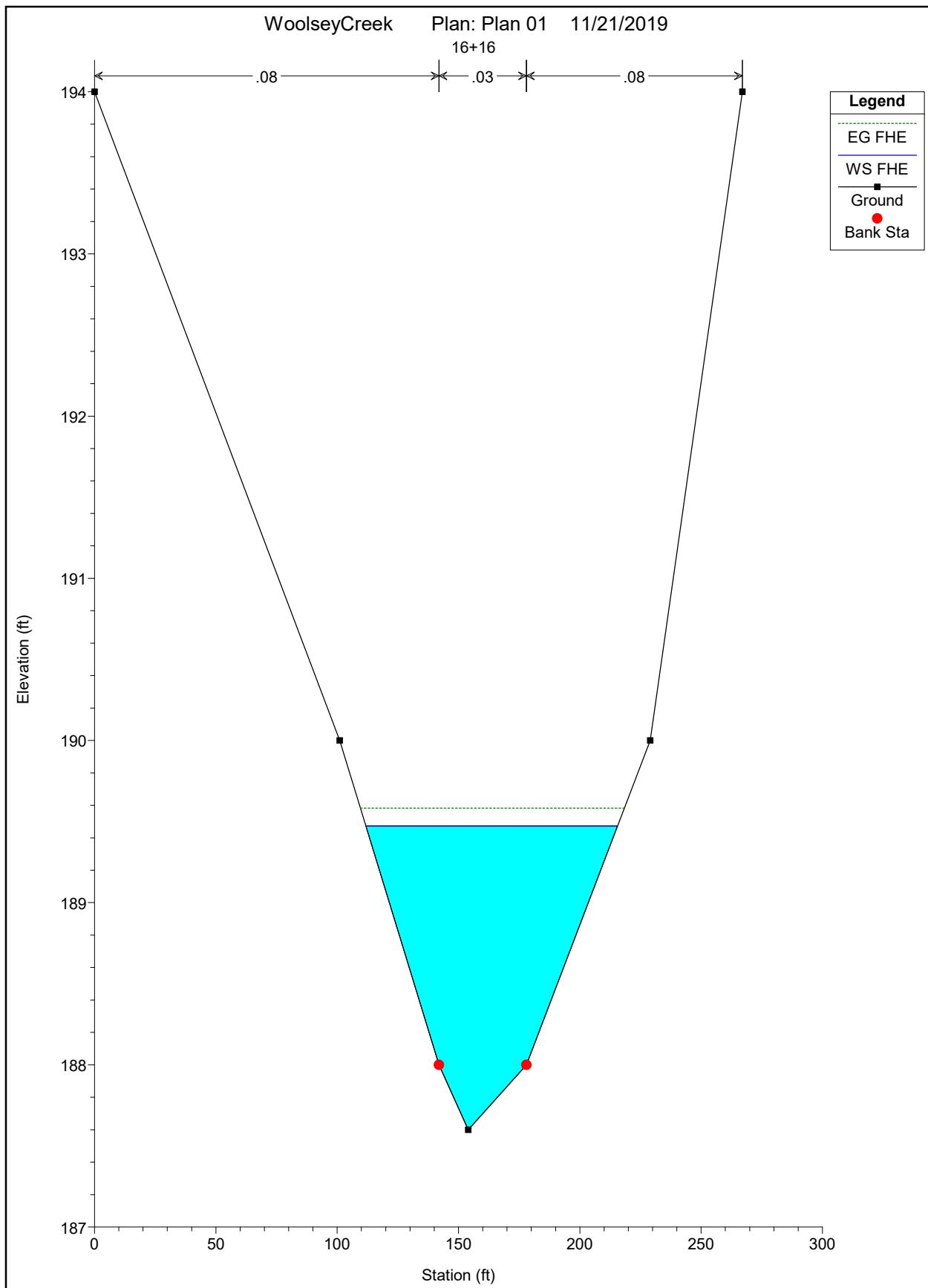
Plan: Plan 01 Woolsey Creek Trib1 RS: 603 Profile: FHE

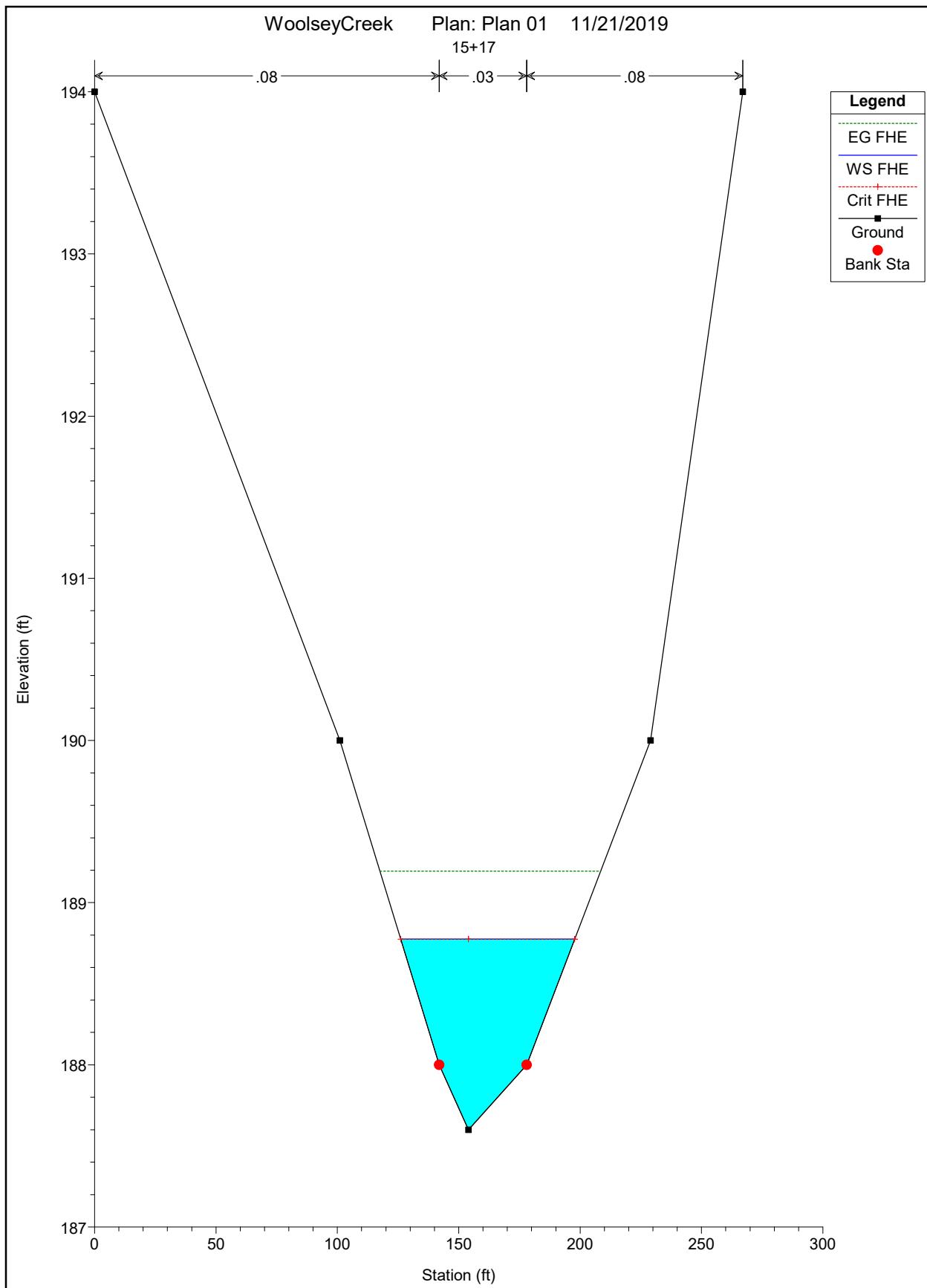
E.G. Elev (ft)	172.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.	0.080	0.030	0.080
W.S. Elev (ft)	172.37	Reach Len. (ft)	46.00	103.00	92.00
Crit W.S. (ft)	172.37	Flow Area (sq ft)	0.96	40.04	8.54
E.G. Slope (ft/ft)	0.013584	Area (sq ft)	0.96	40.04	8.54
Q Total (cfs)	204.03	Flow (cfs)	0.67	194.12	9.23
Top Width (ft)	81.33	Top Width (ft)	5.18	52.00	24.15
Vel Total (ft/s)	4.12	Avg. Vel. (ft/s)	0.70	4.85	1.08
Max Chl Dpth (ft)	1.17	Hydr. Depth (ft)	0.19	0.77	0.35
Conv. Total (cfs)	1750.6	Conv. (cfs)	5.8	1665.6	79.2
Length Wtd. (ft)	102.47	Wetted Per. (ft)	5.19	52.02	24.18
Min Ch El (ft)	171.20	Shear (lb/sq ft)	0.16	0.65	0.30
Alpha	1.32	Stream Power (lb/ft s)	0.11	3.16	0.32
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	0.00	0.09	0.01
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.12	0.03

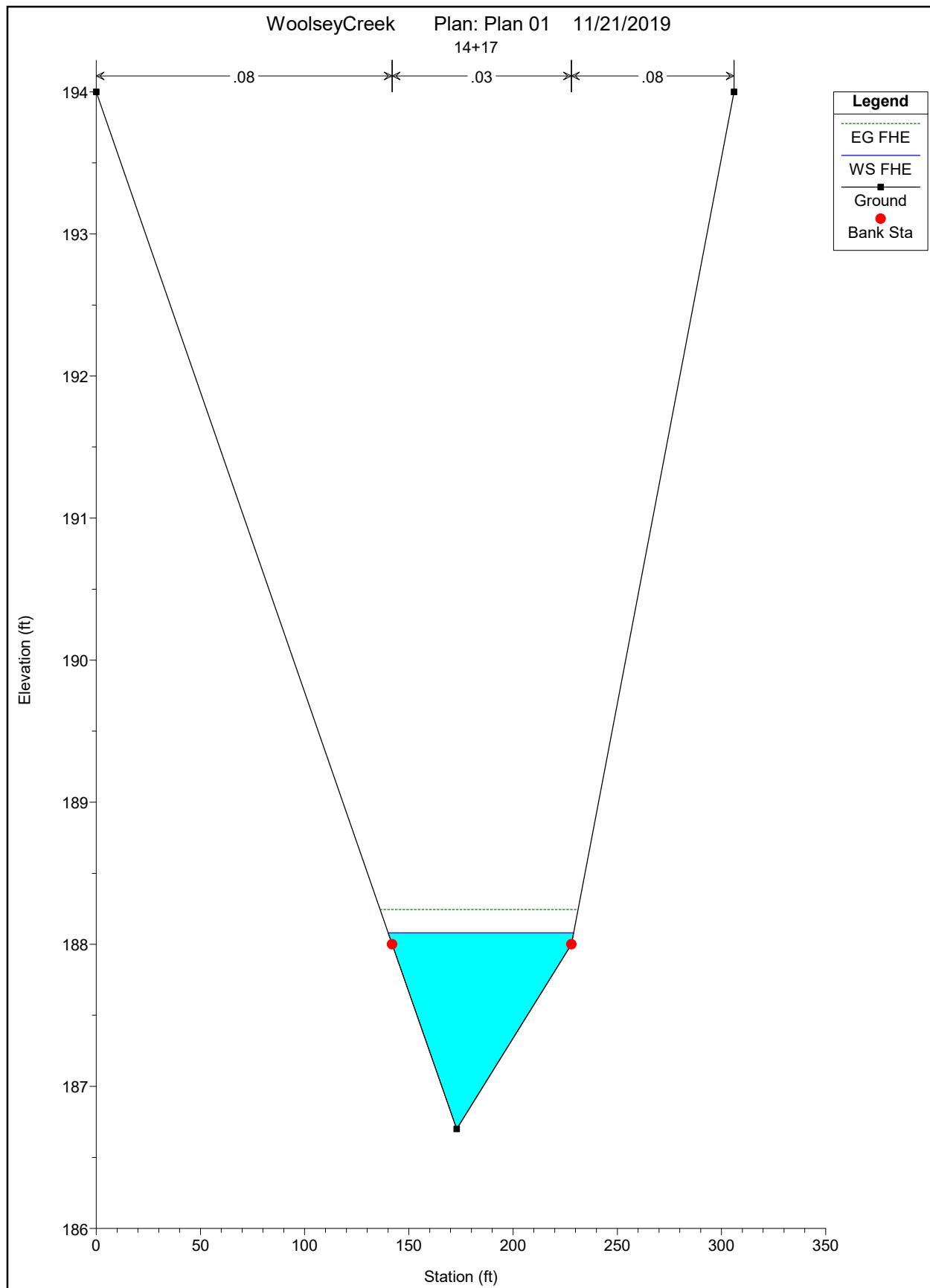
Plan: Plan 01 Woolsey Creek Trib1 RS: 500 Profile: FHE

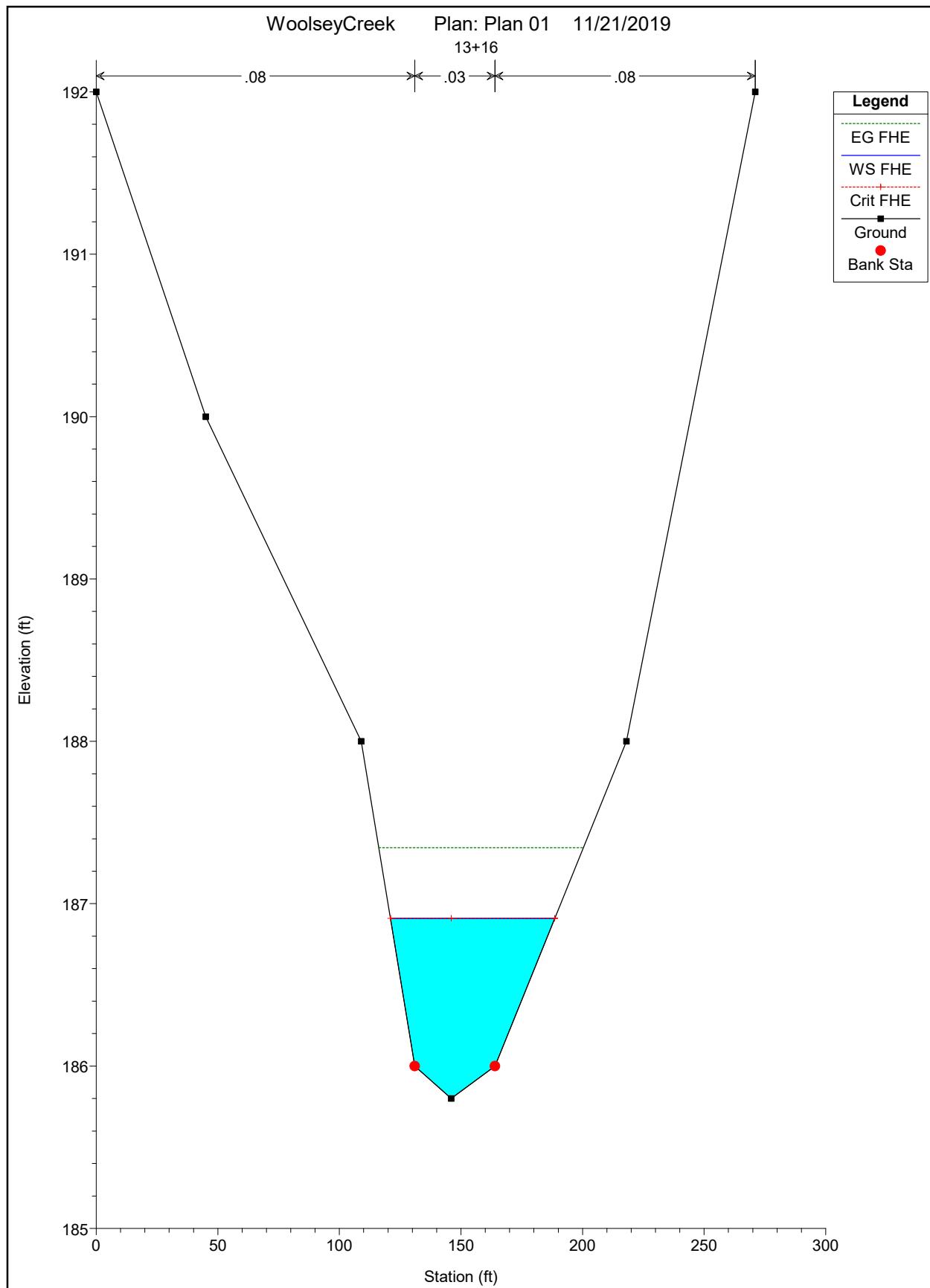
E.G. Elev (ft)	170.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.080	0.030	0.080
W.S. Elev (ft)	170.45	Reach Len. (ft)			
Crit W.S. (ft)	170.45	Flow Area (sq ft)	1.34	39.05	1.76
E.G. Slope (ft/ft)	0.013526	Area (sq ft)	1.34	39.05	1.76
Q Total (cfs)	204.03	Flow (cfs)	1.07	201.56	1.40
Top Width (ft)	59.84	Top Width (ft)	5.98	46.00	7.85
Vel Total (ft/s)	4.84	Avg. Vel. (ft/s)	0.80	5.16	0.80
Max Chl Dpth (ft)	1.25	Hydr. Depth (ft)	0.22	0.85	0.22
Conv. Total (cfs)	1754.3	Conv. (cfs)	9.2	1733.0	12.1
Length Wtd. (ft)		Wetted Per. (ft)	6.00	46.03	7.87
Min Ch El (ft)	169.20	Shear (lb/sq ft)	0.19	0.72	0.19
Alpha	1.12	Stream Power (lb/ft s)	0.15	3.70	0.15
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

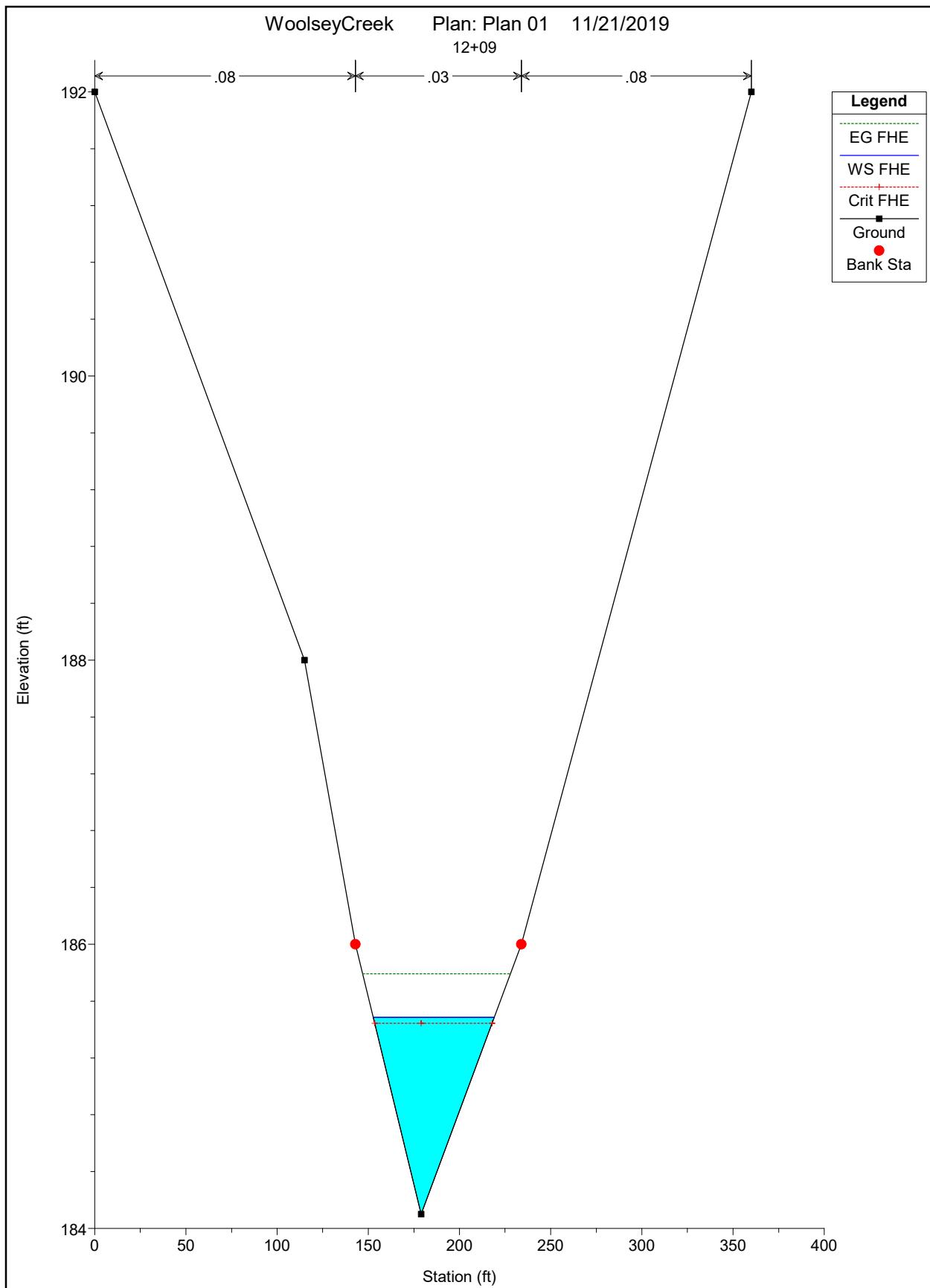


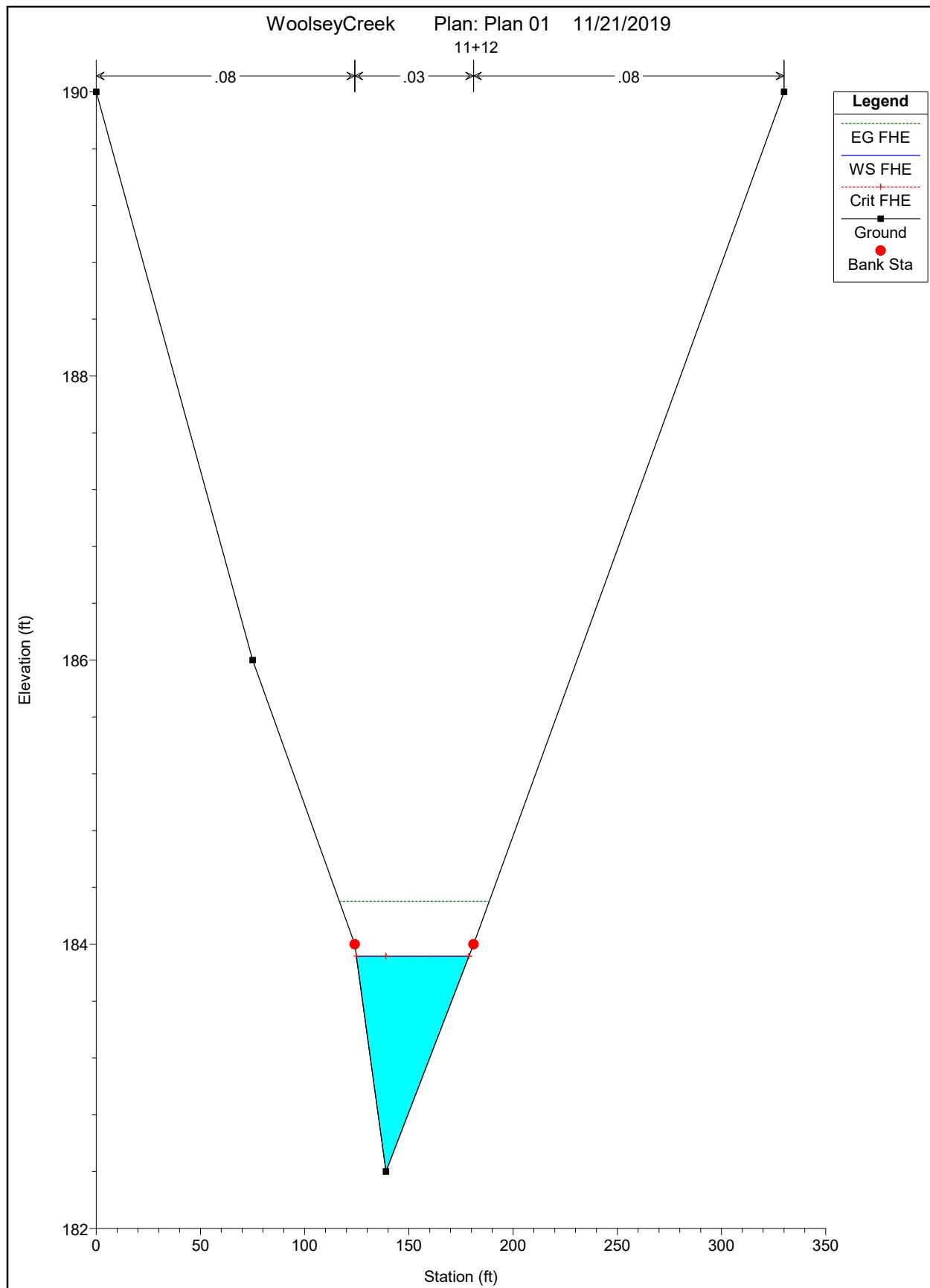


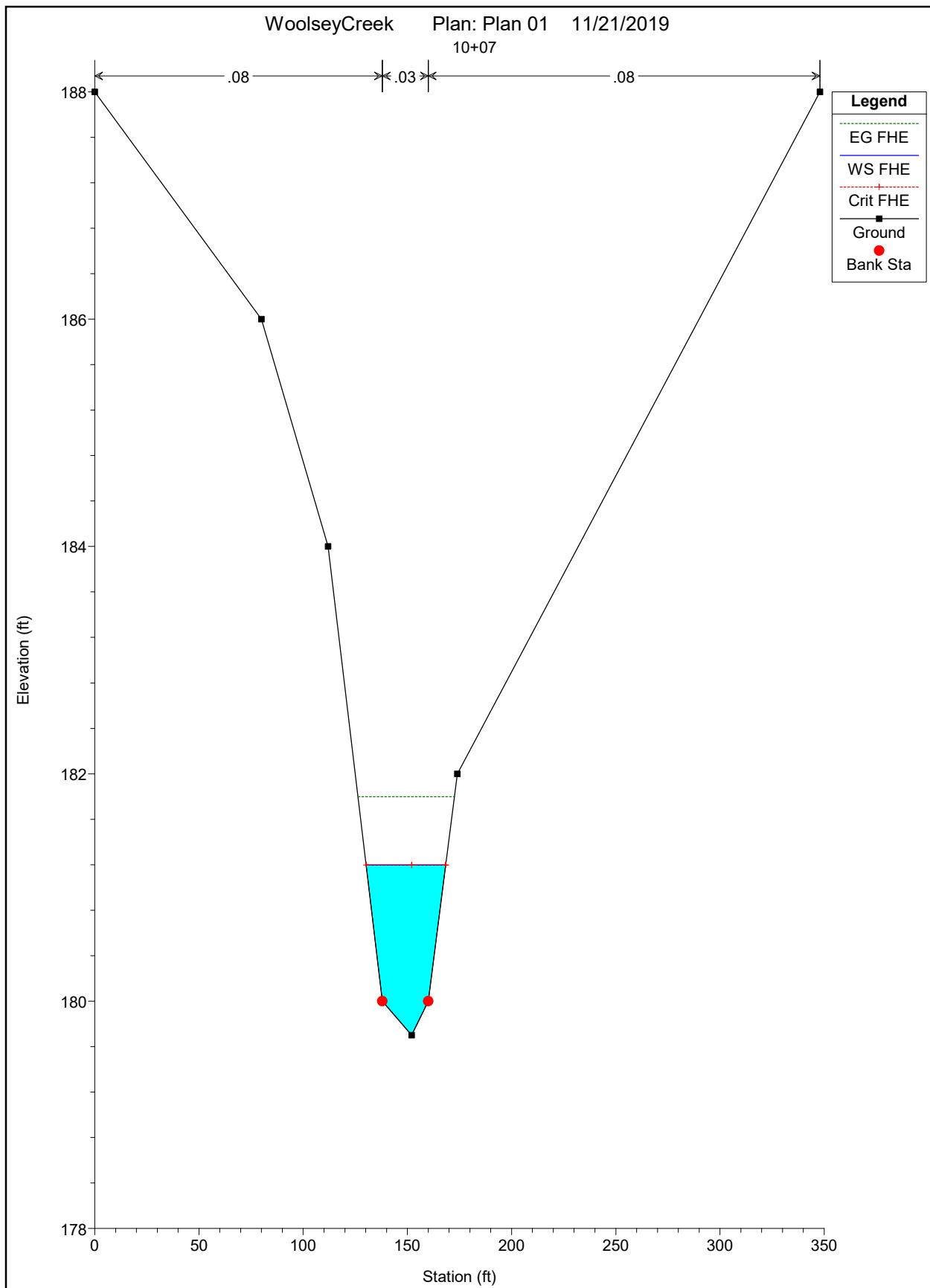


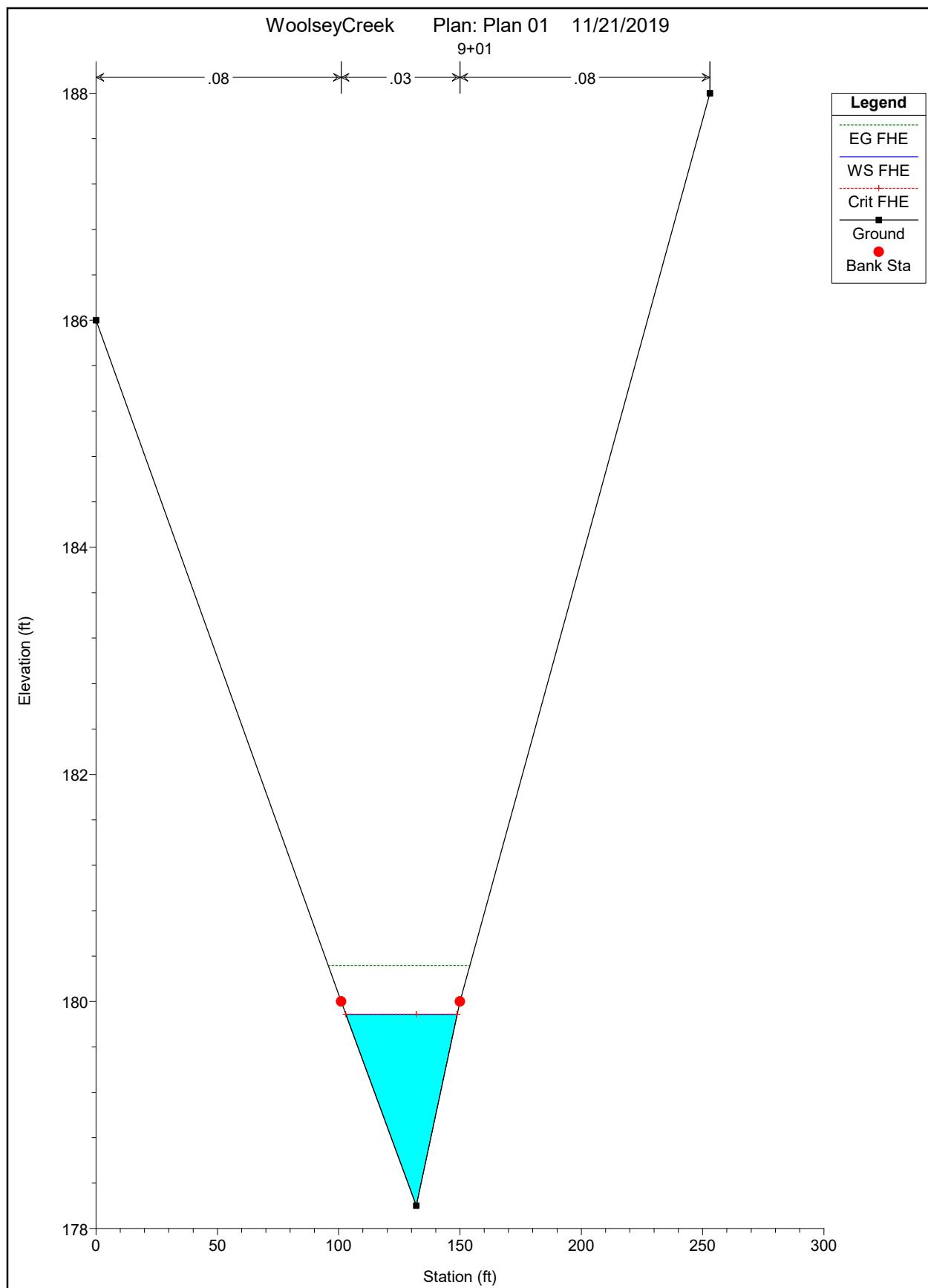


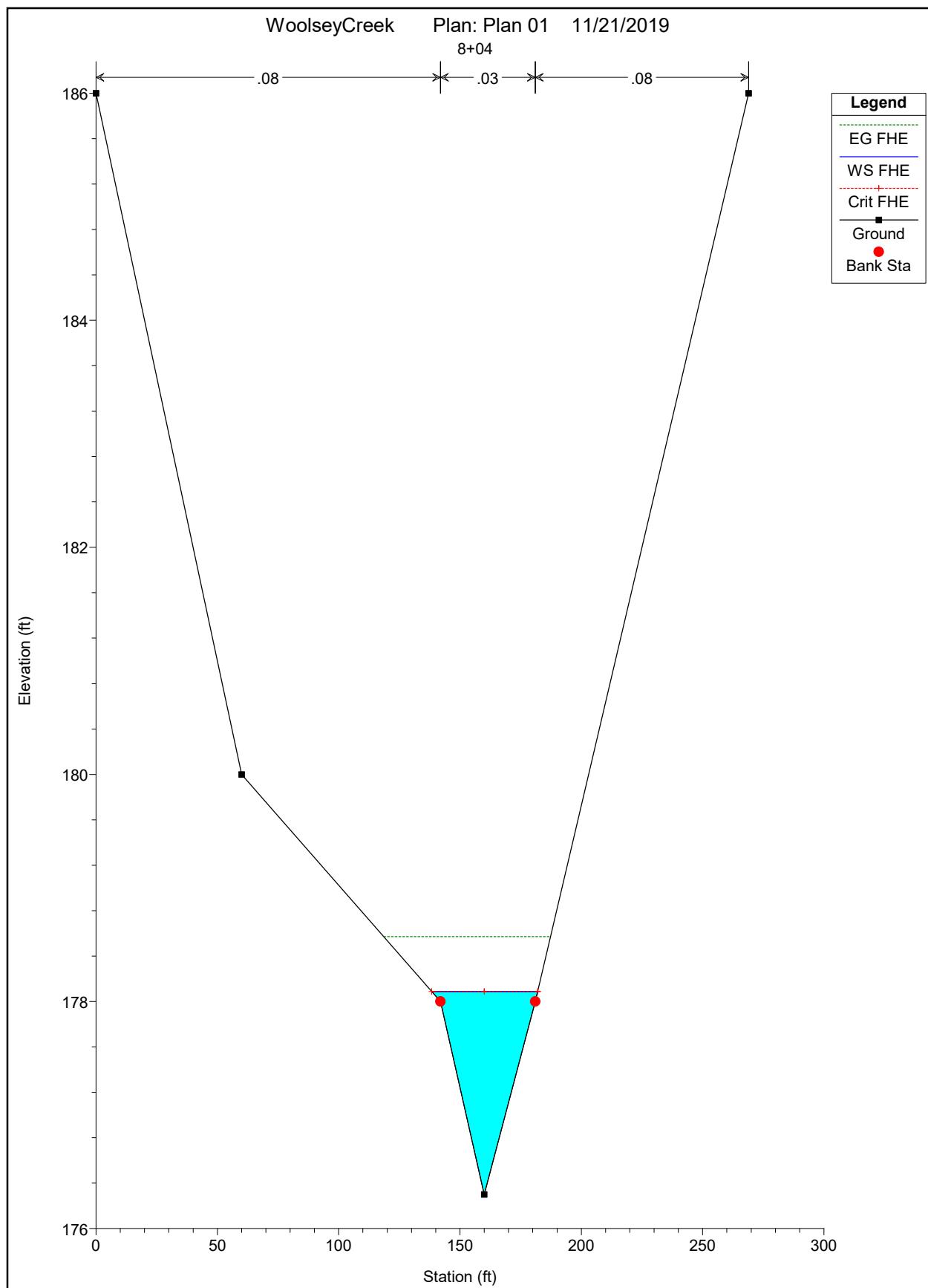


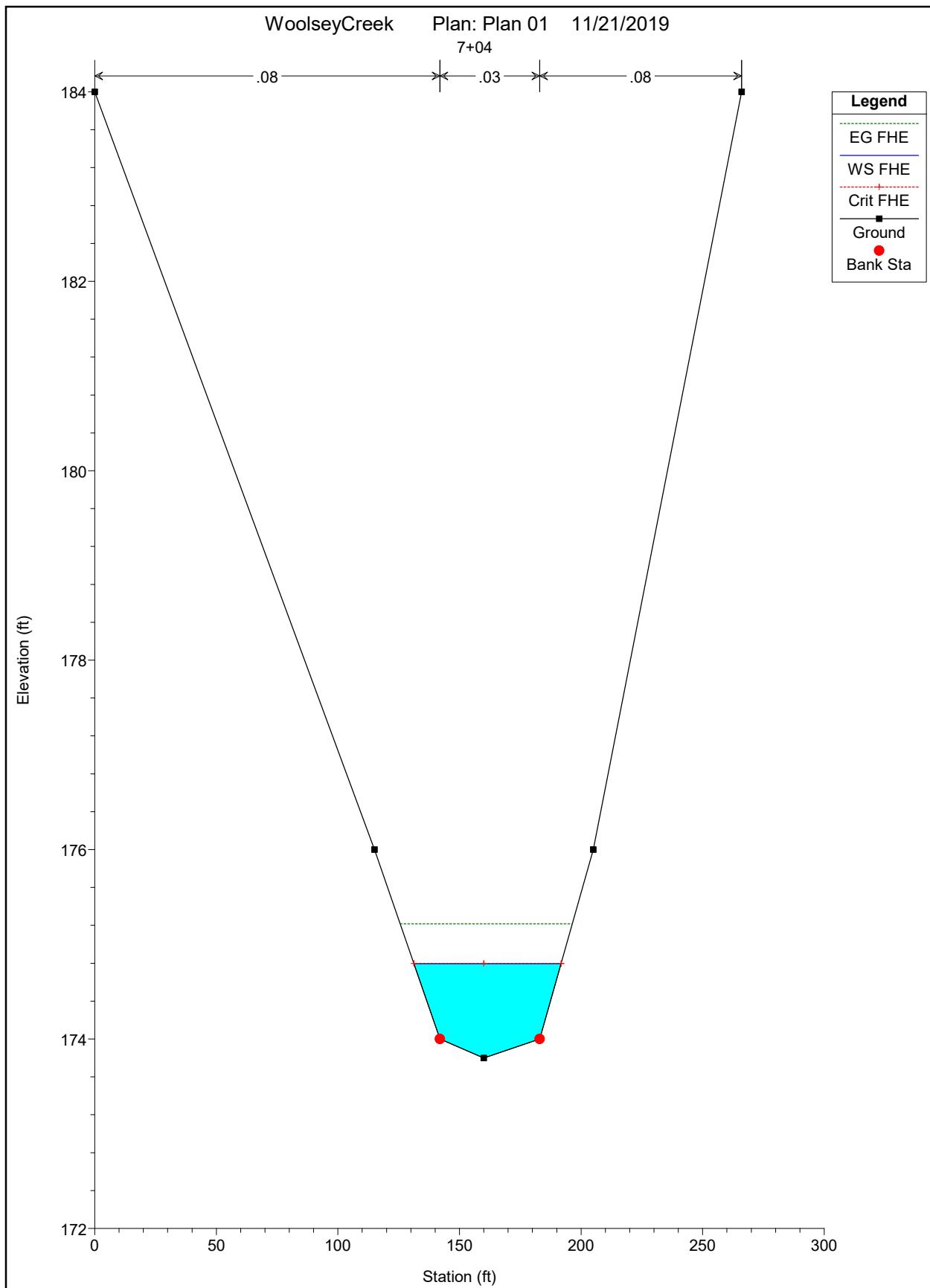


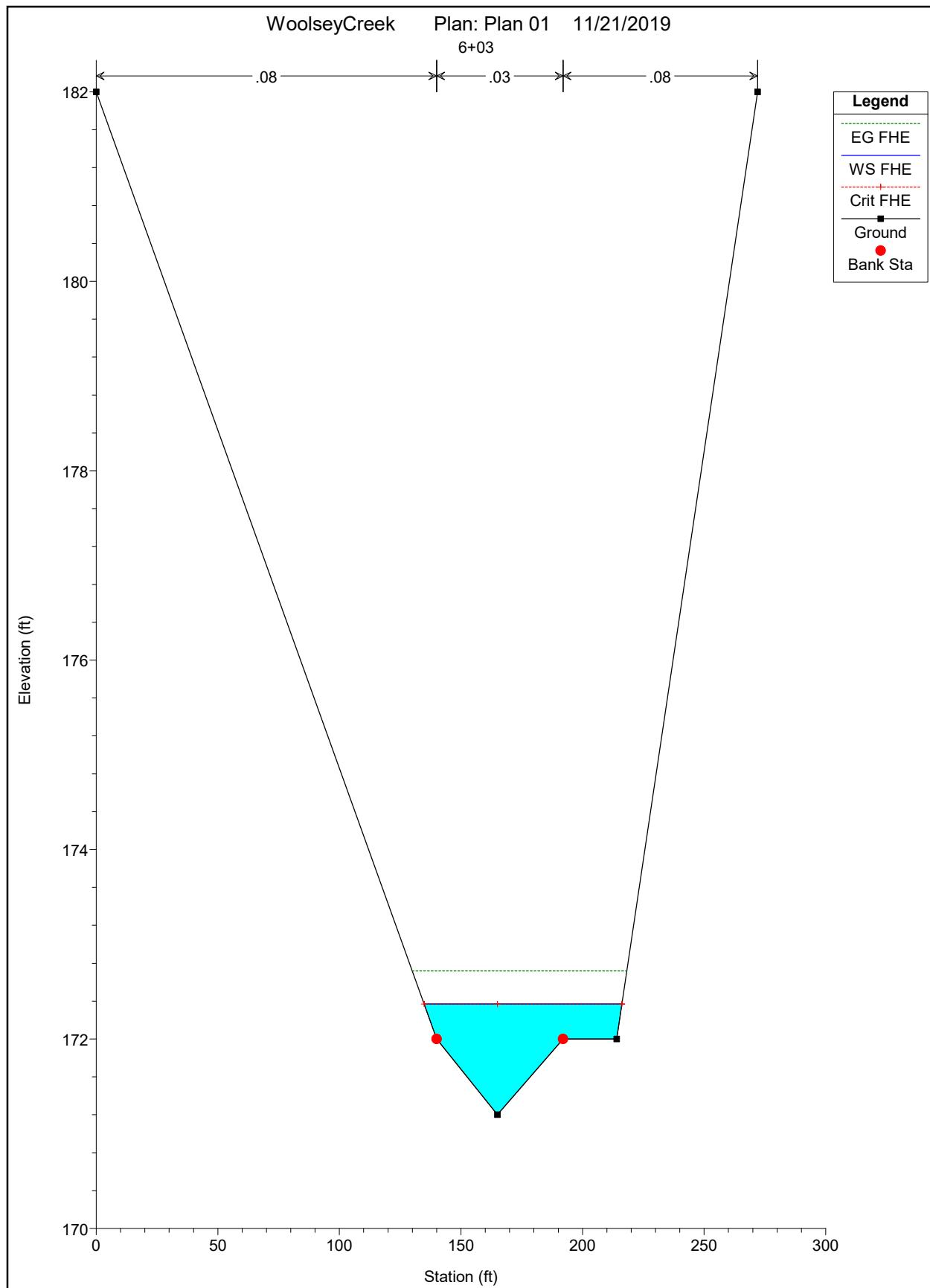






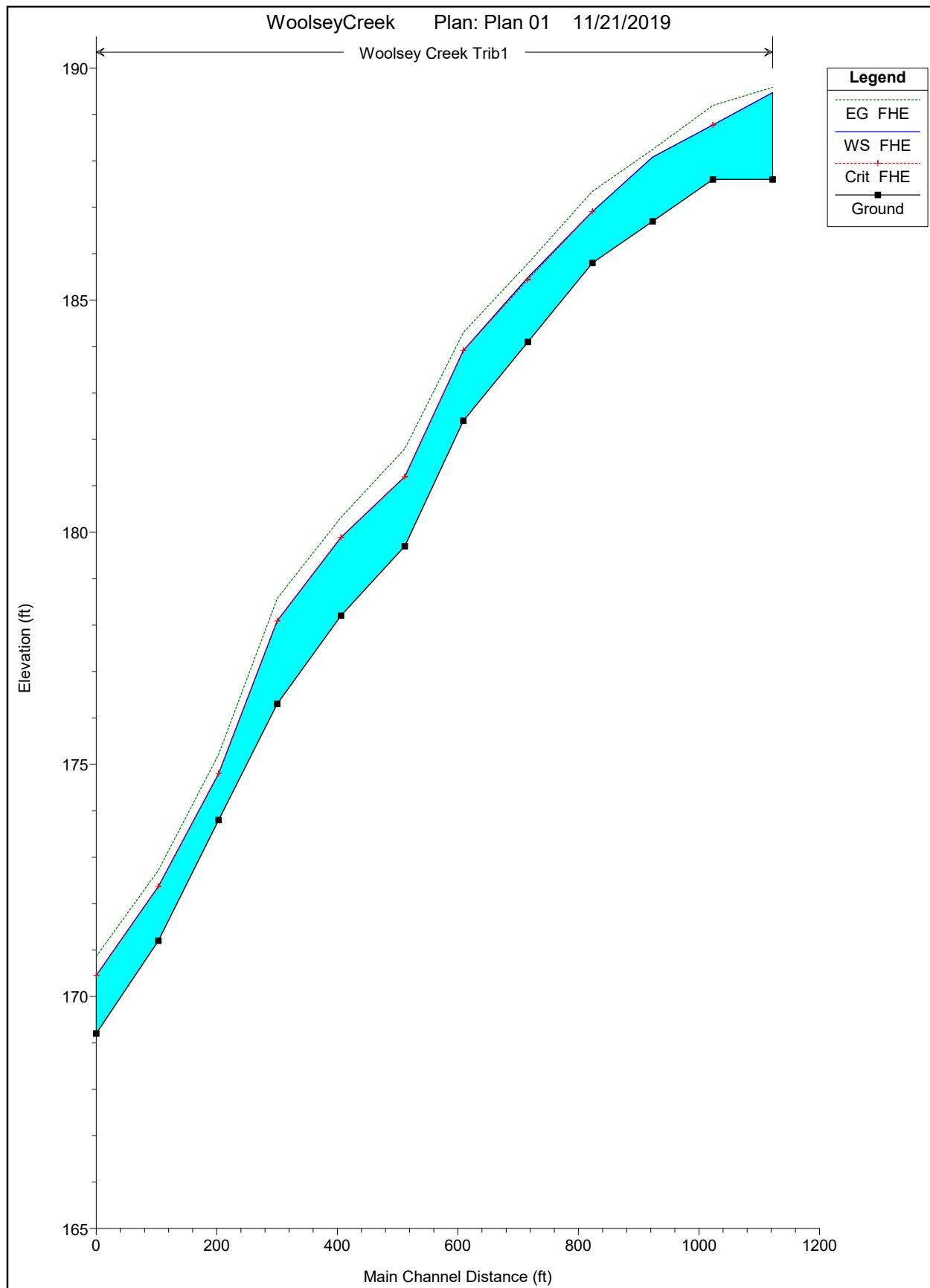






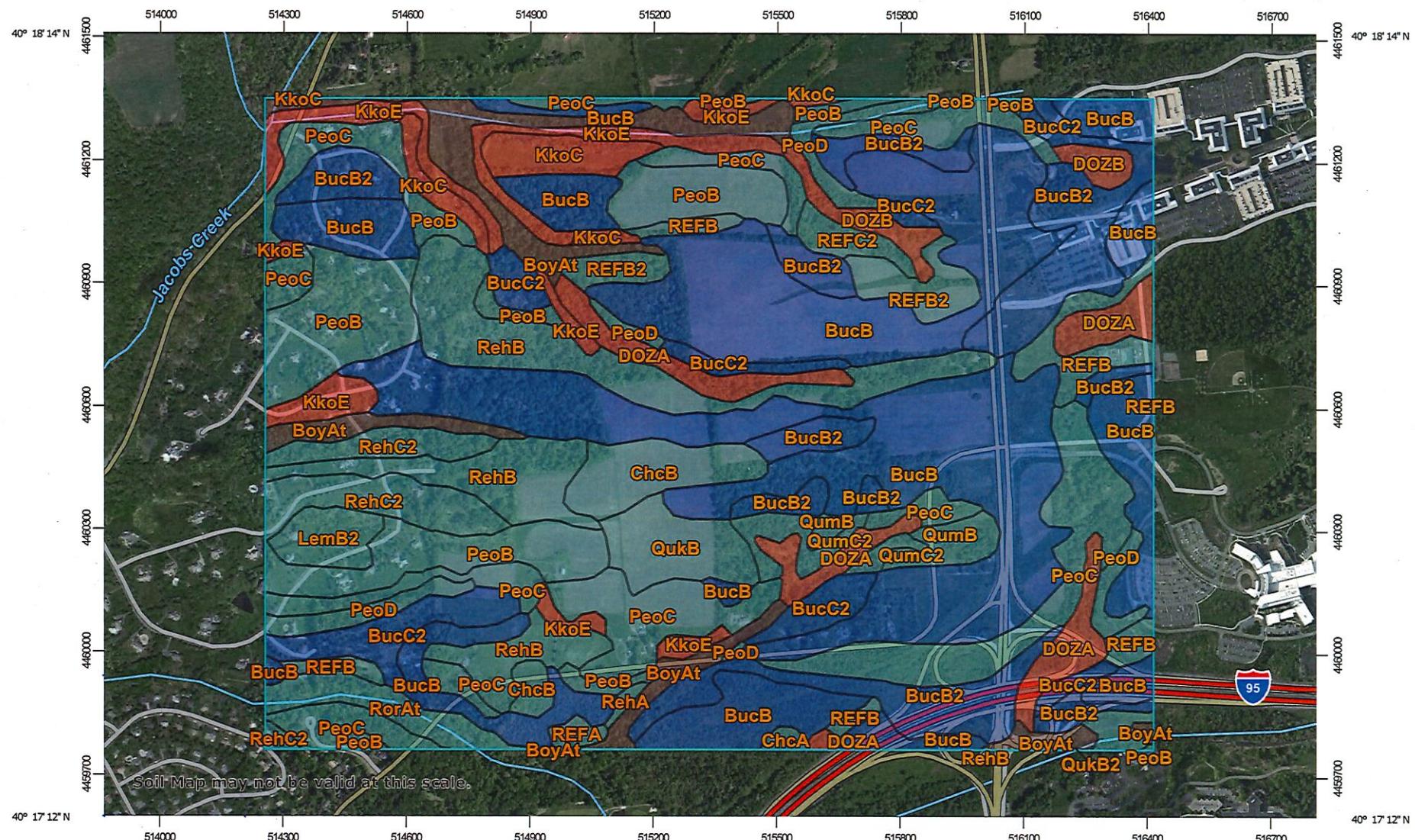
HEC-RAS Plan: Plan 01 River: Woolsey Creek Reach: Trib1 Profile: FHE

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Trib1	1616	FHE	204.03	187.60	189.47		189.58	0.001695	2.87	110.08	103.74	0.39
Trib1	1517	FHE	204.03	187.60	188.77	188.77	189.19	0.012255	5.39	48.86	71.62	0.96
Trib1	1417	FHE	204.03	186.70	188.08		188.24	0.006527	3.25	62.97	88.97	0.67
Trib1	1316	FHE	204.03	185.80	186.91	186.91	187.35	0.012360	5.54	49.08	67.59	0.97
Trib1	1209	FHE	204.03	184.10	185.49	185.44	185.79	0.013085	4.43	46.01	66.39	0.94
Trib1	1112	FHE	204.03	182.40	183.92	183.92	184.30	0.014688	4.98	40.94	54.01	1.01
Trib1	1007	FHE	204.03	179.70	181.20	181.20	181.80	0.011338	6.43	39.30	38.16	0.98
Trib1	901	FHE	204.03	178.20	179.89	179.89	180.32	0.014248	5.27	38.73	45.92	1.01
Trib1	804	FHE	204.03	176.30	178.09	178.09	178.57	0.013856	5.57	36.80	43.59	1.01
Trib1	704	FHE	204.03	173.80	174.80	174.80	175.22	0.013251	5.30	44.56	60.53	0.99
Trib1	603	FHE	204.03	171.20	172.37	172.37	172.72	0.013584	4.85	49.54	81.33	0.97
Trib1	500	FHE	204.03	169.20	170.45	170.45	170.86	0.013526	5.16	42.15	59.84	0.99

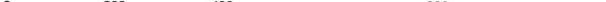


APPENDIX C.
SOILS MAP OF STUDY AREA

Hydrologic Soil Group—Mercer County, New Jersey (Deer Valley Hydrologic Soils Group)



Map Scale: 1:13,500 if printed on A landscape (11" x 8.5") sheet

N  Meters
0 200 400 600 800 1000

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



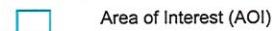
Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

11/15/2019
Page 1 of 5

MAP LEGEND

Area of Interest (AOI)



Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

	A
	A/D
	B
	B/D

C

C/D

D

Not rated or not available

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Mercer County, New Jersey

Survey Area Data: Version 15, Sep 16, 2019

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

Date(s) aerial images were photographed: May 2, 2019—Jul 9, 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
BoyAt	Bowmansville silt loam, 0 to 2 percent slopes, frequently flooded	B/D	35.5	4.2%
BucB	Bucks silt loam, 2 to 6 percent slopes	B	256.2	30.1%
BucB2	Bucks silt loam, 2 to 6 percent slopes, eroded	B	74.4	8.7%
BucC2	Bucks silt loam, 6 to 12 percent slopes, eroded	B	30.1	3.5%
ChcA	Chalfont silt loam, 0 to 2 percent slopes	C	1.2	0.1%
ChcB	Chalfont silt loam, 2 to 6 percent slopes	C	17.3	2.0%
DOZA	Doylestown and Reaville variant silt loams, 0 to 2 percent slopes	D	29.9	3.5%
DOZB	Doylestown and Reaville variant silt loams, 2 to 6 percent slopes	D	9.3	1.1%
KkoC	Klinesville channery loam, 6 to 12 percent slopes	D	14.8	1.7%
KkoE	Klinesville channery loam, 18 to 35 percent slopes	D	30.1	3.5%
LemB2	Lehigh silt loam, 2 to 6 percent slopes, eroded	C	8.1	1.0%
PeoB	Penn channery silt loam, 2 to 6 percent slopes	C	69.0	8.1%
PeoC	Penn channery silt loam, 6 to 12 percent slopes	C	93.6	11.0%
PeoD	Penn channery silt loam, 12 to 18 percent slopes	C	15.4	1.8%
QukB	Quakertown silt loam, 2 to 6 percent slopes	C	17.5	2.1%
QukB2	Quakertown silt loam, 2 to 6 percent slopes, eroded	C	0.0	0.0%
QumB	Quakertown channery silt loam, 2 to 6 percent slopes	C	7.3	0.9%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
QumC2	Quakertown channery silt loam, 6 to 12 percent slopes, eroded	C	7.8	0.9%
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes	C	2.0	0.2%
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	C	17.3	2.0%
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded	C	12.9	1.5%
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded	C	5.1	0.6%
RehA	Reaville silt loam, 0 to 2 percent slopes	C	0.9	0.1%
RehB	Reaville silt loam, 2 to 6 percent slopes	C	61.7	7.2%
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	C	23.1	2.7%
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	C	10.6	1.2%
Totals for Area of Interest			851.2	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

APPENDIX D.

**DRAINAGE AREA MAPS WITH LAND USE
COVERAGE AERIAL PHOTO AND SOIL TYPES**





081077 - Deer Valley - Hopewell Township\Engineering\Engineering Plans\02 Flood Hazard\rfha.dwg 04/27/20 01:12:44PM, jward, LAYOUT:SHT-02-AERIAL

SCALE: 1"=150'


2

IT No.

**AERIAL PHOTO
LAND USE COVERAGE MAP
BLOCK 93, LOTS 19, 20, 45.01, 46 & 60
HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY**


Boys
Cons


4	ALL INFORMATION AUTHORIZED FOR PROPERTY FOR WHOM TRACTED OR TO 1. THIS DRAWING 2. REUSED, 3. RELIED 4. FOR PURPOSE IN CONSENT OF 5. GROUP, LTD. 6. CONSULTING GROUP.	1 UPDATE PROPERTY INFORMATION
---	--	-------------------------------



APPENDIX E.


**STREAM CROSS-SECTIONS, PROFILE, AND FLOOD
HAZARD AREA METES AND BOUNDS PLAN**




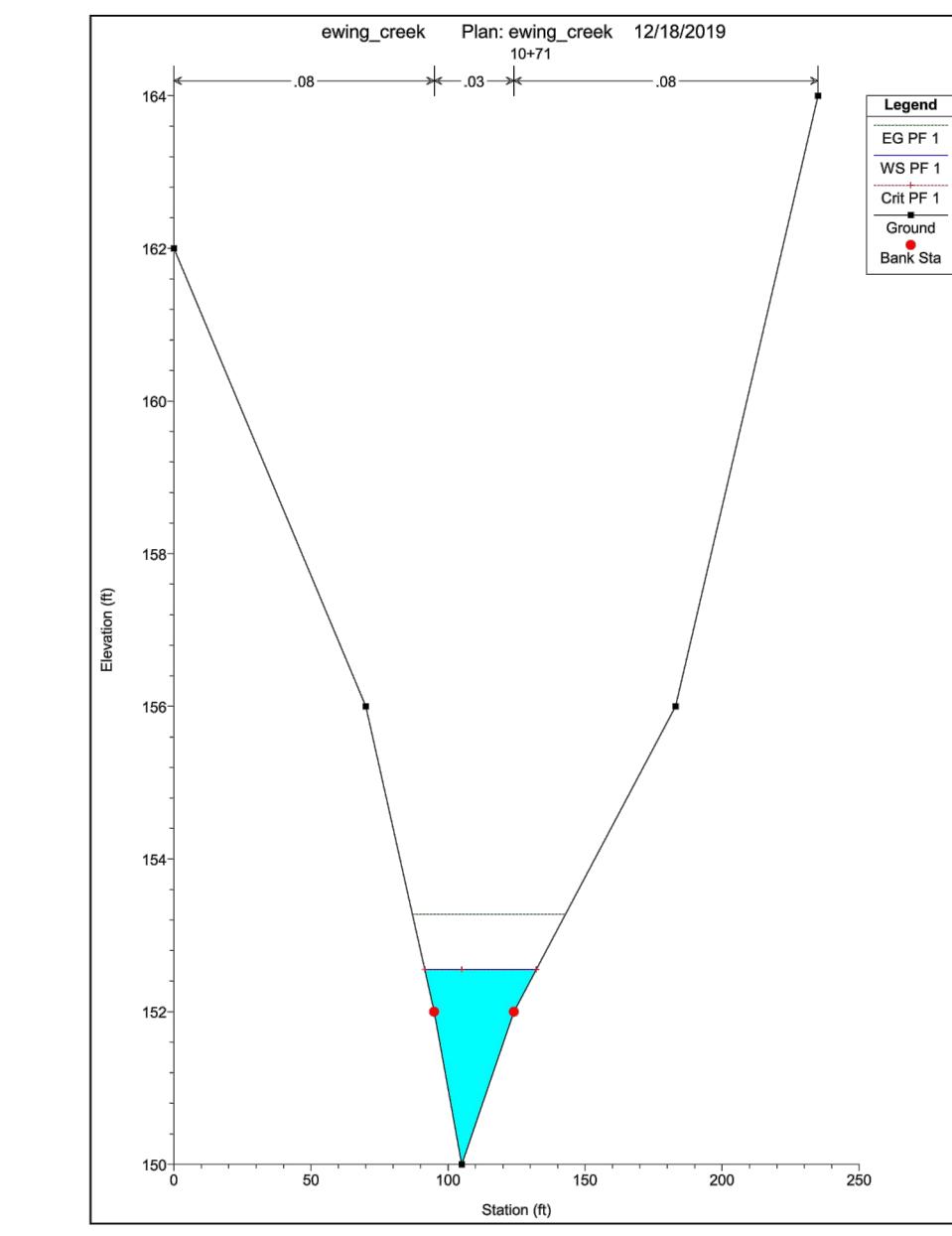
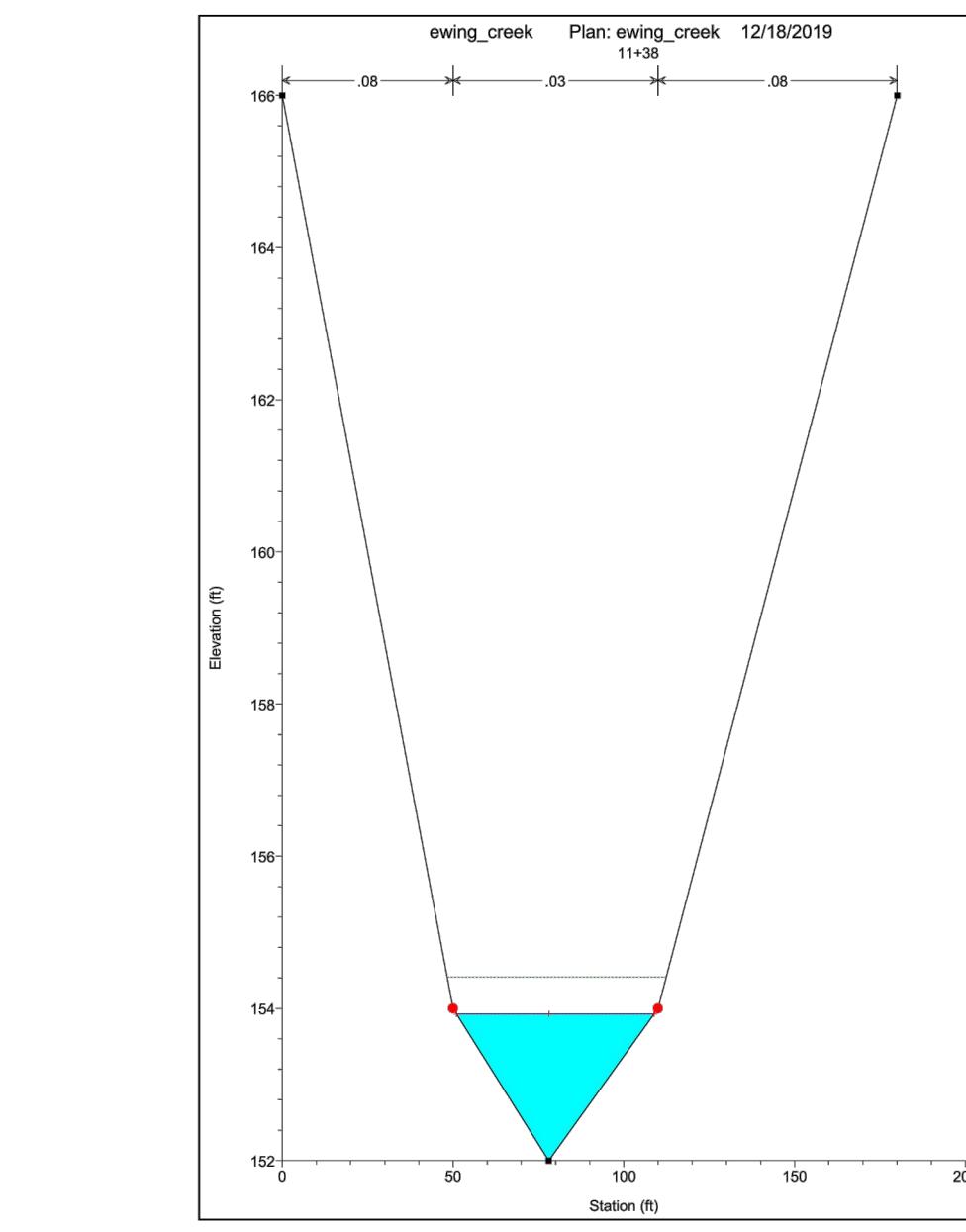
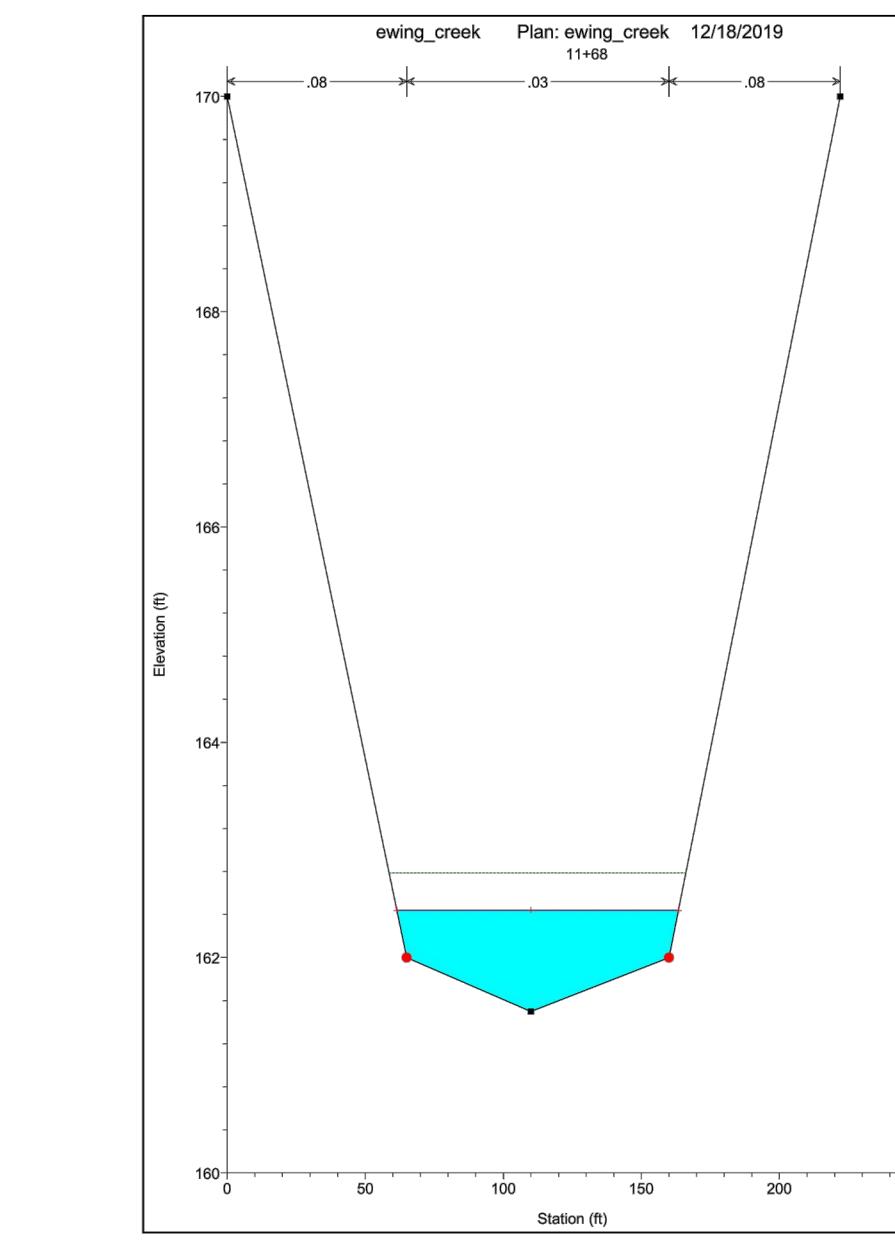
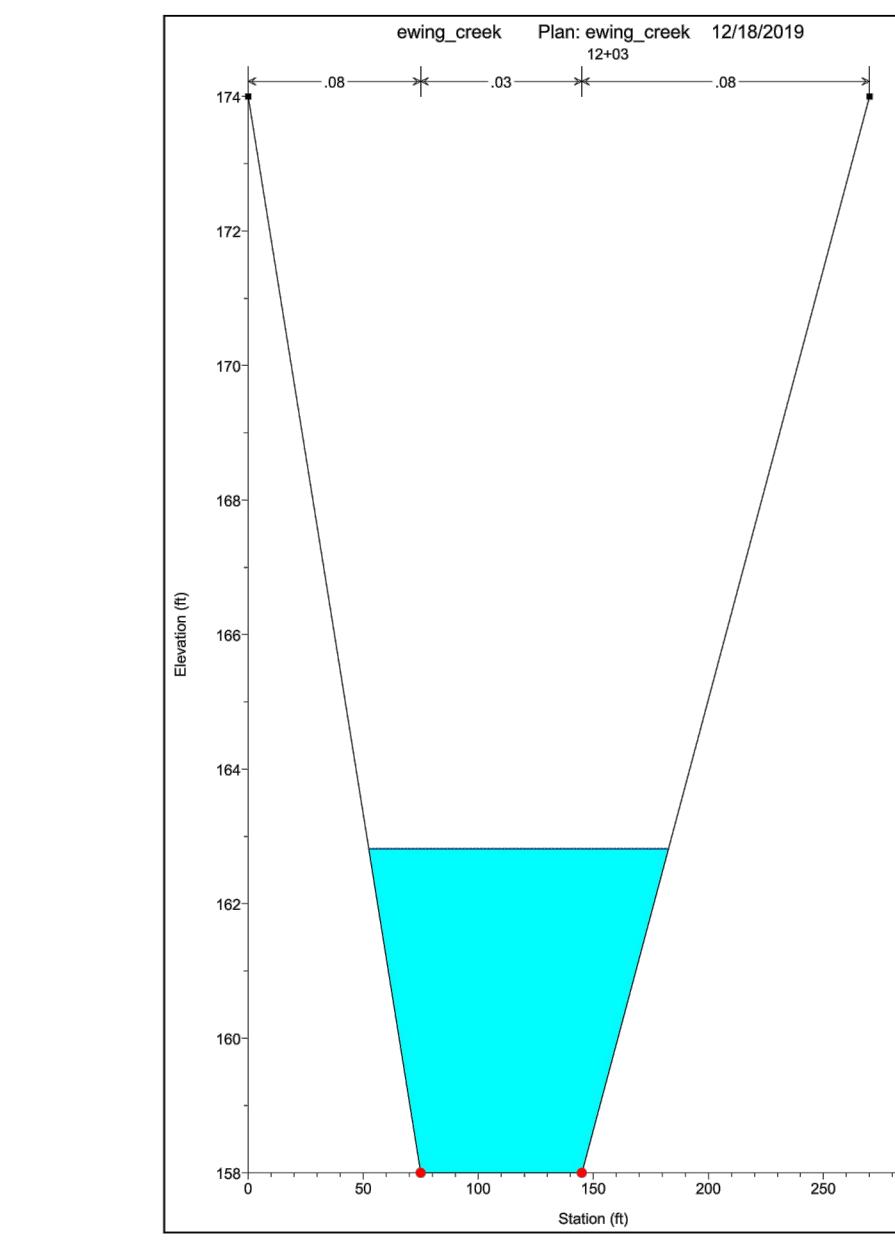
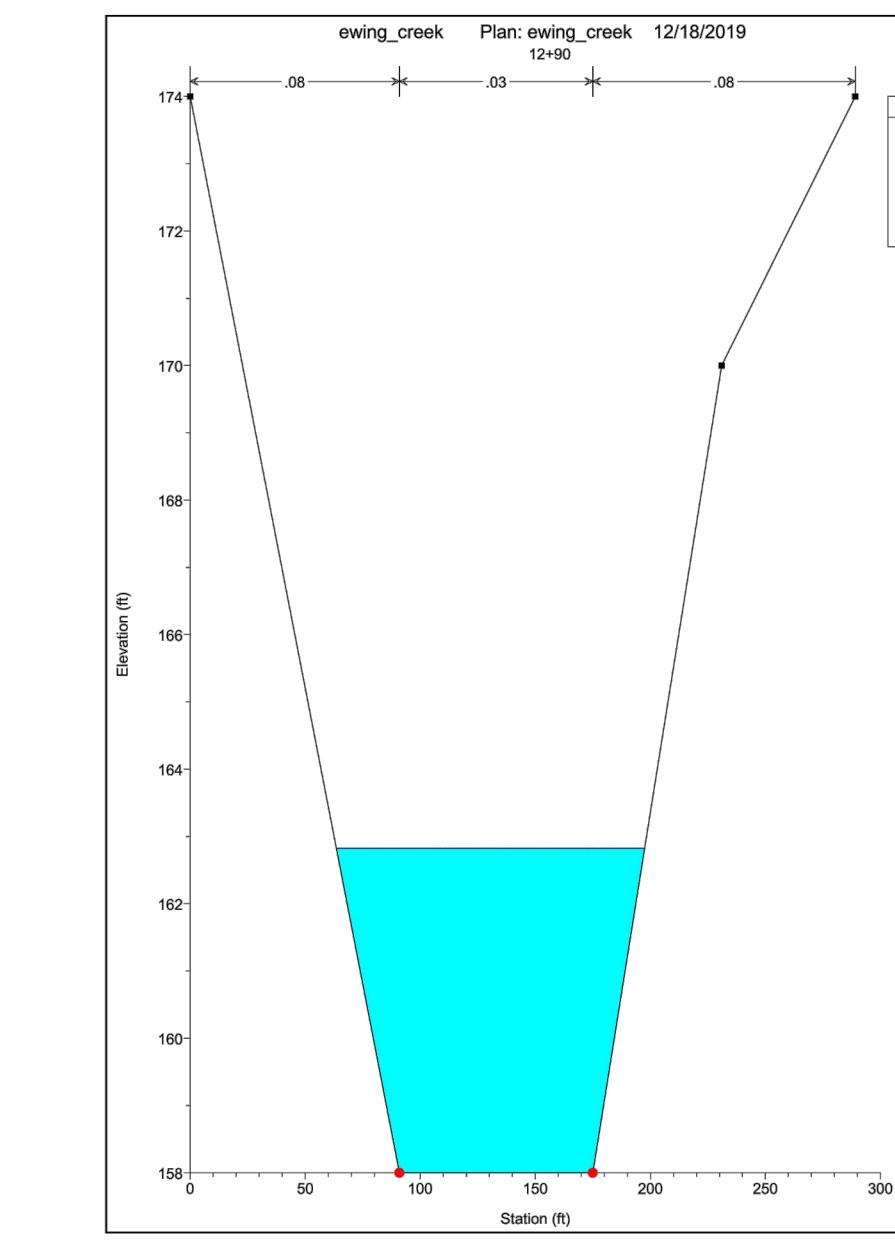
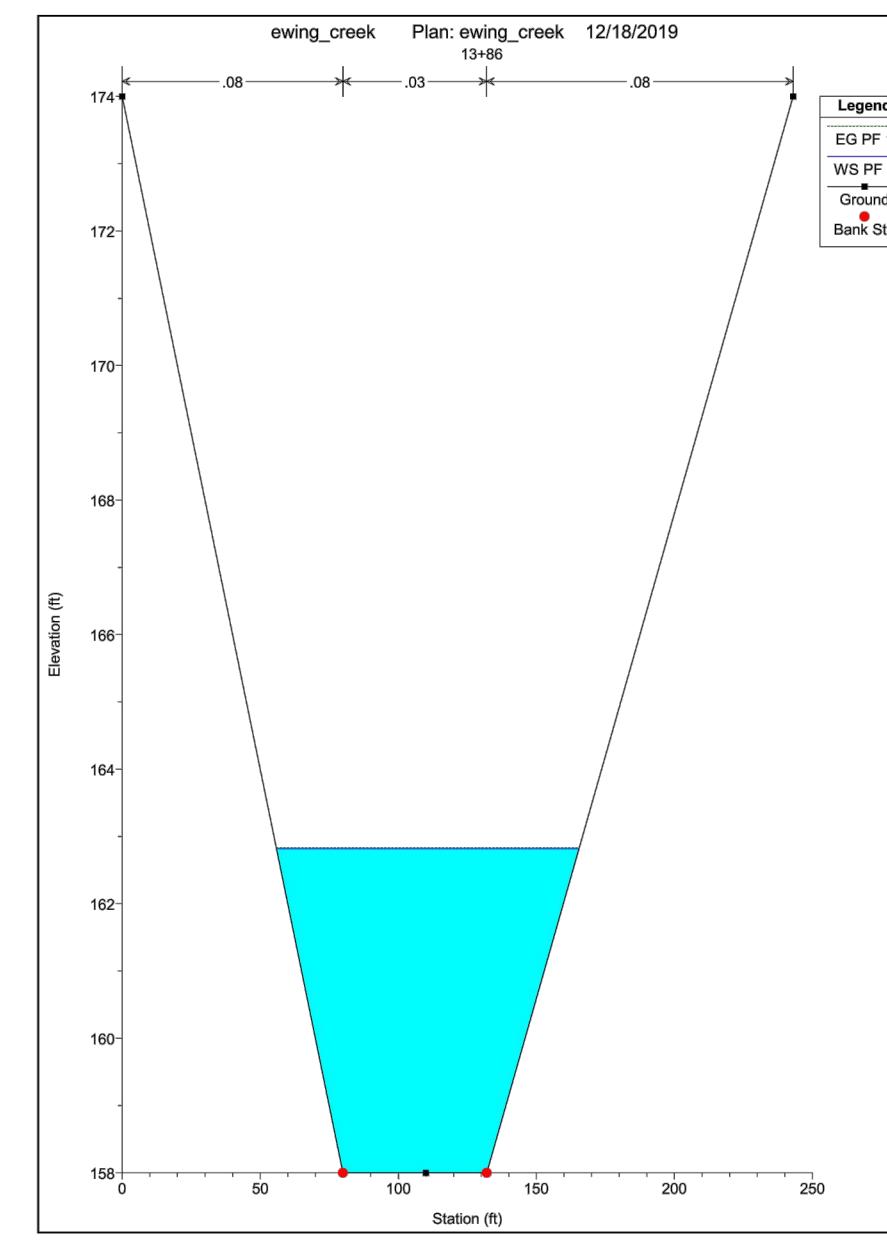
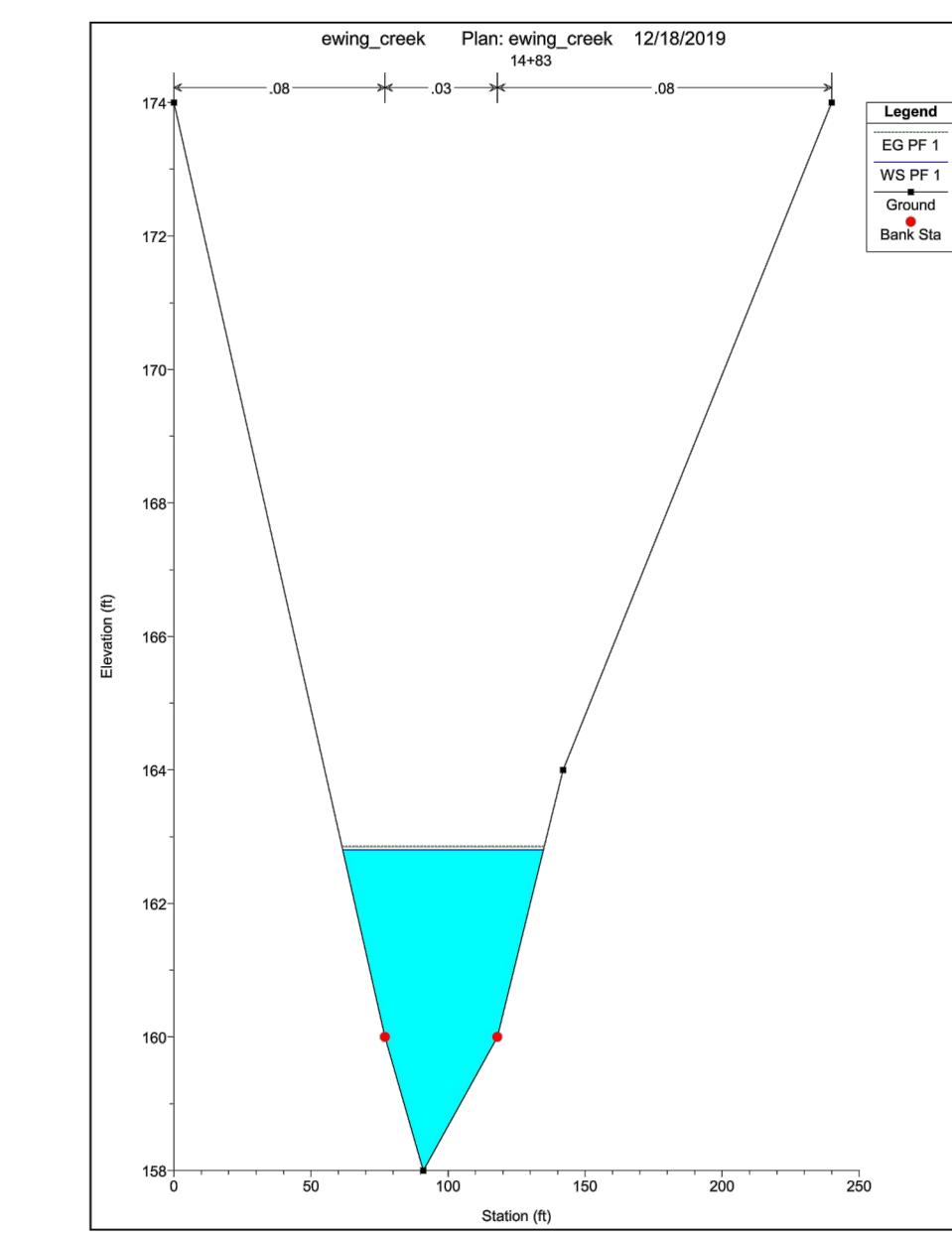
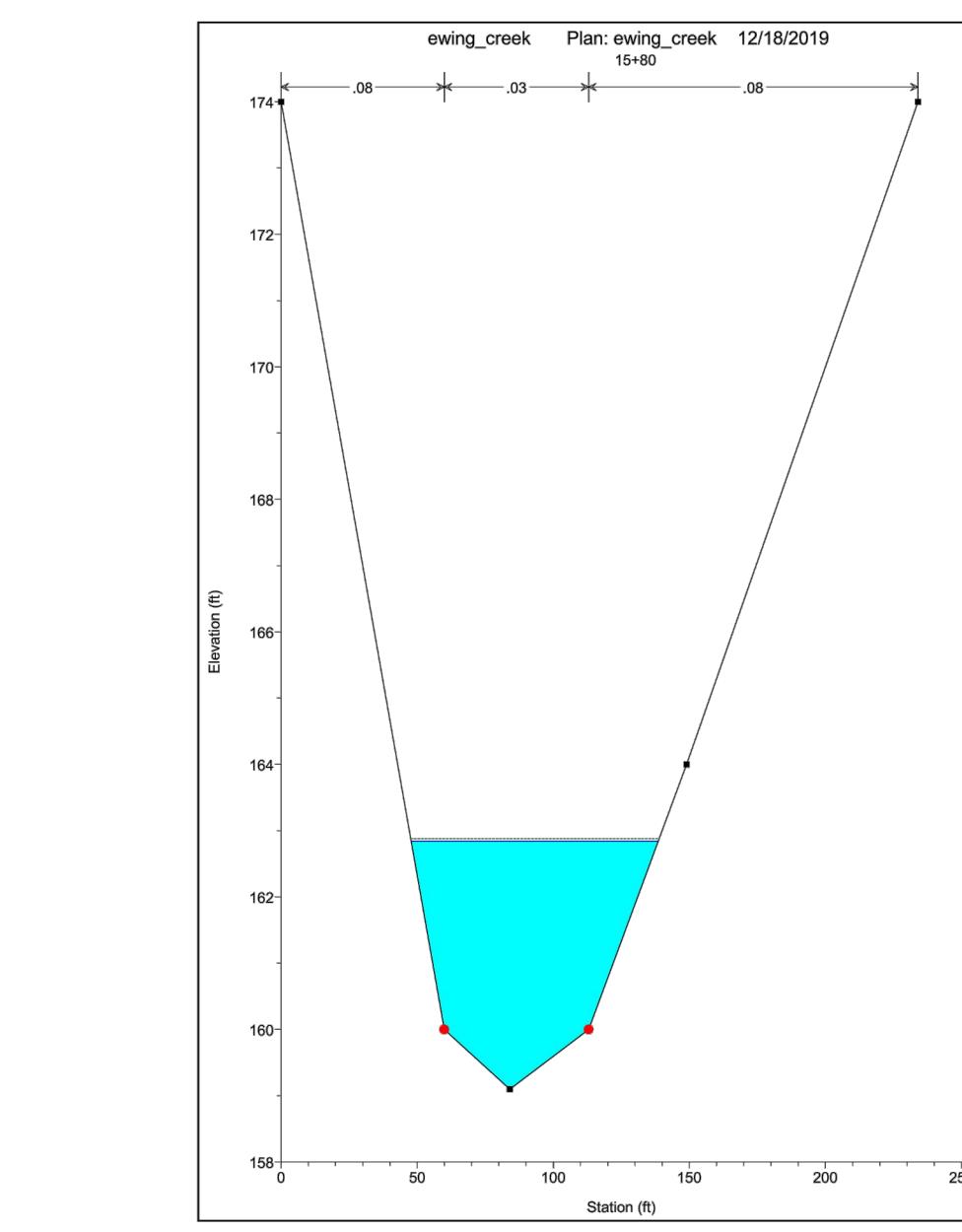
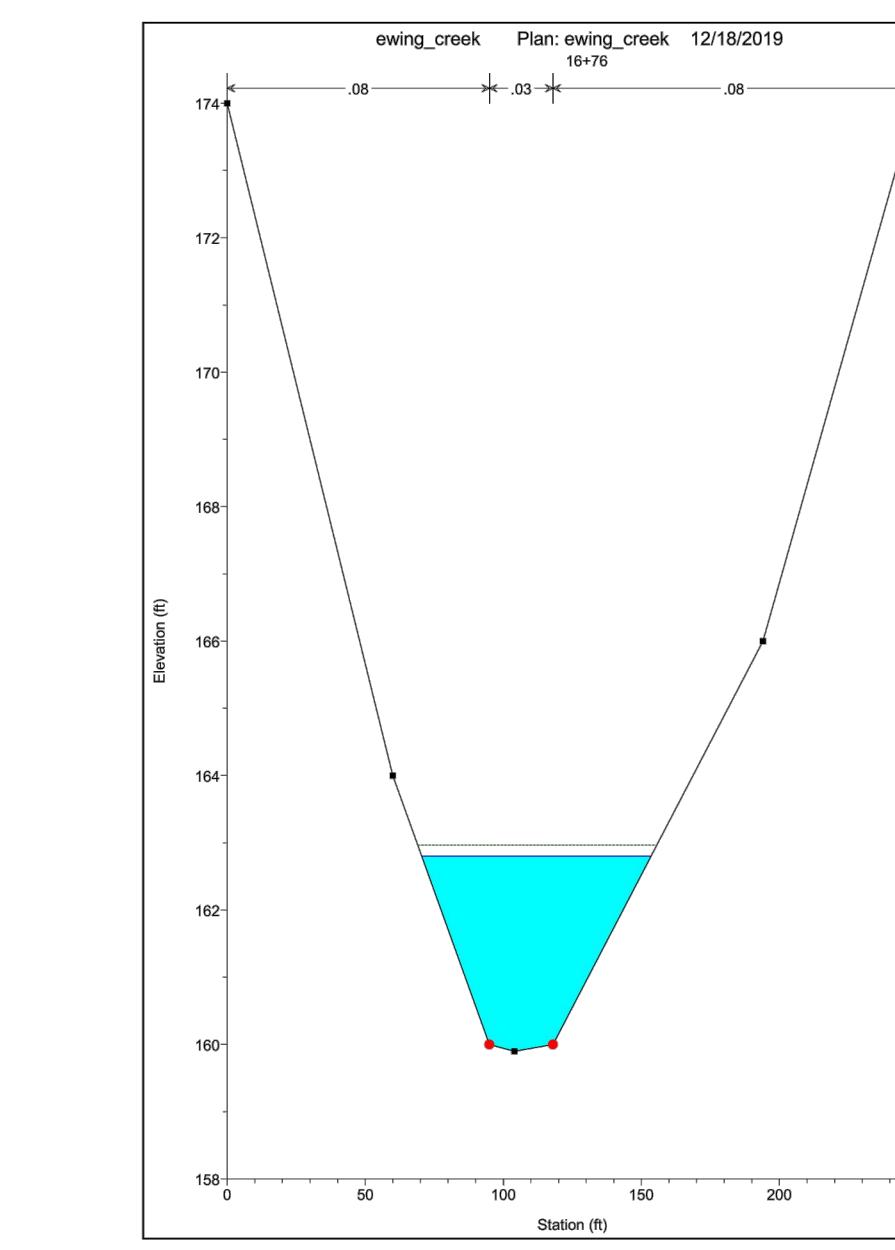
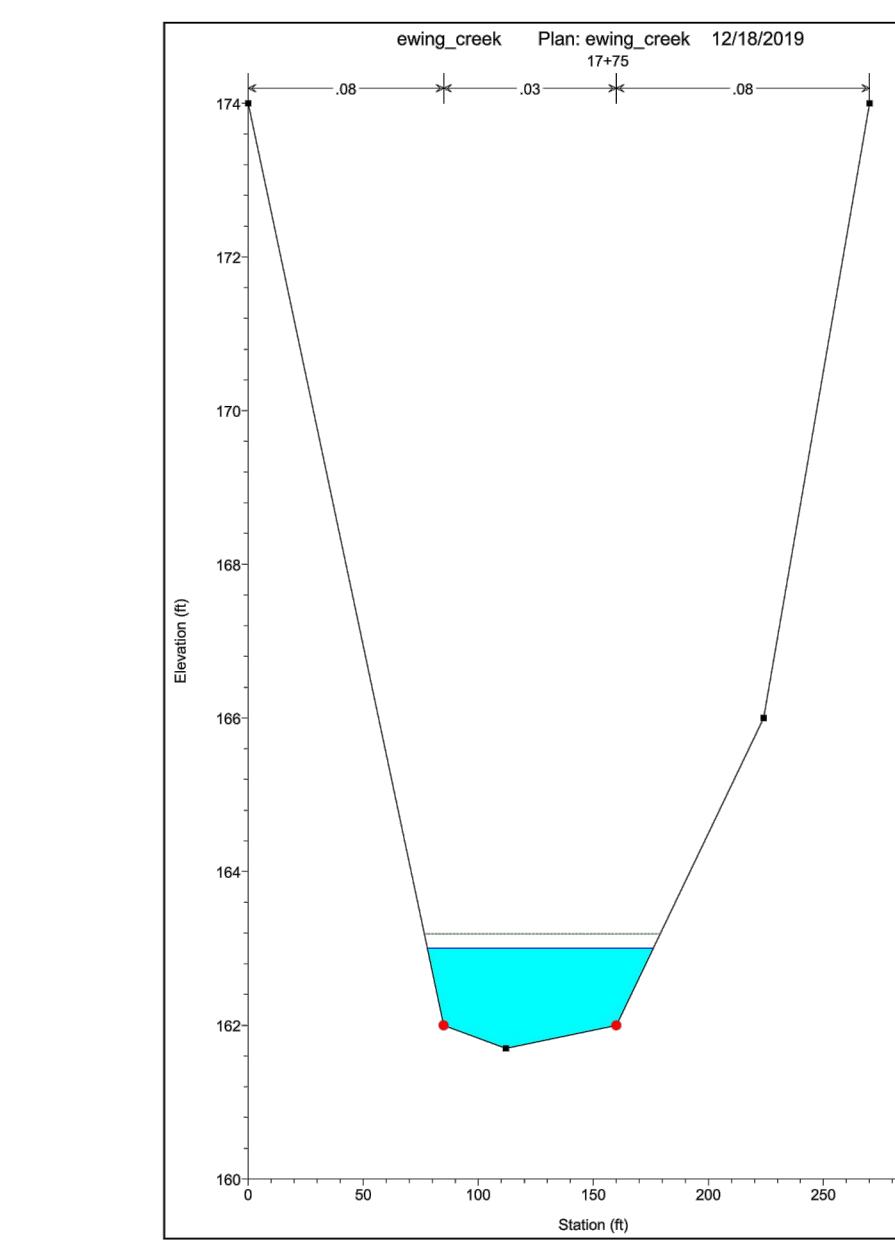
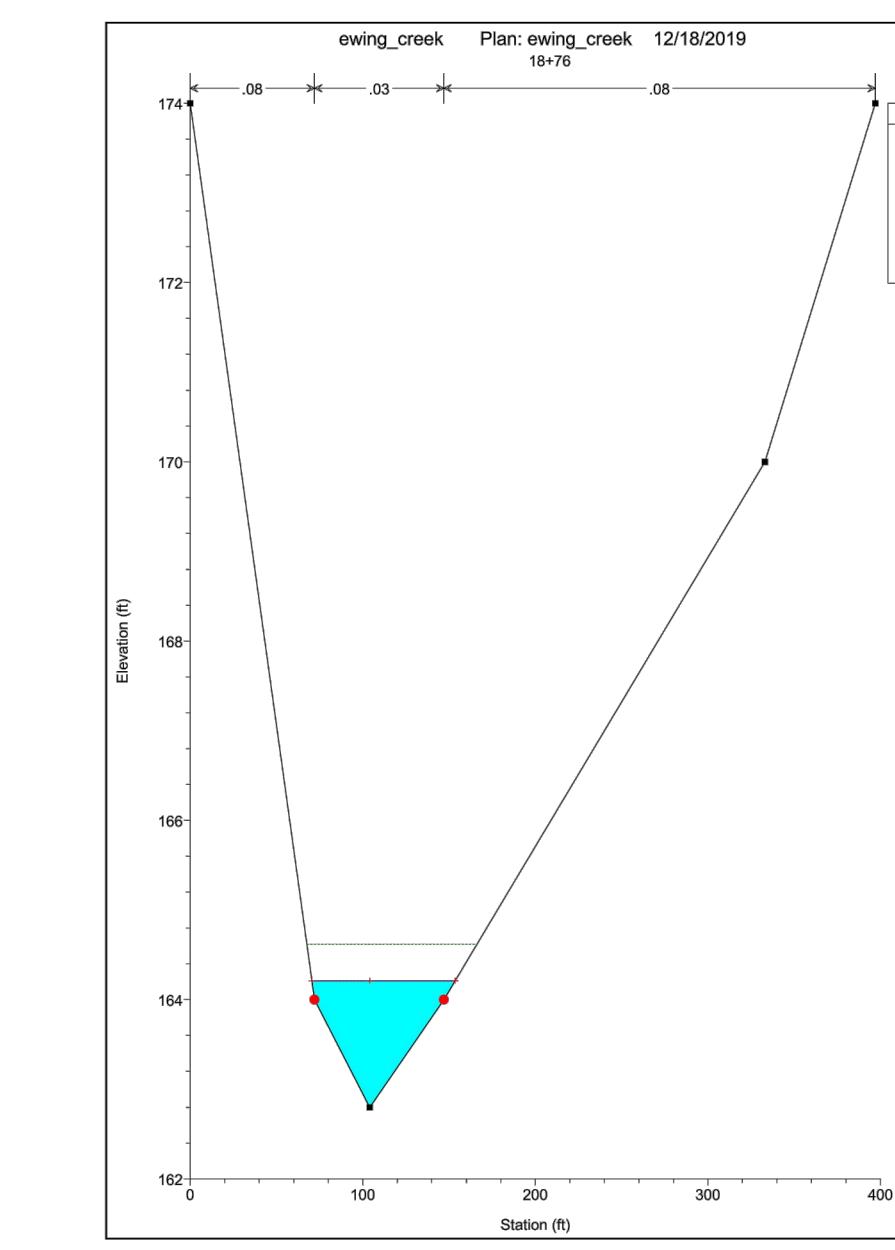
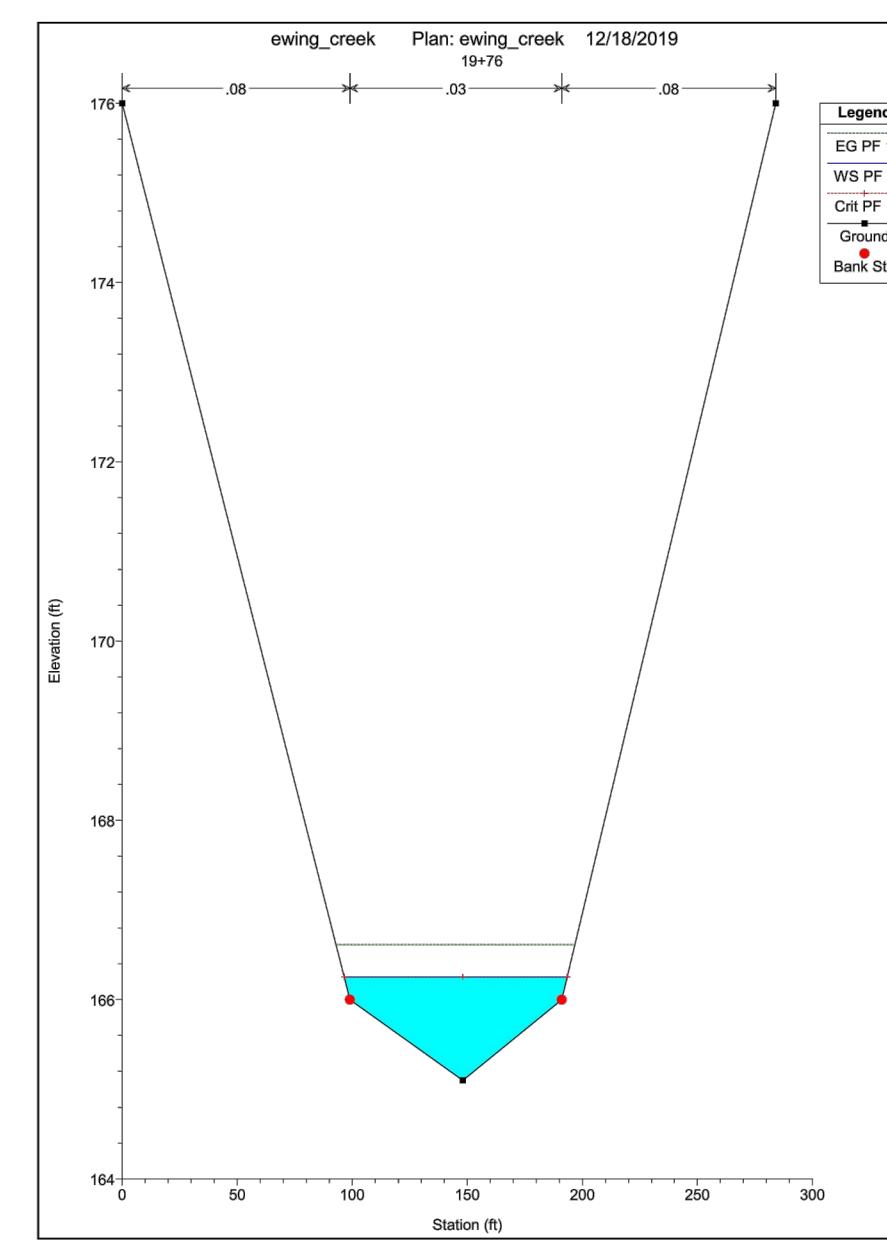
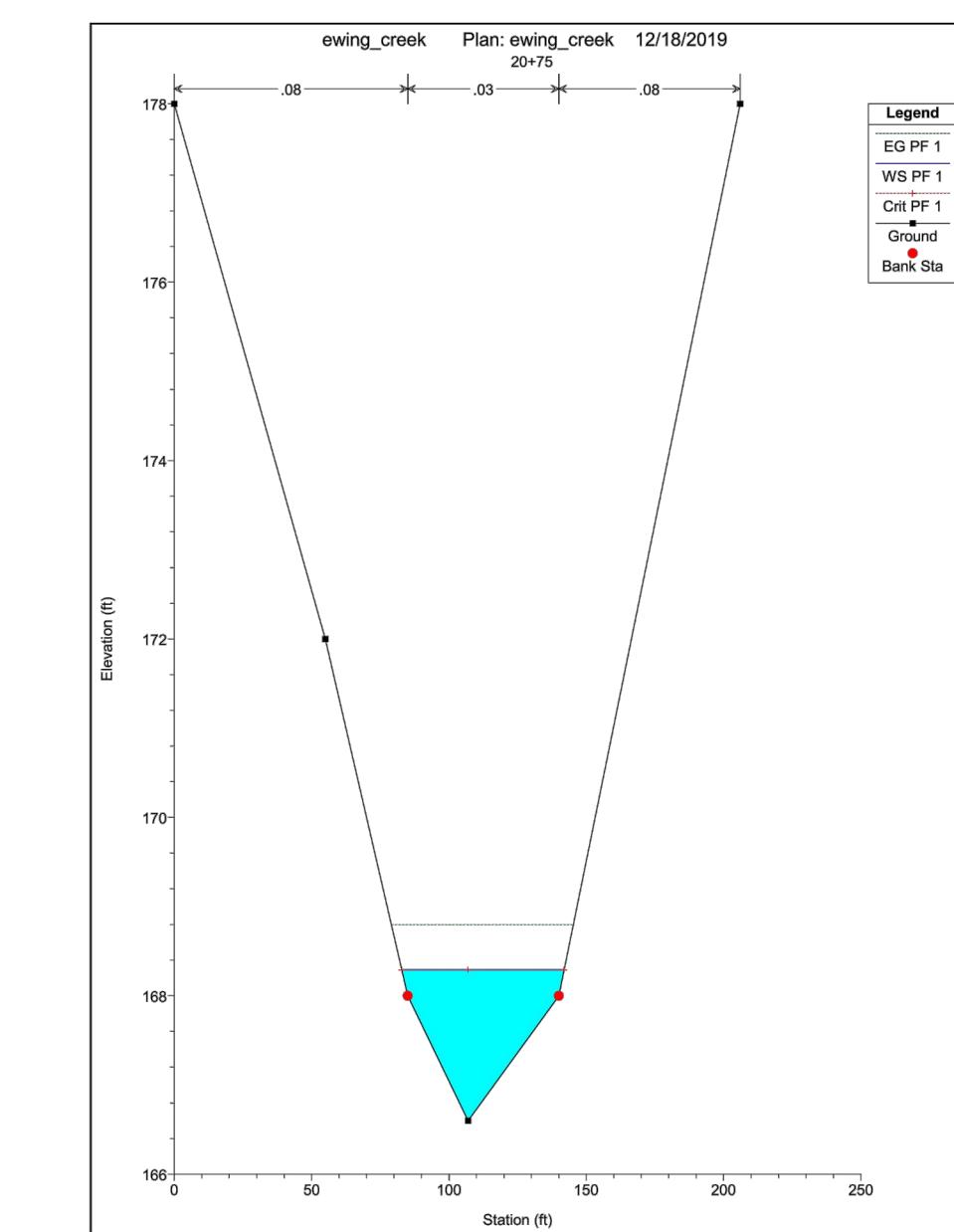
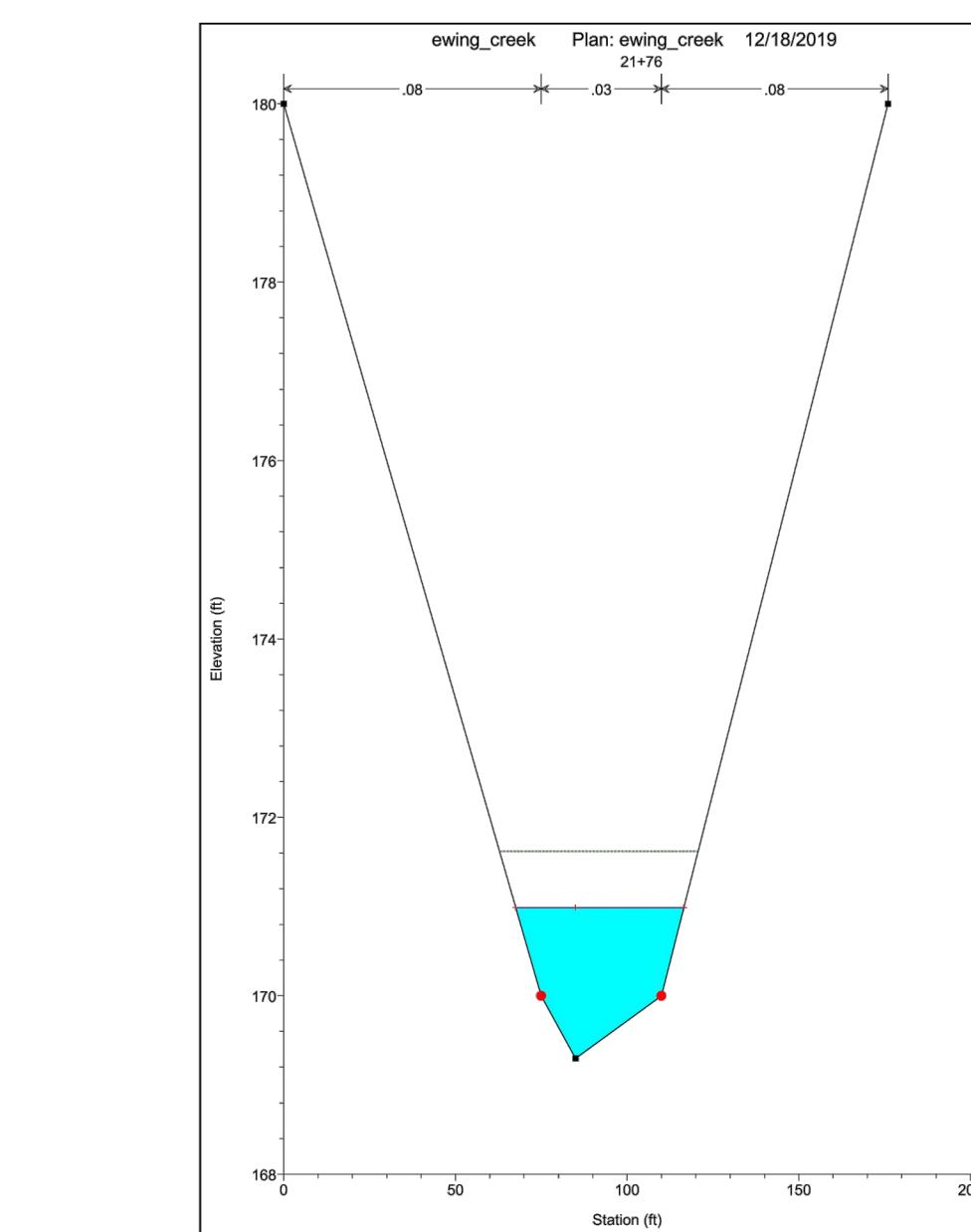
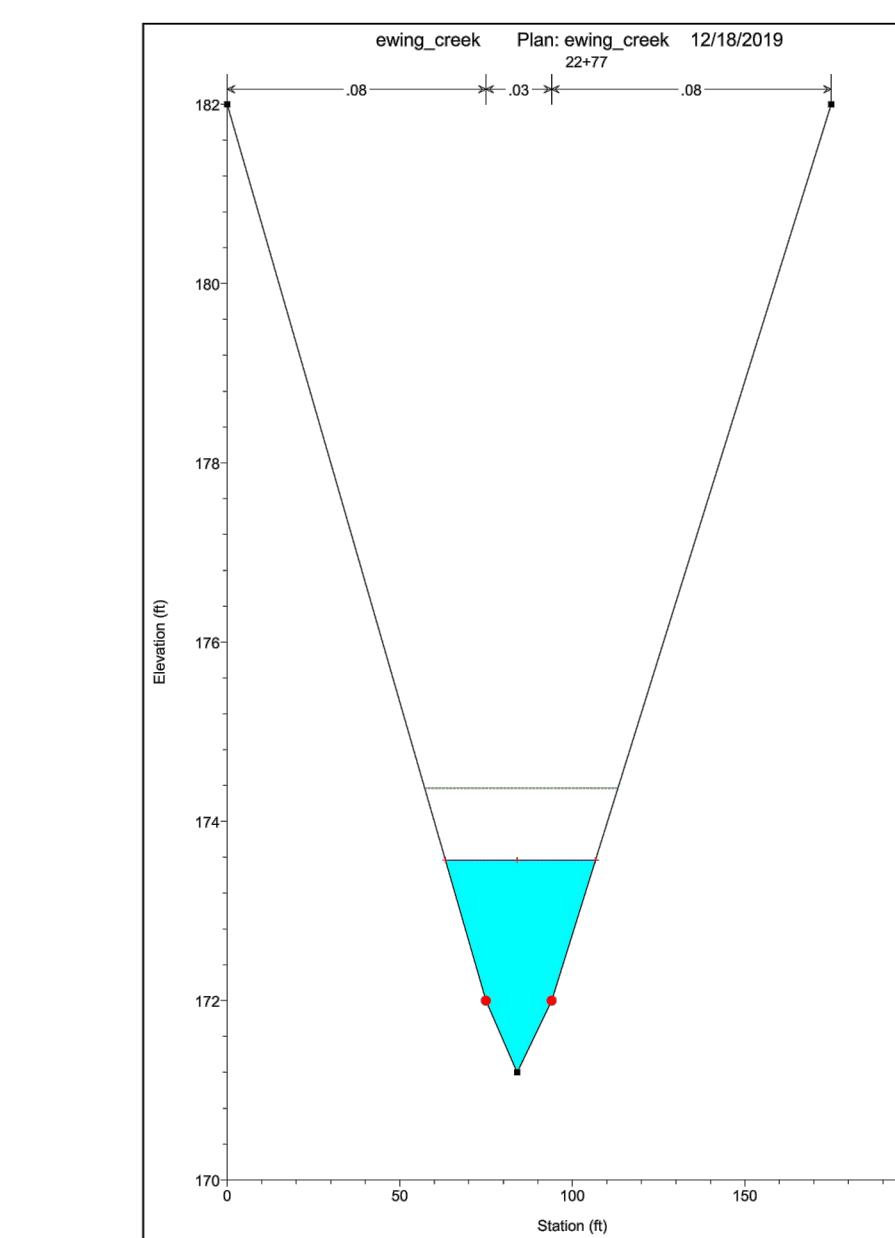
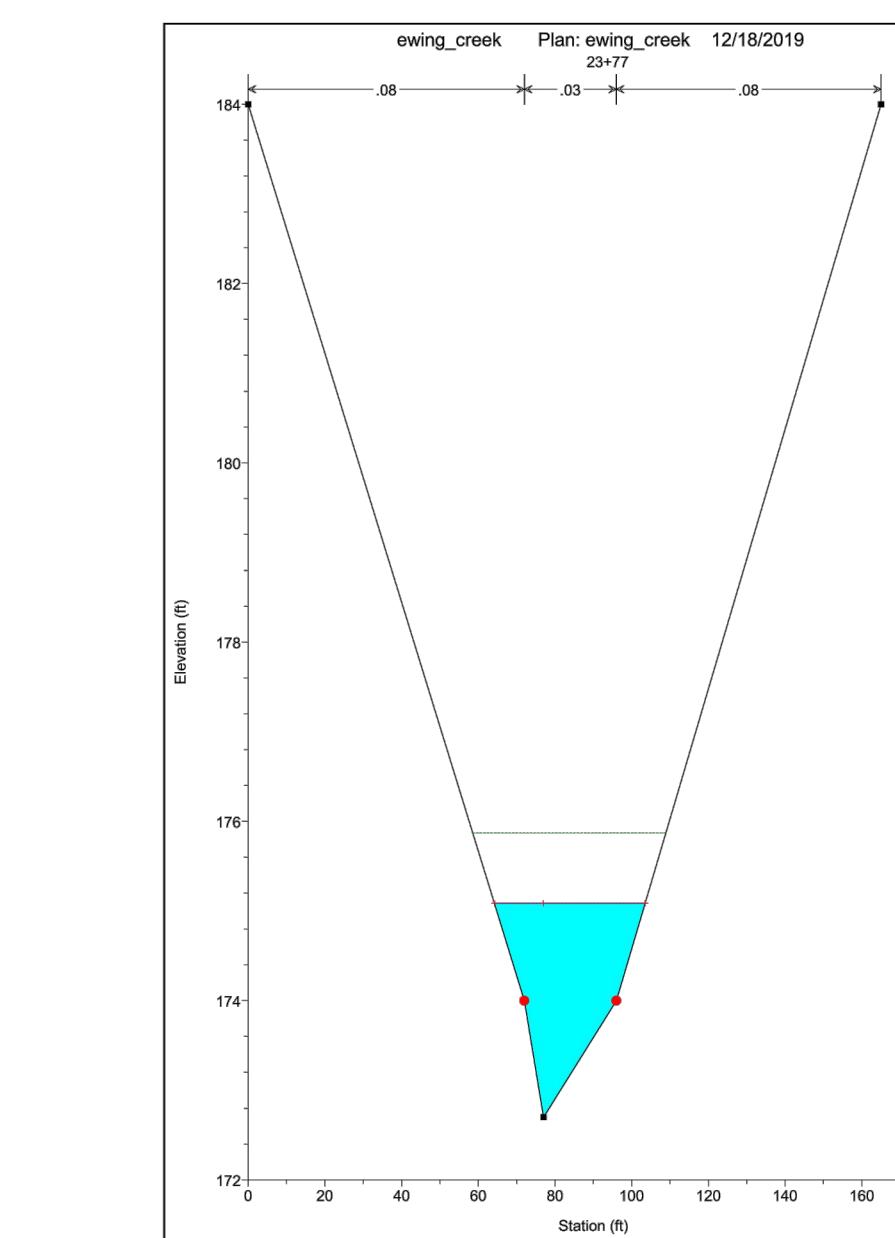
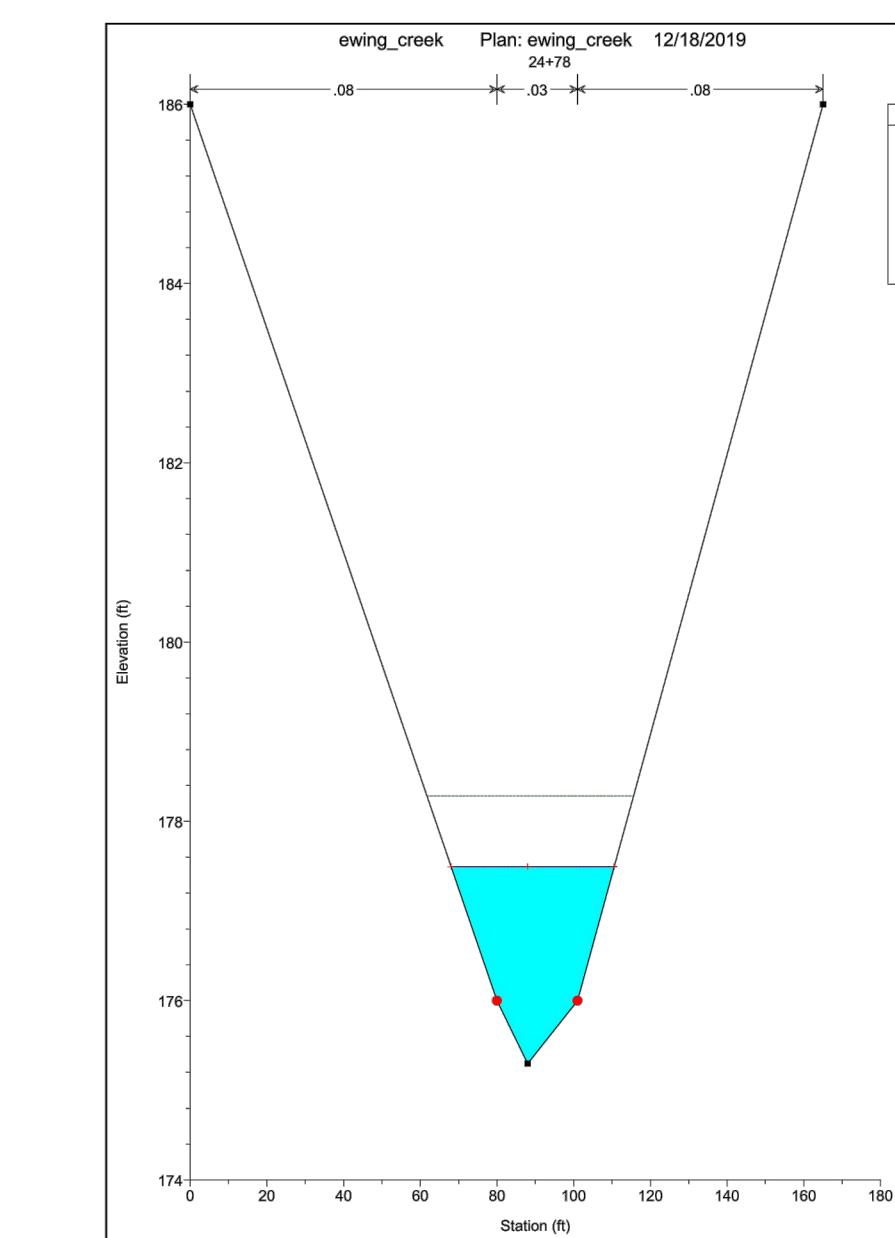
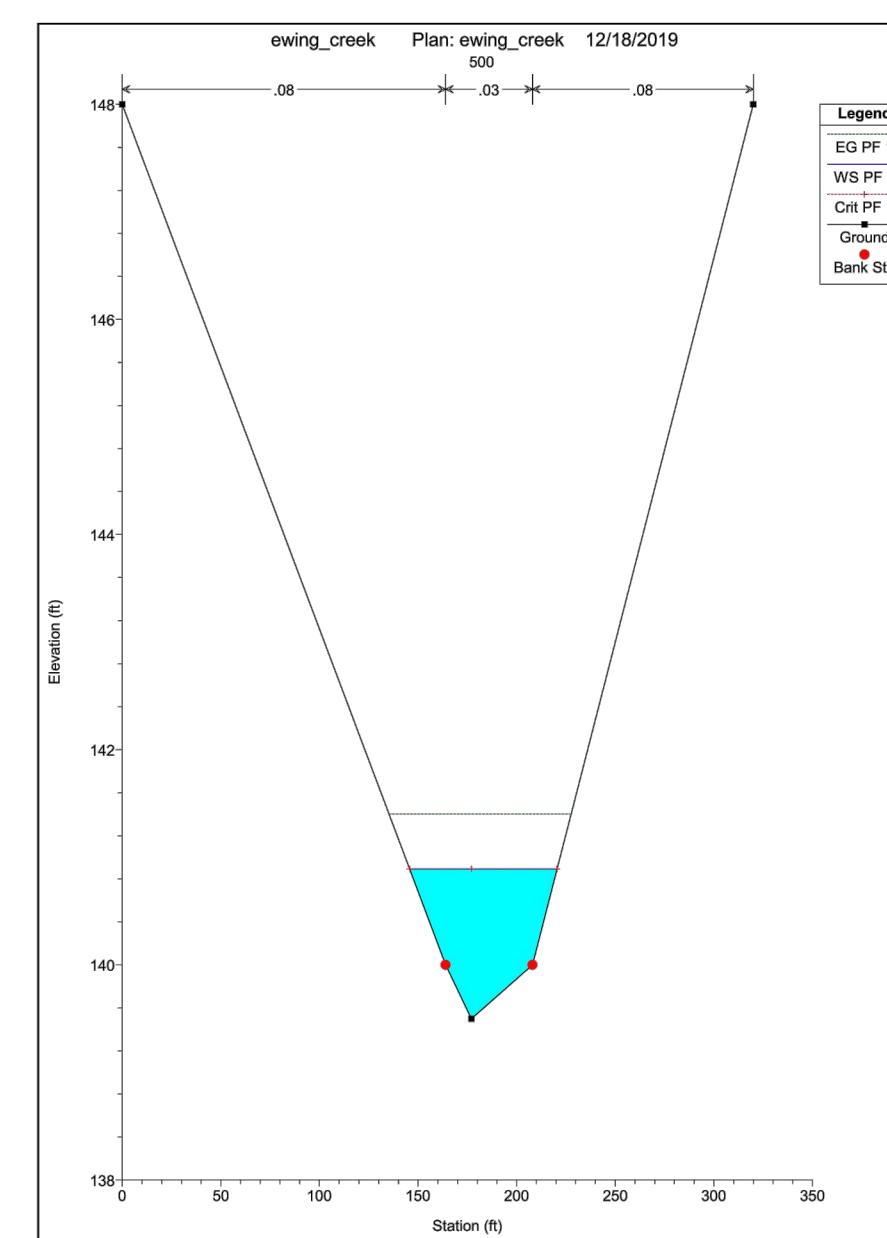


REFERENCES AND GENERAL NOTES:

1. TOPOGRAPHIC SURVEY PREPARED BY BOWMAN CONSULTING. HORIZONTAL DATUM IS BASED UPON THE NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD83), PER GPS OBSERVATIONS UTILIZING TOPNET. VERTICAL DATUM IS BASED UPON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), PER GPS OBSERVATIONS UTILIZING TOPNET.
2. WETLANDS DELINEATION PERFORMED BY ENVIROTACTICS.
3. THE STATE OF NEW JERSEY HAS DETERMINED THAT ALL OR A PORTION OF THIS LOT LIES IN A FLOOD HAZARD AREA AND/OR RIPARIAN ZONE. CERTAIN ACTIVITIES IN FLOOD HAZARD AREAS AND RIPARIAN ZONES ARE REGULATED BY THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND SOME ACTIVITIES MAY BE PROHIBITED ON THIS SITE OR MAY FIRST REQUIRE A FLOOD HAZARD AREA PERMIT. CONTACT THE DIVISION OF LAND USE REGULATION AT 609-292-0060 OR www.nj.gov/dep/landuse FOR MORE INFORMATION PRIOR TO ANY CONSTRUCTION ON SITE.
4. METHOD 6 DESCRIBED IN NJAC 7:13-3.6 WAS UTILIZED TO DETERMINE THE FLOOD HAZARD AREA ASSOCIATED WITH THE ONSITE TRIBUTARIES.
5. APPLICANT:
US Home Corporation dba Lennar
2465 Kuser Road
Hamilton, New Jersey 08690

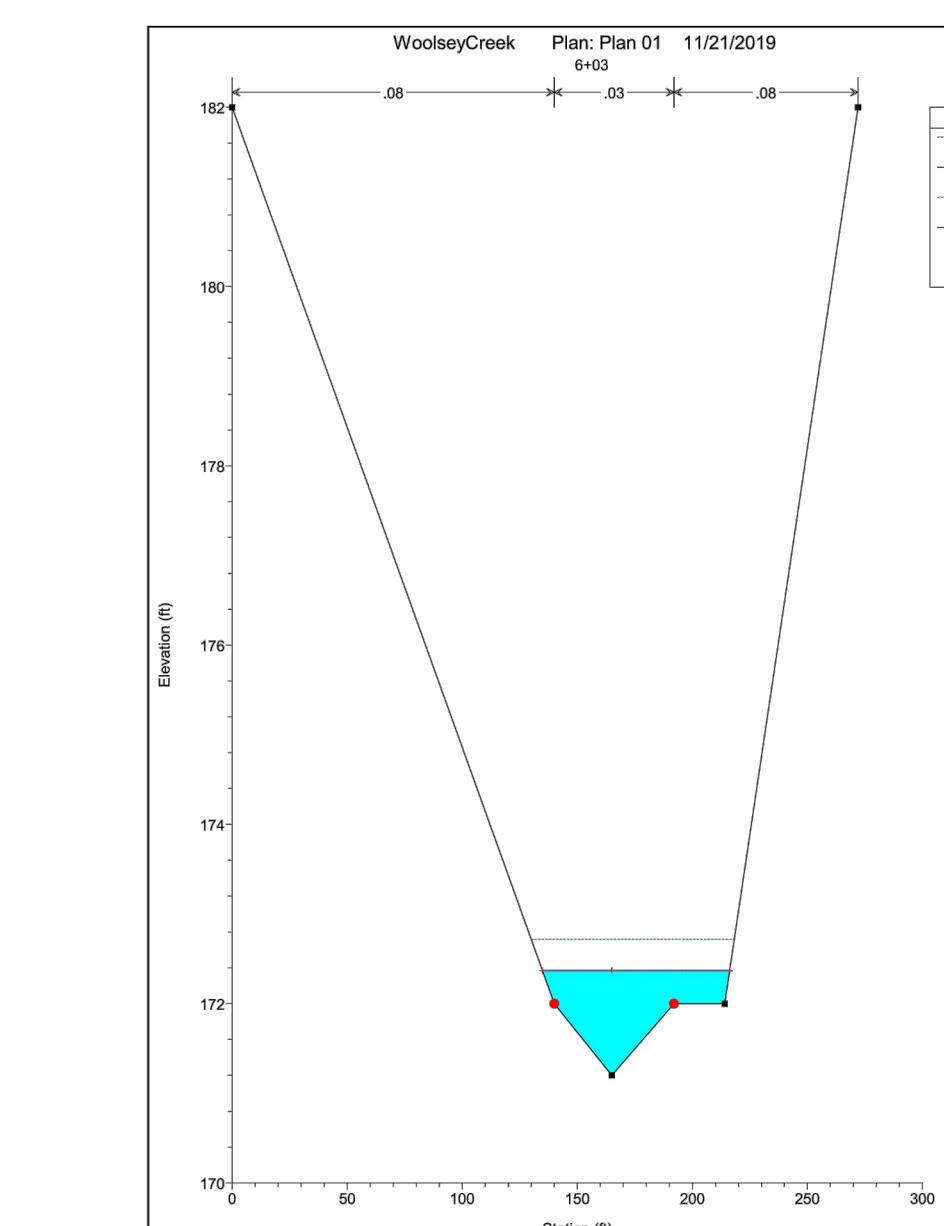
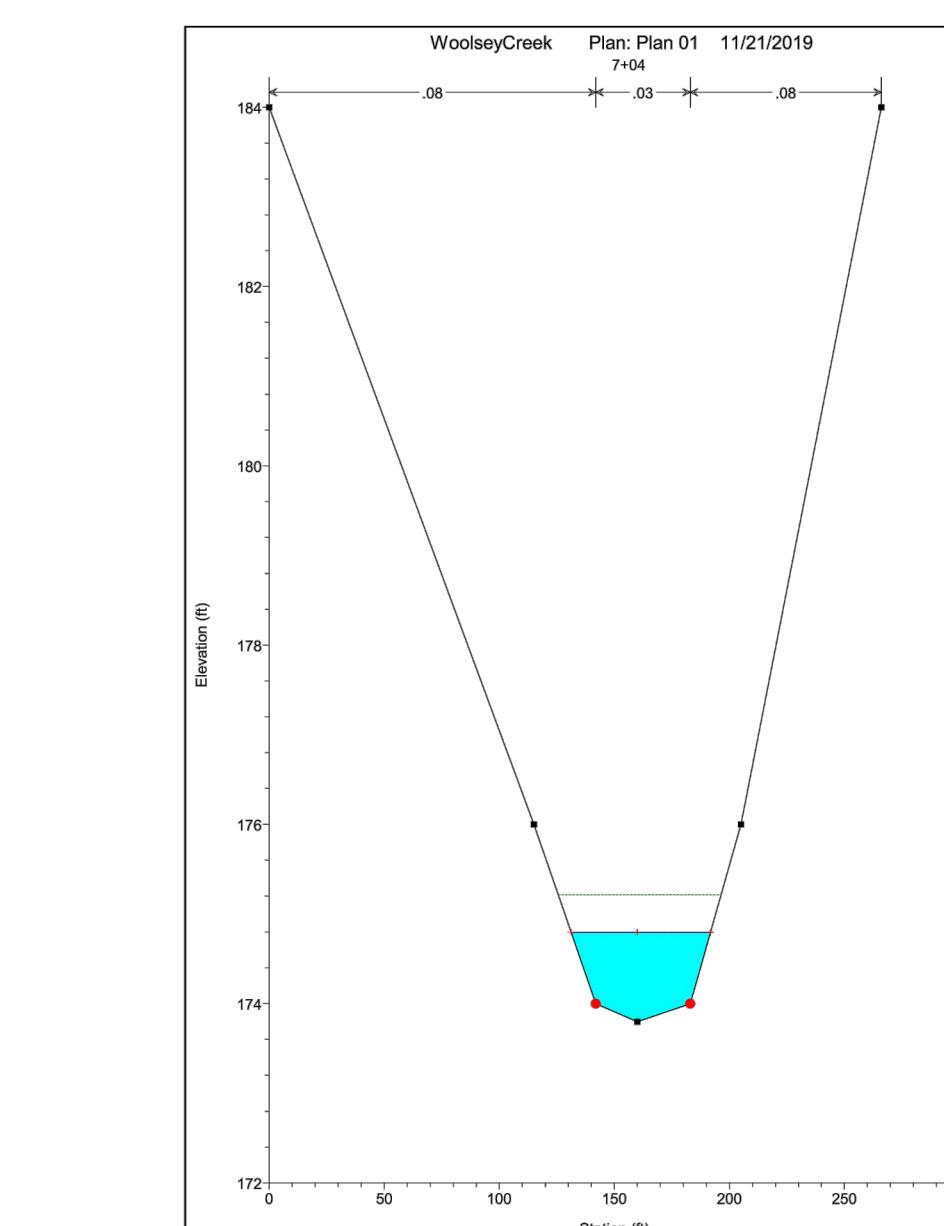
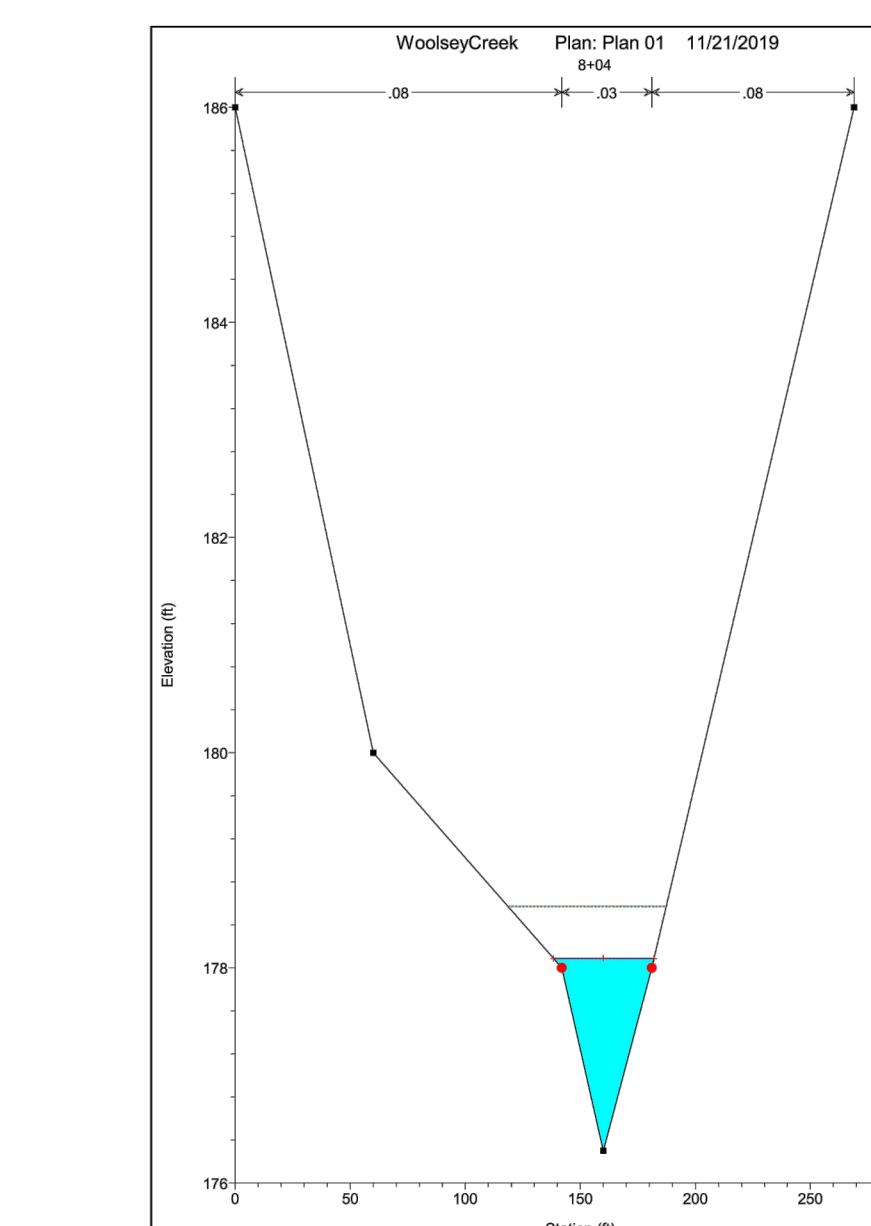
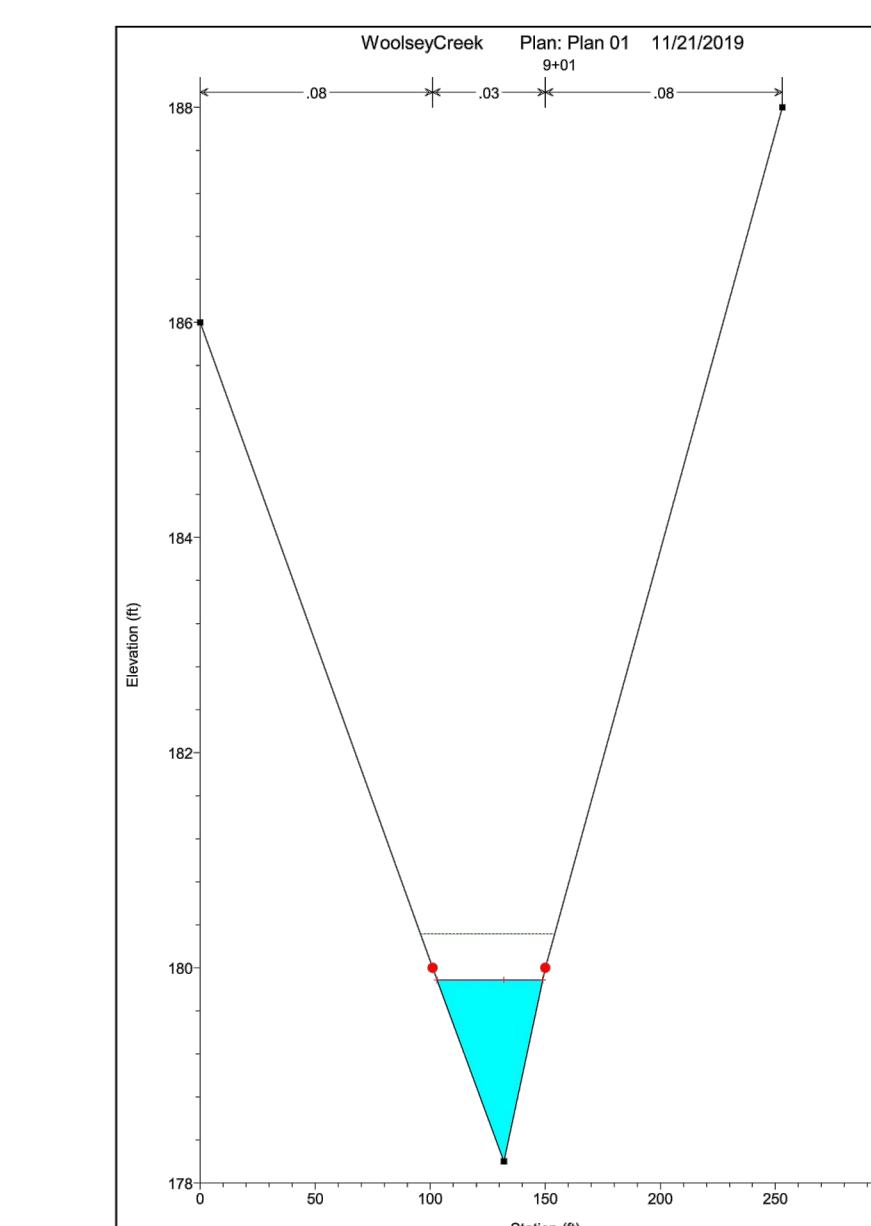
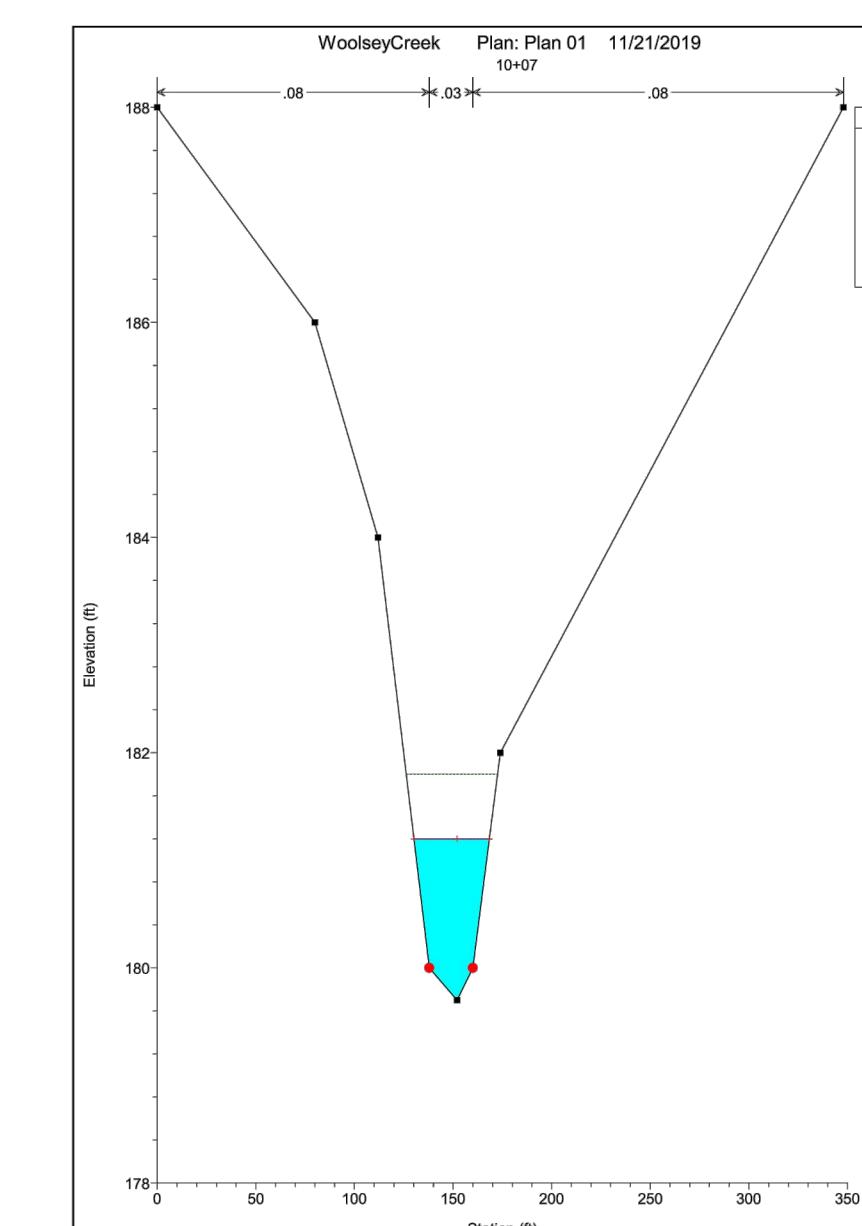
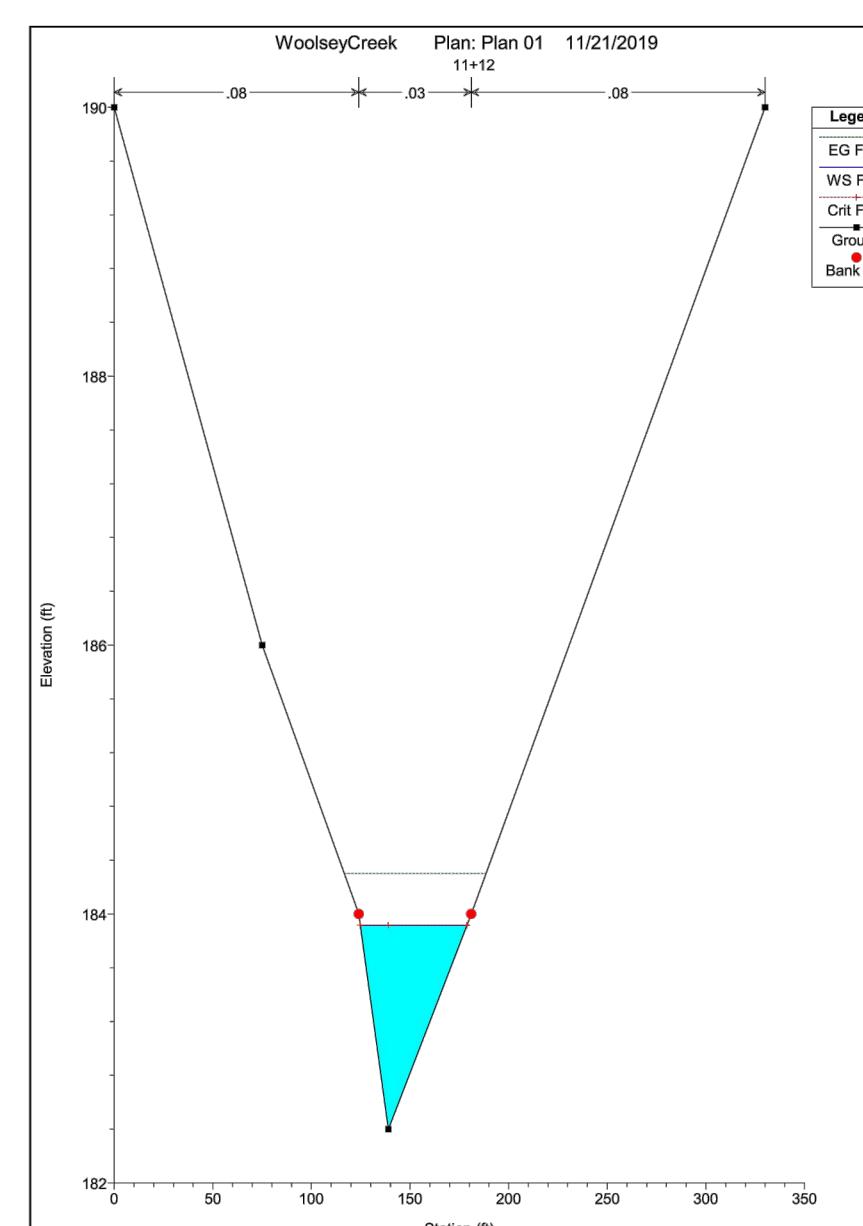
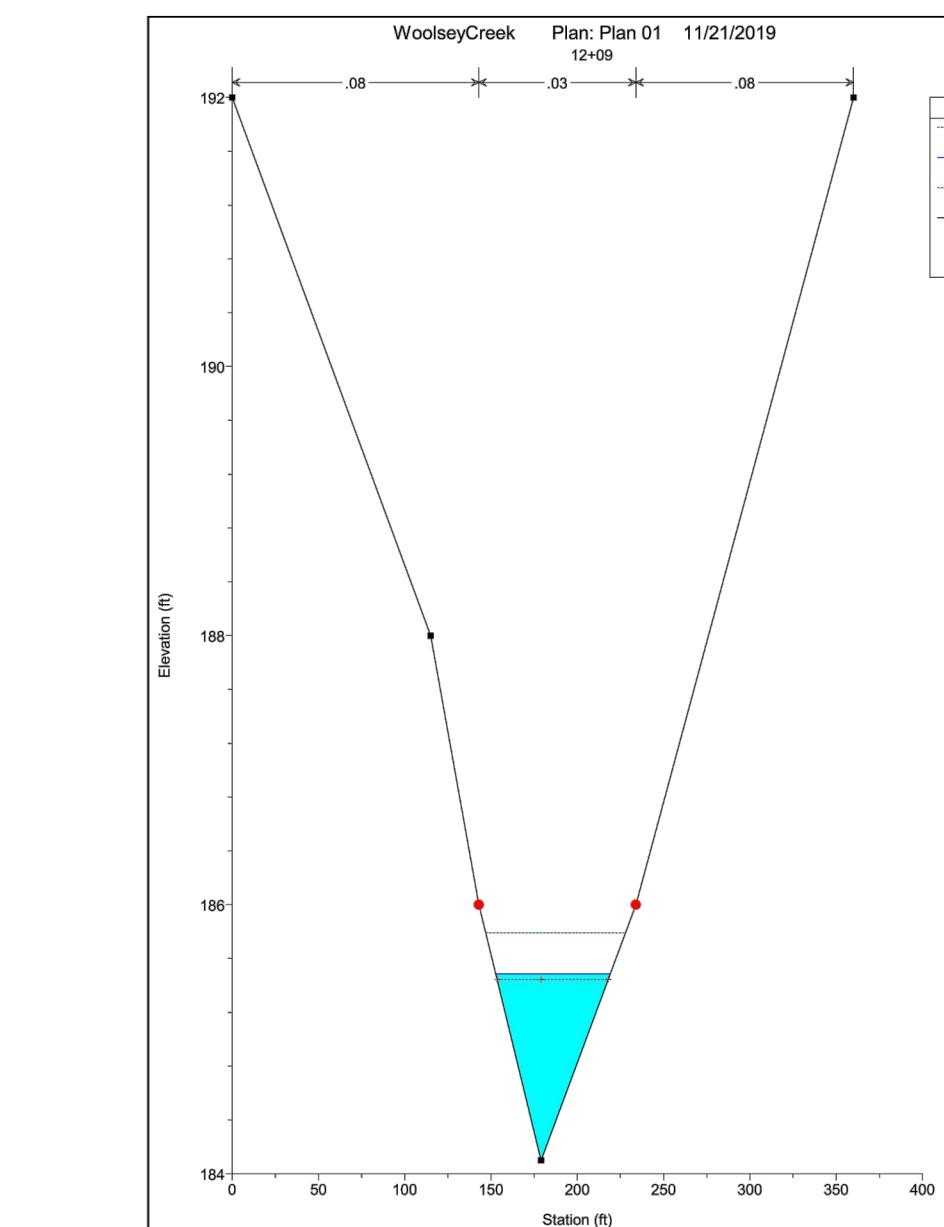
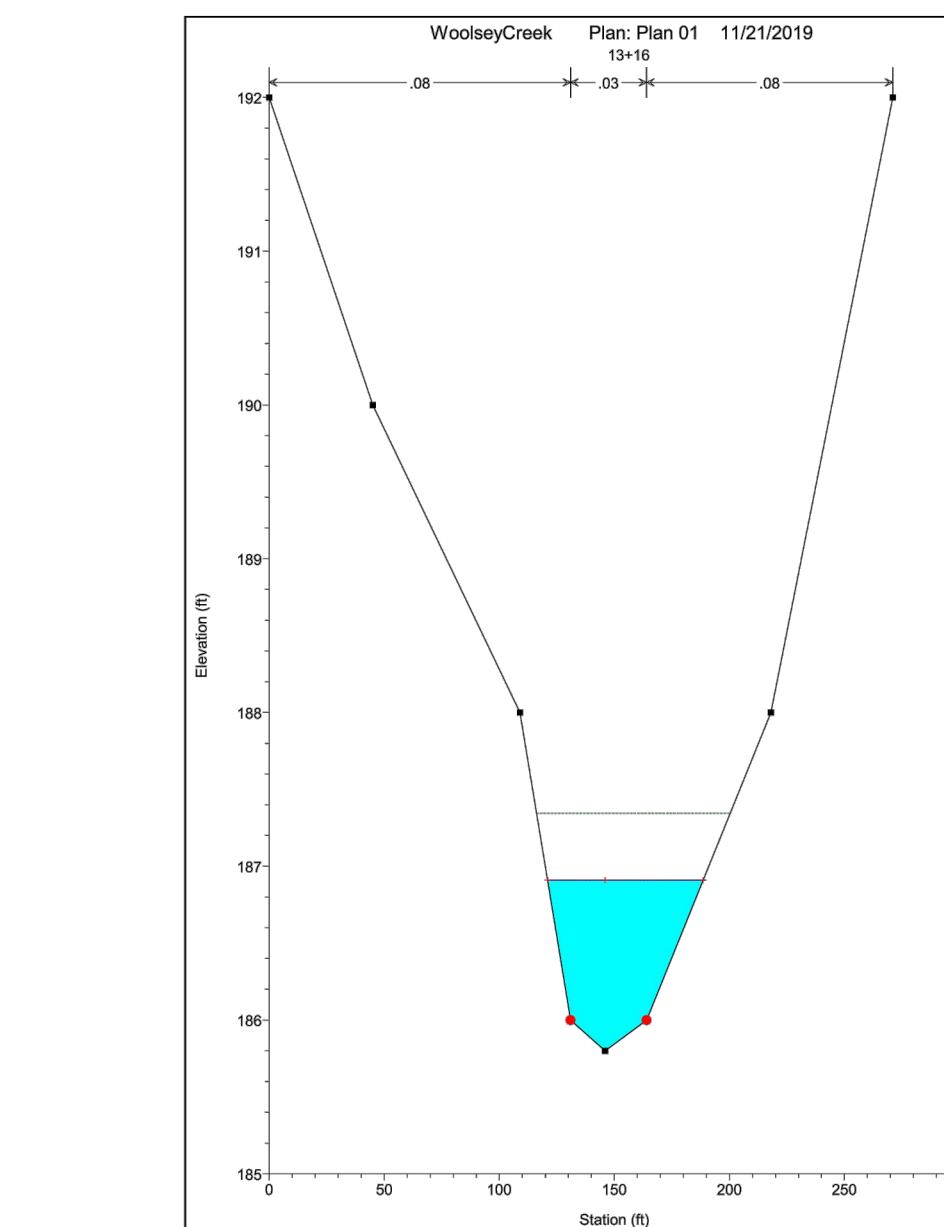
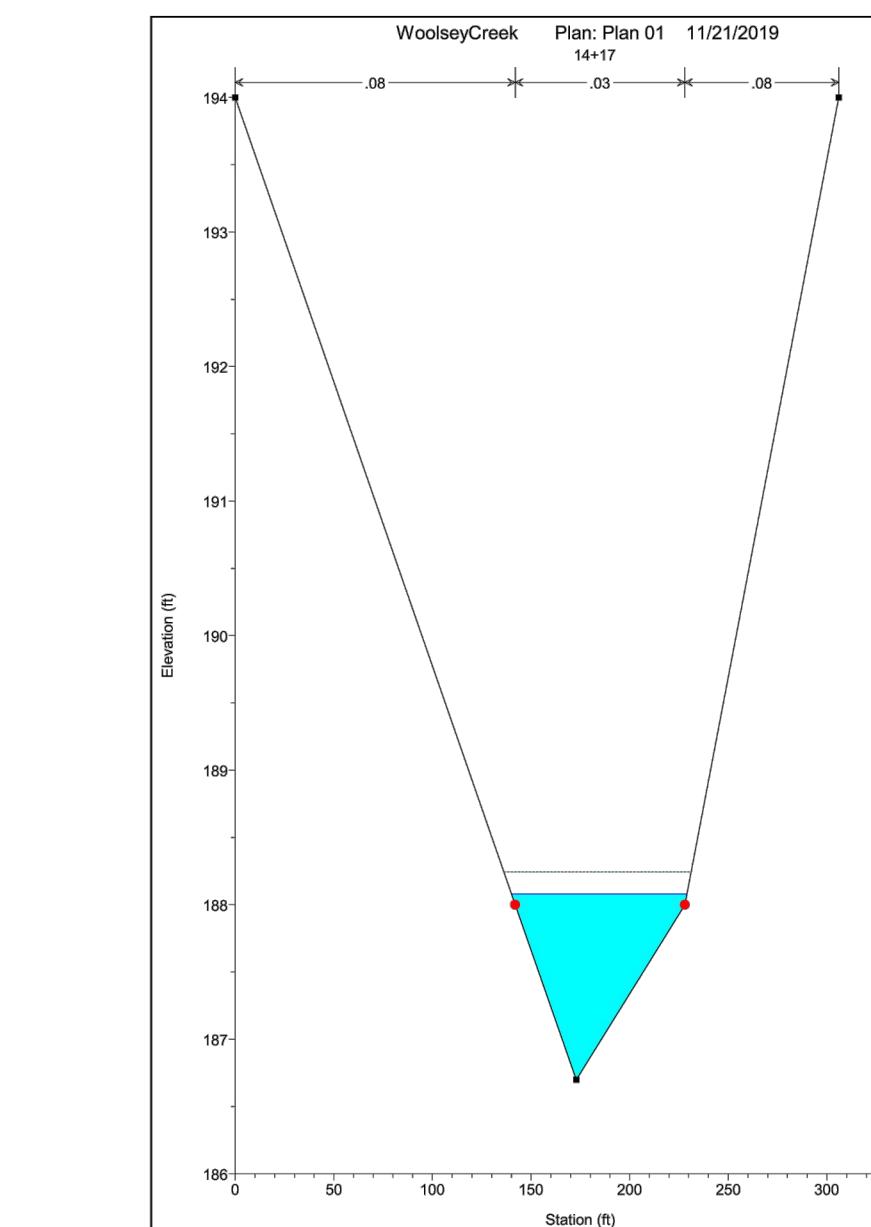
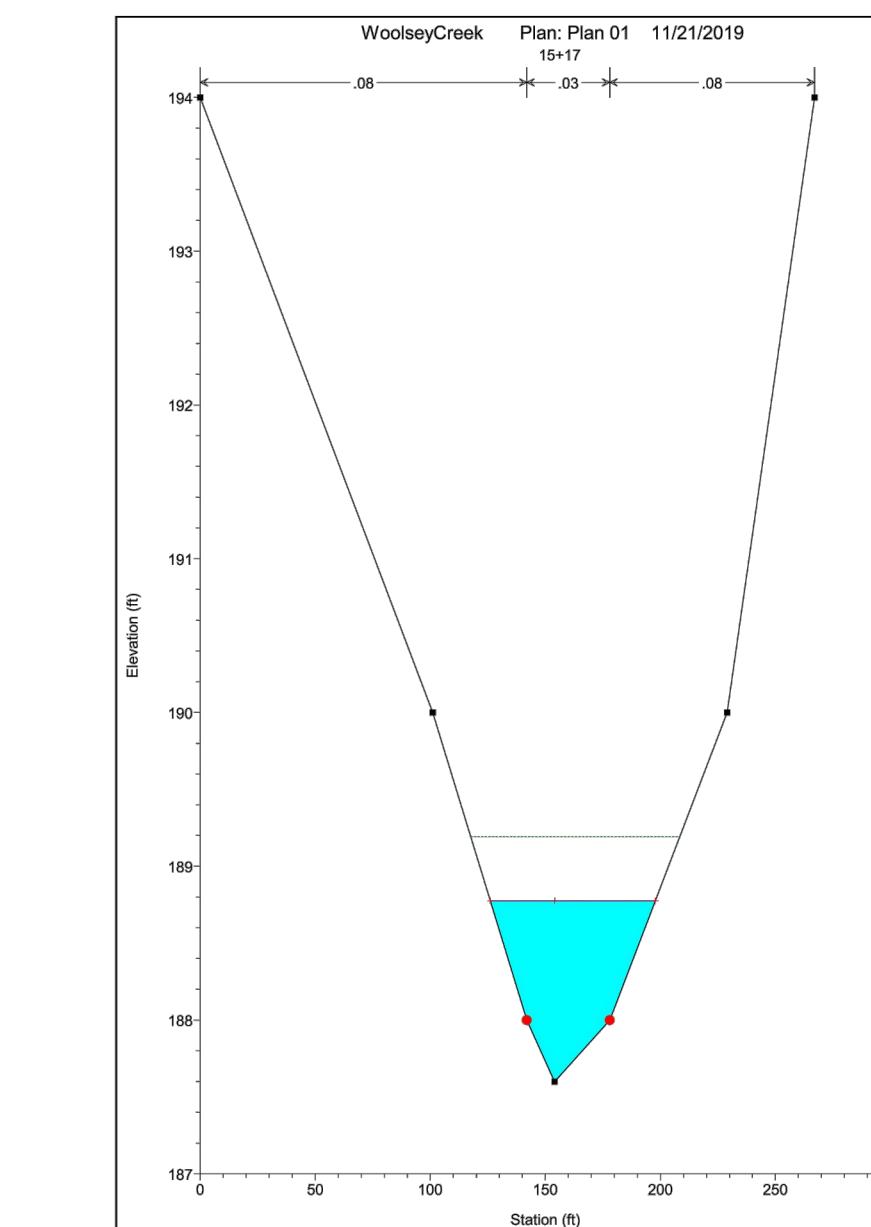
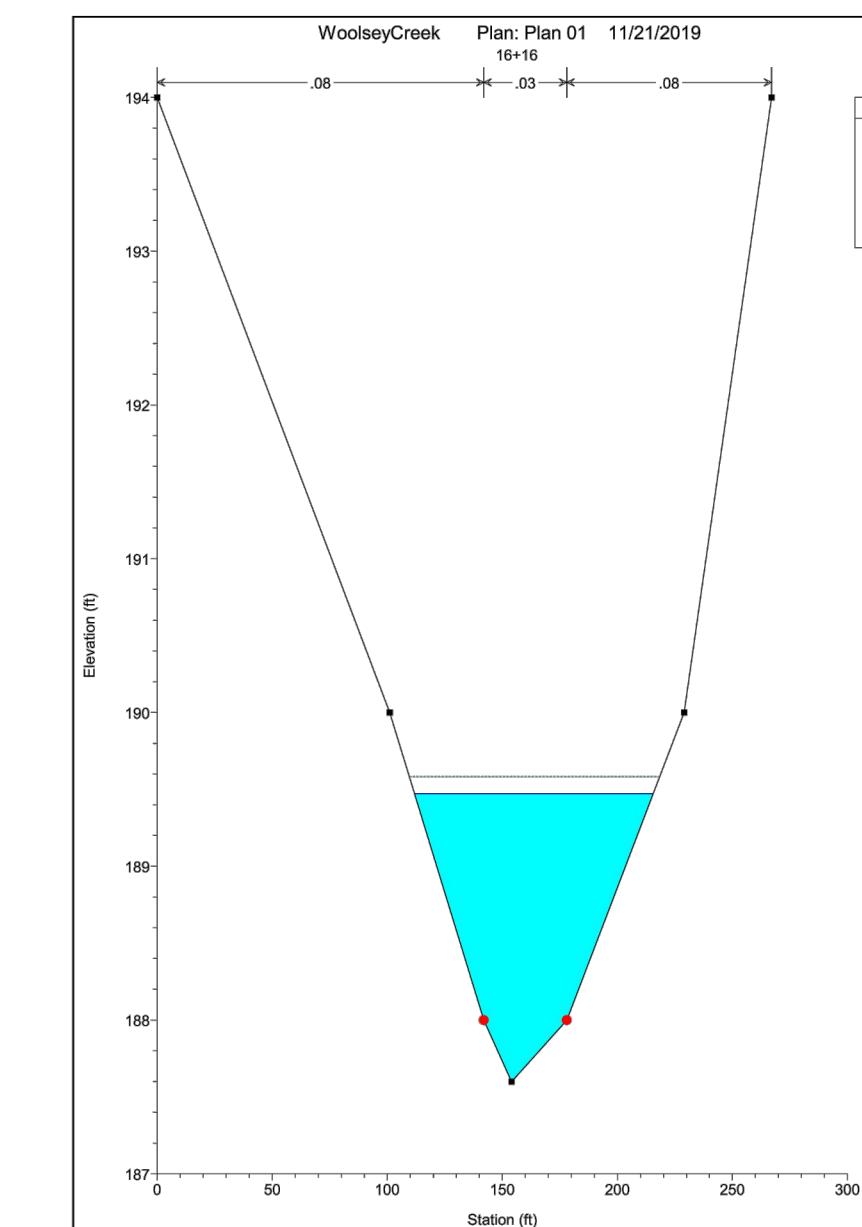
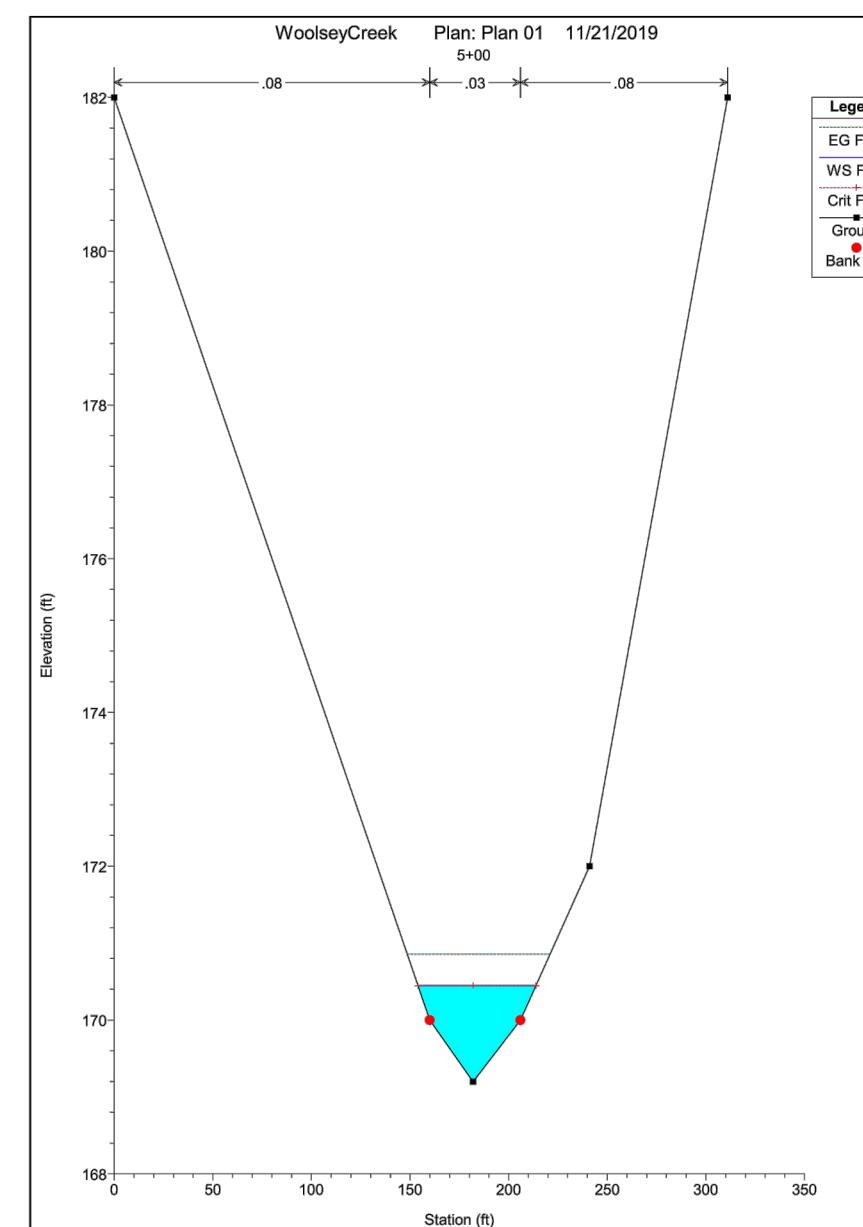
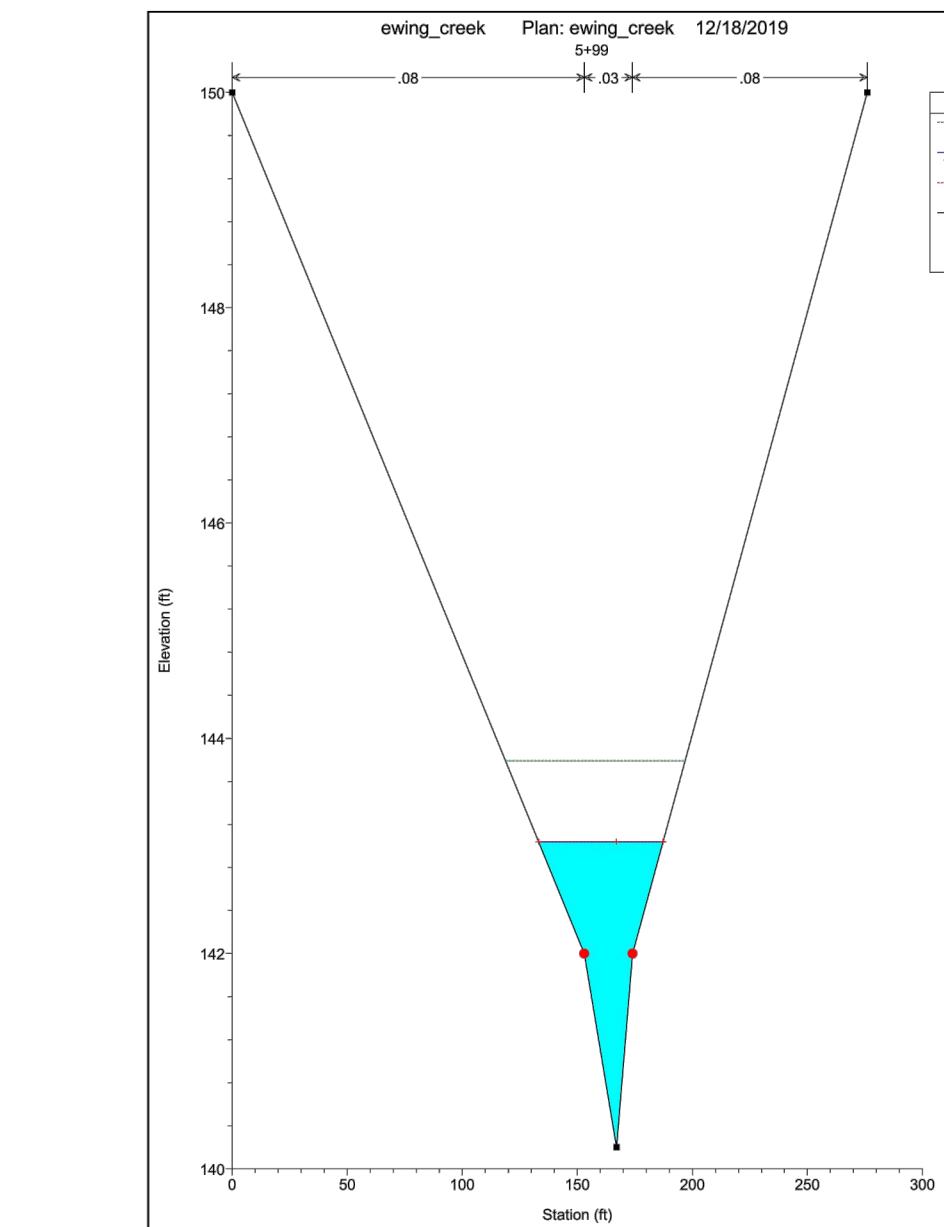
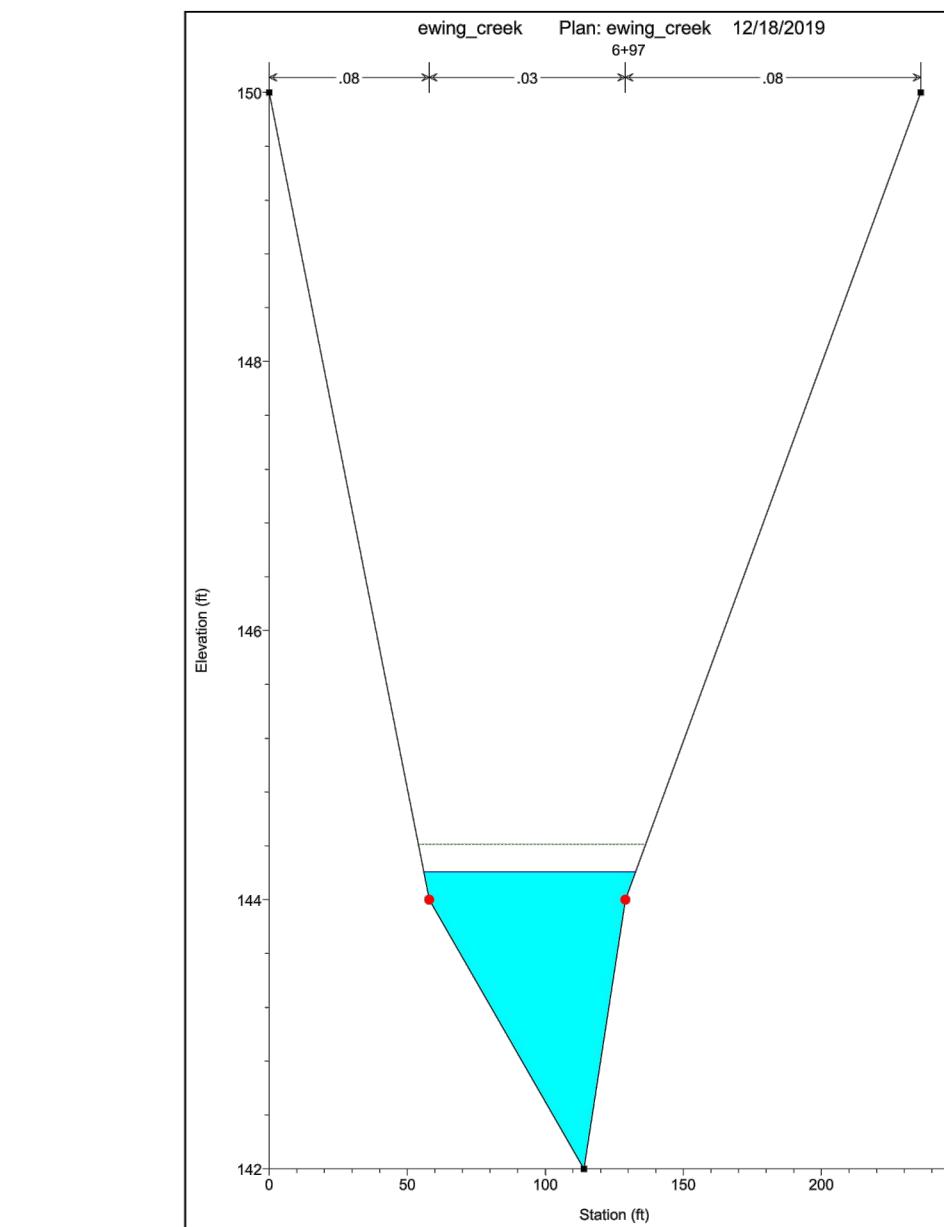
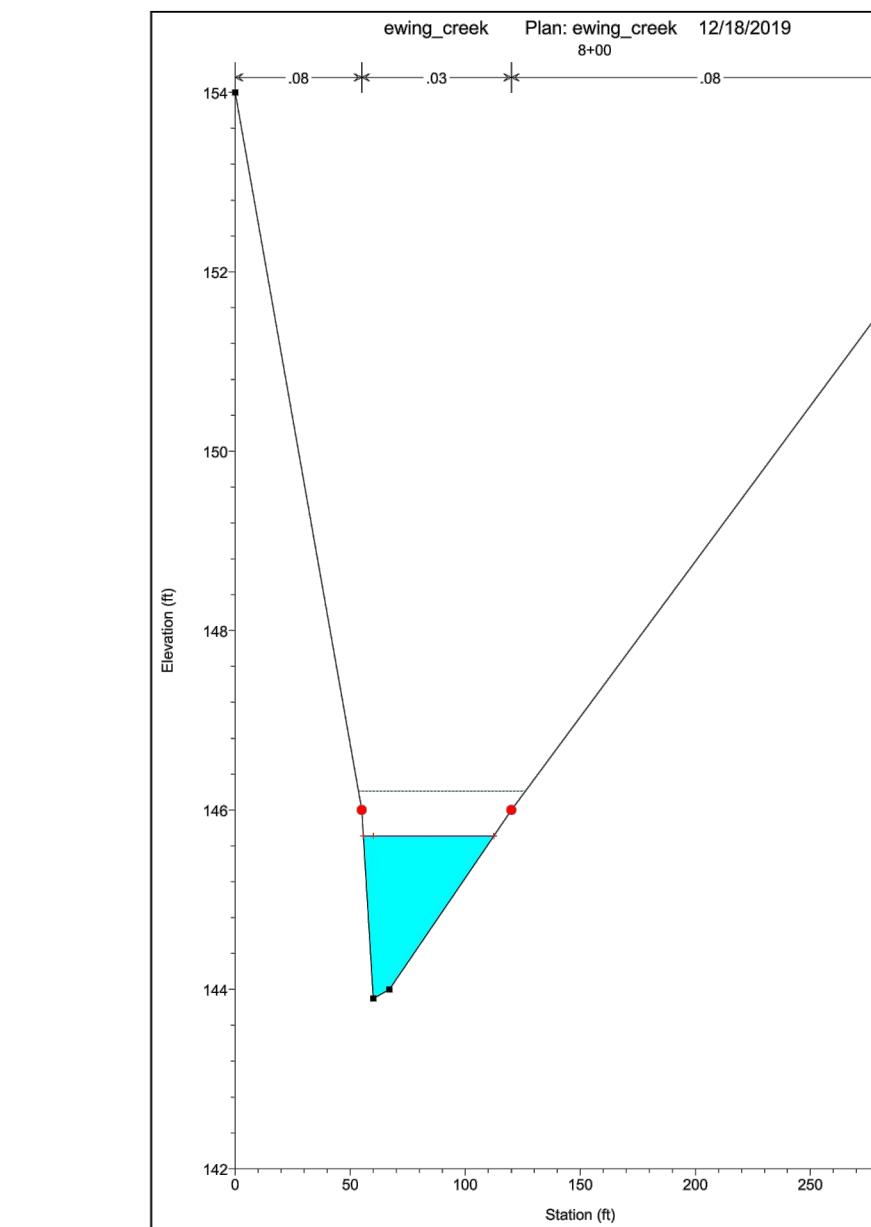
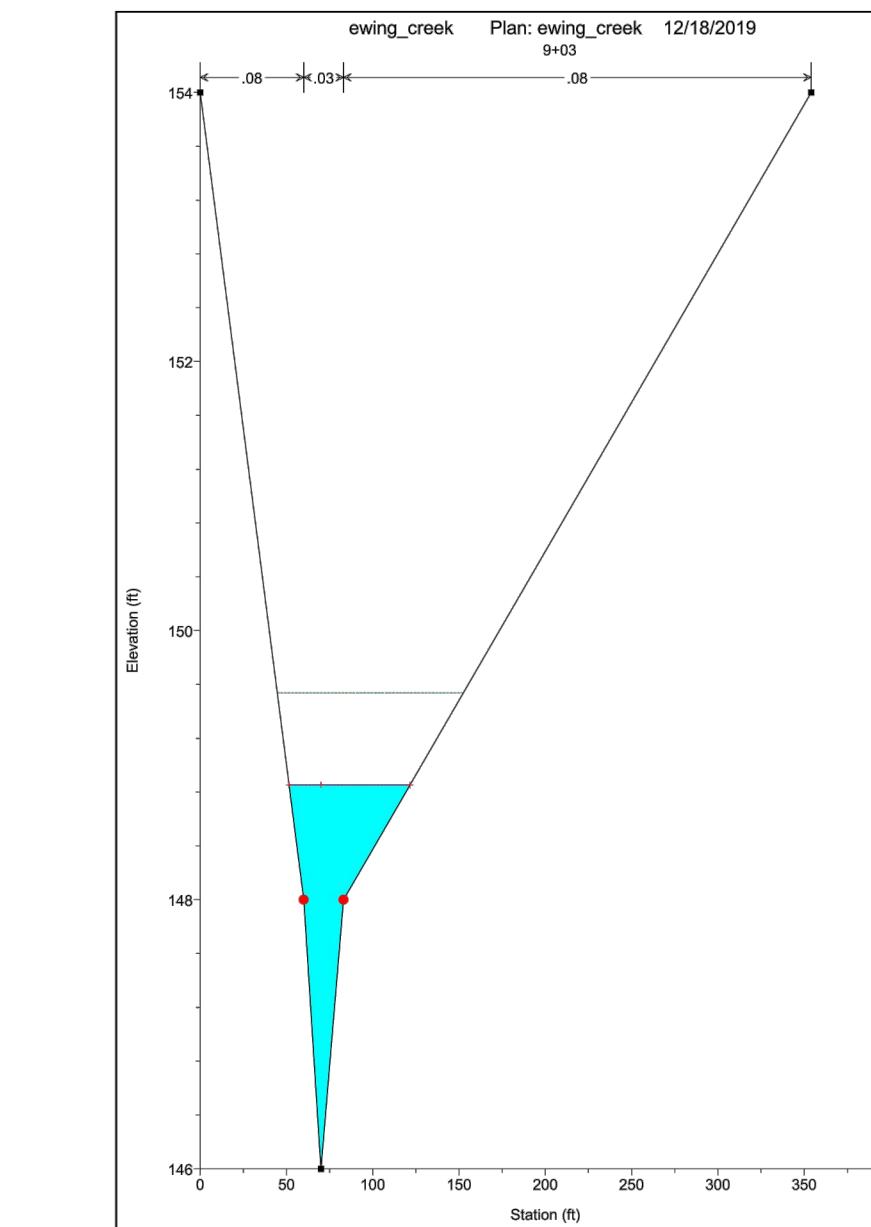
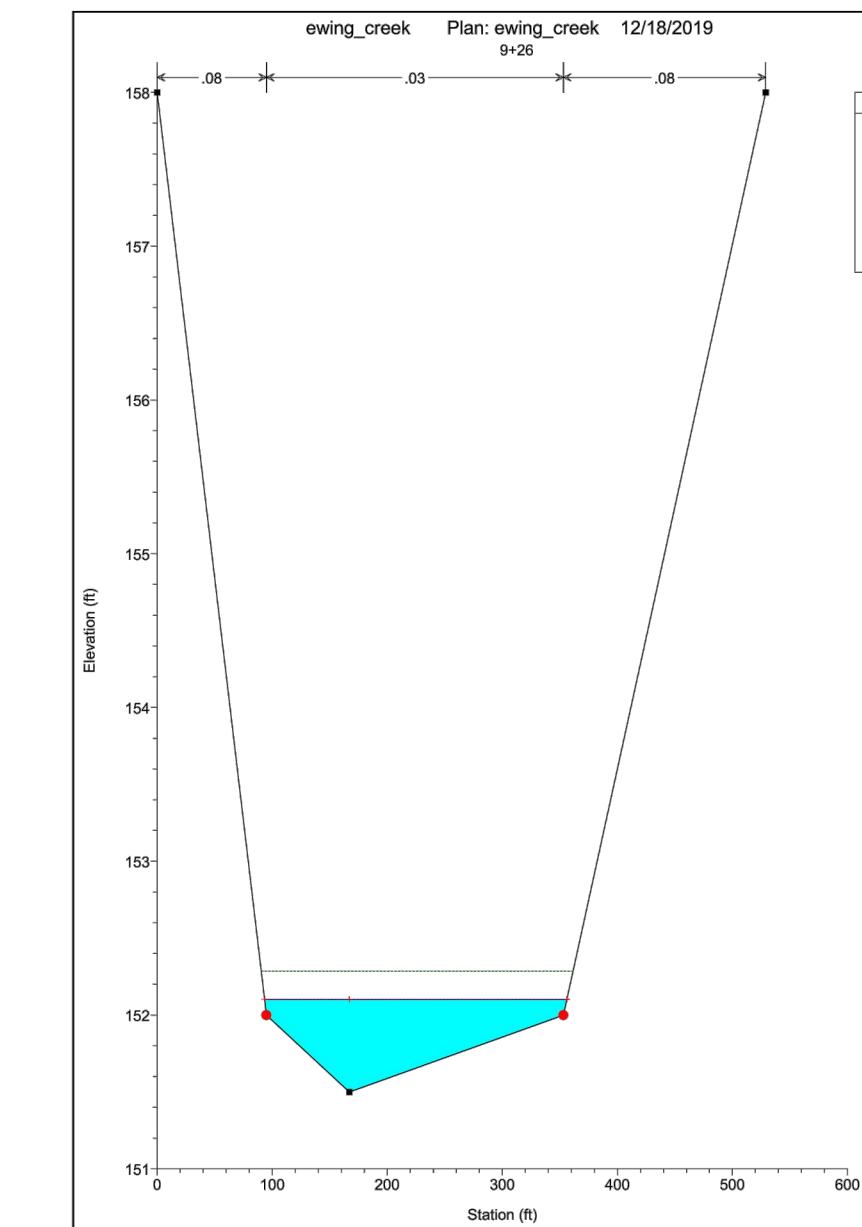
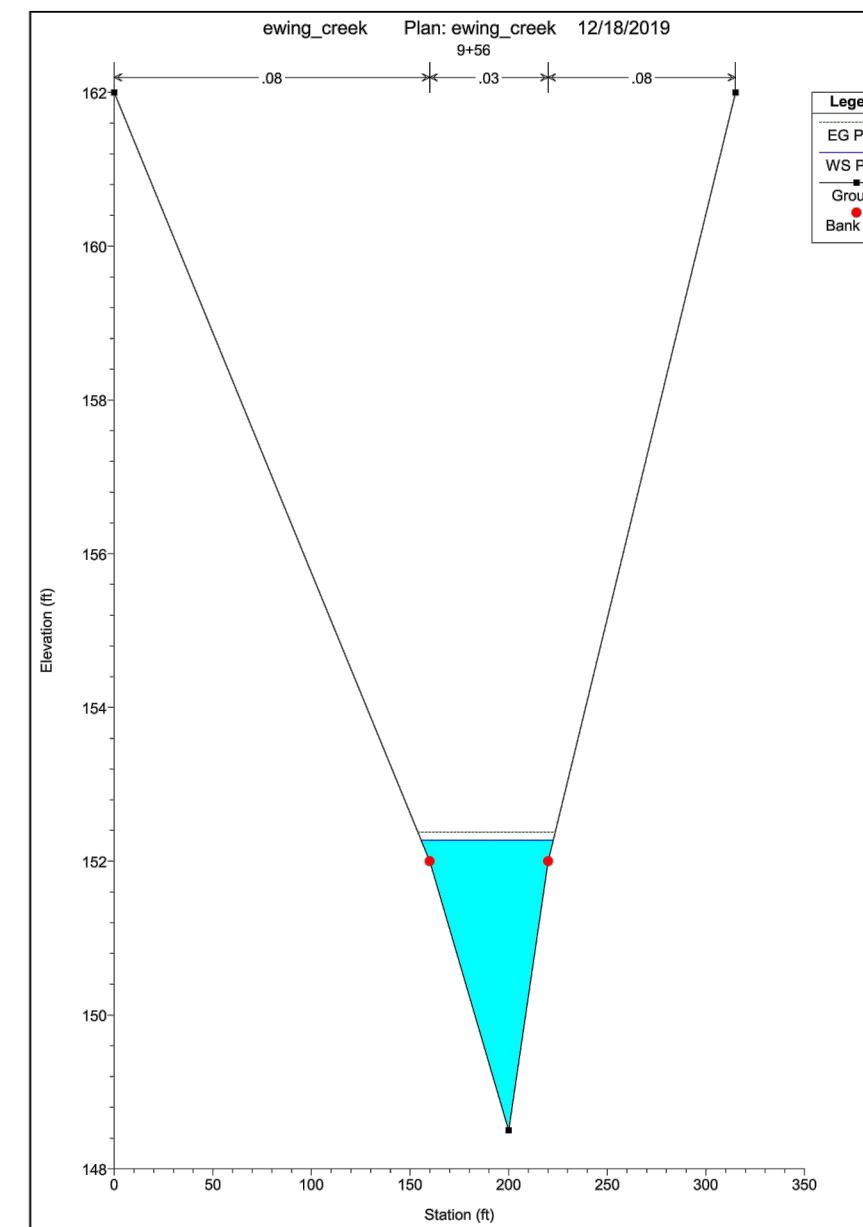






SCALE: 1"=30'
0 30 60 120 ft.

12	11	10	9	8	7
6	5	4	3	2	1
UPDATE PROPERTY INFORMATION REVISION					
DATE: 04/23/20					
FIRM: 081077-01-01-01 CHD					
PROJECT: 0117/2020					
DESCRIPTION: ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED AND IS UNCONTROLLED. IT MAY BE COPIED, REPRODUCED, RELEASED, OR DISCLOSED, AS APPROPRIATE, FOR OTHER PURPOSES, PROVIDED IT IS NOT PROVIDED TO A THIRD PARTY, IS NOT USED TO DAMAGE THE COMPANY, AND IS NOT USED FOR UNAUTHORIZED PURPOSES.					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: James Ward, NJ Professional Engineer, #24GE043400					
NAME: James Ward, NJ Professional Engineer					
ADDRESS: 1000 Broad Street, Suite 100, Newark, NJ 07102					
PHONE: (973) 642-1000					
FAX: (973) 642-1000					
E-MAIL: James.Ward@njpe.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite 100, New York, NY 10019					
PHONE: 718-966-5600					
FAX: 718-966-5600					
E-MAIL: BowmanConsultingGroup.com					
CREDITS: NJ Certificate of Authorization No. 21G2822600					
SIGNATURE: Bowman Consulting Group, Ltd.					
NAME: Bowman Consulting Group, Ltd.					
ADDRESS: 333 W Main Street, Suite					



A horizontal scale bar diagram. It features a thick black line with a total length of 120 units. On the left, there is a small vertical tick mark at 0. At the 30-unit mark, there is a thick black segment. At the 60-unit mark, there is another thick black segment. The remaining length of the bar from 60 to 120 is represented by a thin white line. Above the scale bar, the text "SCALE: 1\" data-bbox="350 100 477 125" data-label="Text">=30' is centered.

Bowman Consulting

Bowman Consulting Group, Ltd.
303 W. Main Street
Freehold, New Jersey 07728
www.bowmanconsulting.com
E-mail: NJ@BowmanConsulting.com

James W. Bowman

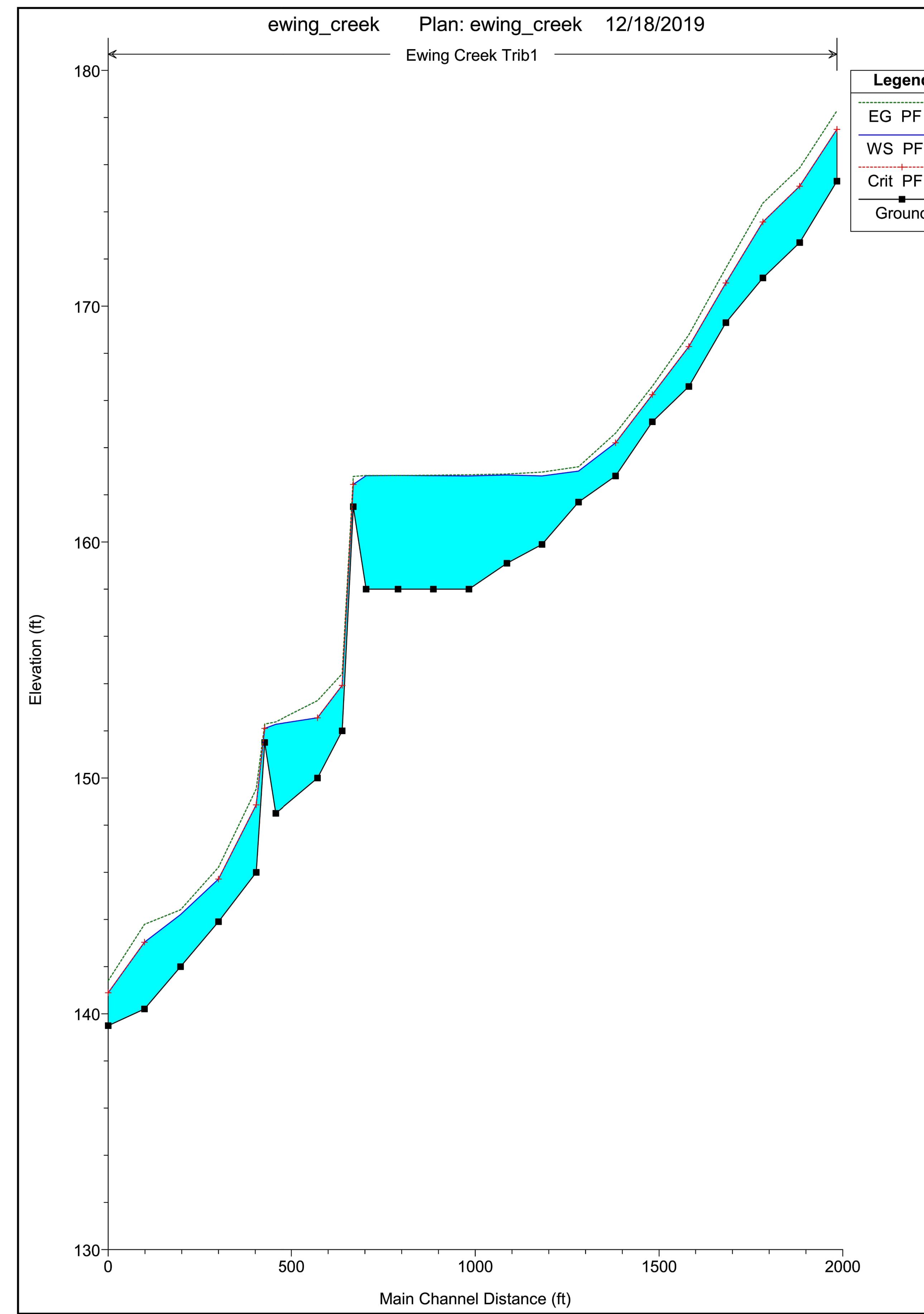
FHA STREAM CROSS-SECTIONS

FLOOD HAZARD AREA ANALYSIS

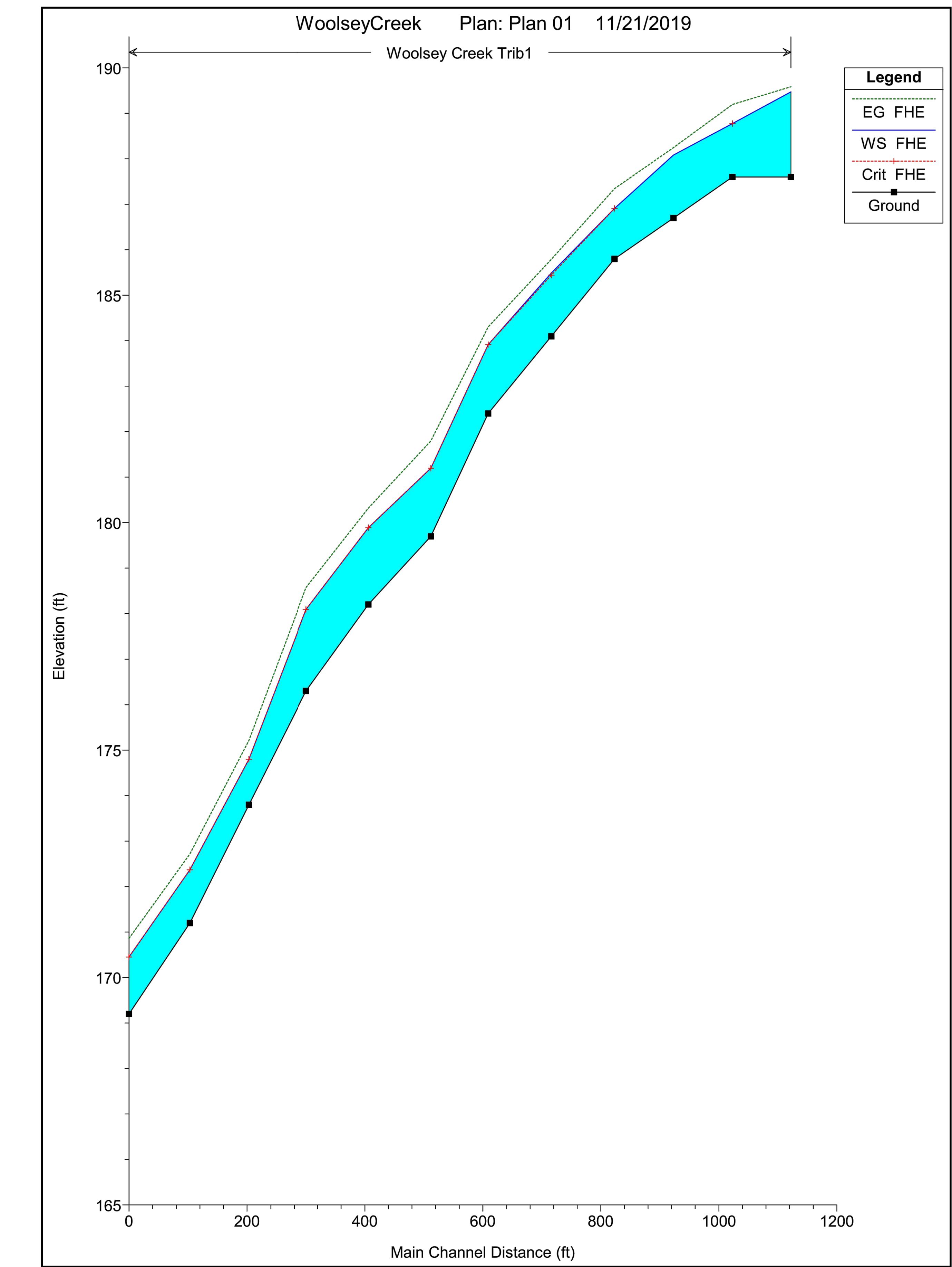
BLOCK 93, LOTS 19, 20, 45.01, 46 & 60

SHEET No. 9

6	12	1	UPDATE PROPERTY INFORMATION
5	11	2	1. BOWMAN CONSULTING GROUP, LTD.
4	10	3	2. WITHOUT THE WRITTEN CONSENT OF
3	9	4	3. BOWMAN CONSULTING GROUP, LTD.
2	8	5	4. BOWMAN CONSULTING GROUP, LTD.
		6	5. BOWMAN CONSULTING GROUP, LTD.
		7	6. BOWMAN CONSULTING GROUP, LTD.
		8	7. BOWMAN CONSULTING GROUP, LTD.
		9	8. BOWMAN CONSULTING GROUP, LTD.
		10	9. BOWMAN CONSULTING GROUP, LTD.
		11	10. BOWMAN CONSULTING GROUP, LTD.
		12	11. BOWMAN CONSULTING GROUP, LTD.



SCALE: 1"=30'
0 30 60 120 ft



10

FLOOD HAZARD AREA ANALYSIS
FHA STREAM PROFILES
BLOCK 93, LOTS 19, 20, 45.01, 46 & 60
HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY

Bowman CONSULTING GROUP, Ltd.
Phone: 732-466-5600
333 W Main Street, #0728
NJ Certificate of Authorization
No. 21G2822900
E-mail: NJ@BowmanConsulting.com
Signature:

JAMES A. WARD, NJ. Professional Engineer, #24G04343400

DATE: 04/23/2020
CRED: PROJ: 081077-01-001
Comments: THIS DRAWING CONTAINS HAZARD INFORMATION FOR THE PROPERTY OWNED BY THE HOPESWELL TOWNSHIP. IT IS THE PROPERTY OWNER'S RESPONSIBILITY TO USE THIS INFORMATION FOR THE PURPOSES FOR WHICH IT WAS PROVIDED. THIS DRAWING IS NOT TO BE COPIED, REPRODUCED, OR USED FOR ANY OTHER PURPOSE. IT IS THE PROPERTY OWNER'S RESPONSIBILITY TO NOTIFY BOWMAN CONSULTING GROUP, LTD. OF ANY CHANGES IN THE PROPERTY, INCLUDING ADDITIONS, REMOVALS, OR CHANGES IN USE. BOWMAN CONSULTING GROUP, LTD. IS NOT RESPONSIBLE FOR CHANGES MADE TO THE PROPERTY THAT ARE NOT NOTIFIED TO THEM.

1 UPDATE PROPERTY INFORMATION
REVISION
DATE: 04/23/2020
CRED: PROJ: 081077-01-001
Comments: THIS DRAWING CONTAINS HAZARD INFORMATION FOR THE PROPERTY OWNED BY THE HOPESWELL TOWNSHIP. IT IS THE PROPERTY OWNER'S RESPONSIBILITY TO USE THIS INFORMATION FOR THE PURPOSES FOR WHICH IT WAS PROVIDED. THIS DRAWING IS NOT TO BE COPIED, REPRODUCED, OR USED FOR ANY OTHER PURPOSE. IT IS THE PROPERTY OWNER'S RESPONSIBILITY TO NOTIFY BOWMAN CONSULTING GROUP, LTD. OF ANY CHANGES IN THE PROPERTY, INCLUDING ADDITIONS, REMOVALS, OR CHANGES IN USE. BOWMAN CONSULTING GROUP, LTD. IS NOT RESPONSIBLE FOR CHANGES MADE TO THE PROPERTY THAT ARE NOT NOTIFIED TO THEM.

12 11 10 9 8 7

REVISION
DATE: 04/23/2020
CRED: PROJ: 081077-01-001
Comments: THIS DRAWING CONTAINS HAZARD INFORMATION FOR THE PROPERTY OWNED BY THE HOPESWELL TOWNSHIP. IT IS THE PROPERTY OWNER'S RESPONSIBILITY TO USE THIS INFORMATION FOR THE PURPOSES FOR WHICH IT WAS PROVIDED. THIS DRAWING IS NOT TO BE COPIED, REPRODUCED, OR USED FOR ANY OTHER PURPOSE. IT IS THE PROPERTY OWNER'S RESPONSIBILITY TO NOTIFY BOWMAN CONSULTING GROUP, LTD. OF ANY CHANGES IN THE PROPERTY, INCLUDING ADDITIONS, REMOVALS, OR CHANGES IN USE. BOWMAN CONSULTING GROUP, LTD. IS NOT RESPONSIBLE FOR CHANGES MADE TO THE PROPERTY THAT ARE NOT NOTIFIED TO THEM.

Attachment 5 – Flood Hazard Verification



State of New Jersey

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Land Resource Protection
Mail Code 501-02A
P.O. Box 420
Trenton, New Jersey 08625-0420
www.nj.gov/dep/landuse

CATHERINE R. McCABE
Commissioner

December 2, 2020

Mitchell Newman
US Home Corporation dba Lennar
2465 Kuser Road
Hamilton, NJ 08690

Re: Flood Hazard Area Verification Approval
File No.: 1106-19-0002.2 – LUP200001
Applicant: US Home Corporation dba Lennar; c/o Mitchell Newman
Blocks and Lots: [93, 19]; [93, 20]; [93, 45.01]; [93, 46]; [93, 60]
Municipality: Hopewell Township; County: Mercer

Dear Mr. Newman:

This letter is in response to your request for a flood hazard area verification along an unnamed tributary to Ewing Creek, an unnamed tributary to Woolsey Creek, and two unnamed tributaries to Jacobs Creek at the above-referenced site. The Department has reviewed your application and hereby verifies the flood hazard area elevation and limits and riparian zone limits on this site, as depicted on the approved plans described below.

The flood hazard area was established using Method 6 (calculation method) as described at N.J.A.C. 7:13-3.6, which is based on hydrologic and hydraulic calculations provided by the applicant. The flood hazard area design flood elevations across the parcels are described as follows:

1. The flood hazard elevation of the unnamed tributary to Ewing Creek varies from **152.1 feet** to **170.9 feet NAVD 88** across lots 20 and 45.01; and
2. The flood hazard elevation of the unnamed tributary to Woolsey Creek varies from **181.1 feet** to **185.4 feet NAVD 88** across lot 60.

Furthermore, the applicant has demonstrated that on Block 93, Lot 19, only riparian zone exists—no flood hazard area is currently present on the property.

The riparian zone extends **50 feet** from the top of bank along both sides of each regulated water on this site. If a discernible bank is not present along a regulated water, the riparian zone is measured in accordance with the definition of the top of bank at N.J.A.C. 7:13-1.2.

Please note that altering land cover or topography in a flood hazard area, as well as clearing, cutting and/or removing vegetation within a riparian zone, is regulated by the Flood Hazard Area Control Act rules, and may be prohibited or restricted in some cases. A flood hazard area permit is required prior to

undertaking any regulated activity within a flood hazard area or riparian zone described at N.J.A.C. 7:13-2.4. Some projects may qualify for a permit-by-rule at N.J.A.C. 7:13-7, a general permit by certification at N.J.A.C. 7:13-8, a general permit at N.J.A.C. 7:13-9, or an individual permit at N.J.A.C. 7:13-10. Projects situated entirely outside both the flood hazard area and riparian zone do not require a flood hazard area approval.

This verification is based on the best information presently available to the Department, and is subject to change if this information is no longer accurate or if additional information is made available to the Department including, but not limited to, information supplied by the applicant.

The drawings hereby approved are:

- Thirteen (13) sheets prepared by Bowman Consulting, dated October 23, 2020, last revised November 9, 2020, and entitled:

“BLOCK 93, LOTS 19, 20, 45.01, 46 & 60; HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY:”

“FHA VERIFICATION PERMIT PLAN,” Sheets 1 through 13 of 13; and

- Two (2) sheets prepared by Bowman Consulting, dated January 17, 2020, last revised June 19, 2020, and entitled:

“FLOOD HAZARD AREA ANALYSIS; FHA STREAM SECTION LOCATION MAP; BLOCK 93, LOTS 19, 20, 45.01, 46 & 60; HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY:”

“EWING CREEK TRIBUTARY,” Sheet 4, and

“WOOLSEY CREEK TRIBUTARY,” Sheet 5.

Within 90 calendar days of the date of this letter, the applicant shall submit the following information to the clerk of each county in which the site is located, and shall send proof to the Department that this information is recorded on the deed of each lot referenced in the verification:

1. The Department file number for the verification;
2. The approval and expiration dates of the verification;
3. A metes and bounds description of any flood hazard area limit and/or floodway limit approved under the verification;
4. The flood hazard area design flood elevation, or range of elevations if variable, approved under the verification;
5. The width and location of any riparian zone approved under the verification; and
6. The following statement: “The State of New Jersey has determined that all or a portion of this lot lies in a flood hazard area. Certain activities in flood hazard areas are regulated by the New Jersey Department of Environmental Protection and some activities may be prohibited on this site or may first require a permit. Contact the Division of Land Resource Protection at (609) 777-0454 for more information prior to any construction onsite.”

Failure to have this information recorded in the deed of each lot and/or to submit proof of recording to the Department constitutes a violation of the Flood Hazard Area Control Act rules and may result in suspension or termination of the verification and/or subject the applicant to enforcement action pursuant to N.J.A.C. 7:13-24.

A copy of this plan, together with the information upon which this boundary determination is based, has been made part of the Division's public records. Please note that this letter in no way legalizes any fill that may have been previously placed onsite, or any other regulated activities that may have previously occurred. Also this determination does not affect the applicant's responsibility to obtain any local, State or Federal permits that may be required, such as local building permits or freshwater wetlands approvals.

This verification is valid for five years from its issuance date and it can be transferred at the time of sale of a property to which the verification applies to a new owner pursuant to N.J.A.C. 7:13-22.4. Pursuant to N.J.A.C. 7:13-5.4(a), if the Department issues a verification for a site, and within five years issues a general permit authorization or an individual permit for a regulated activity that references or relies upon the verification at that site, the Department shall automatically reissue the verification upon approval of the permit or authorization so that the verification and permit or authorization have the same expiration date. This automatic reissuance shall occur only once per verification and there is no fee for this reissuance. The reissued verification shall reflect any alterations to the flood hazard area design flood elevation, flood hazard area limit and/or floodway limit that will result from the regulated activities authorized under the individual permit or general permit authorization. All pre-construction and post-construction elevations and limits shall be demarcated on drawings approved under the reissued verification.

In accordance with N.J.A.C. 7:13-23.1, any person who is aggrieved by this decision may request a hearing within 30 days after notice of the decision is published in the DEP Bulletin by writing to: New Jersey Department of Environmental Protection, Office of Legal Affairs, Attention: Adjudicatory Hearing Requests, Mail Code 401-04L, PO Box 402, 401 East State Street, 7th Floor, Trenton, NJ 08625-0402. This request shall include a completed copy of the Administrative Hearing Request Checklist. The DEP Bulletin is available through the Department's website at <http://www.nj.gov/dep/> and the Checklist is available through the Division's website at <http://www.nj.gov/dep/landuse/forms.html>.

Please contact Erin Signor at erin.signor@dep.nj.gov should you have any questions regarding this letter. Be sure to indicate the Division's file number in all communication.

Sincerely,



Damian T. Friebel, Supervisor
Bureau of Inland Regulation
Division of Land Resource Protection

c. Applicant
 Municipal Clerk:
 Municipal Construction Official

Attachment 6 – Letter of Interpretation



State of New Jersey

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION

SHAWN M. LATOURETTE
Commissioner

Division of Land Resource Protection
Mail Code 501-02A
P.O. Box 420
Trenton, New Jersey 08625-0420
www.nj.gov/dep/landuse

Mitch Newman
2465 Kuser Road
Hamilton, NJ 08690

04/13/2022

RE: Freshwater Wetlands Letter of Interpretation: Line Verification
File No.: 1106-19-0002.2
Activity Number: FWW200001
Applicant: US HOME CORP LENNAR
Block: 93; Lots: 19, 20, 45.01, 46, 60
Hopewell Township, Mercer County
Watershed: Alexauken Creek / Moore Creek / Jacobs Creek
Sub-watershed: Jacobs Creek (below/incl Woolsey Brook)

Dear Mr. Newman:

This letter is in response to your request for a Letter of Interpretation to have Division of Land Resource Protection (Division) staff verify the boundary of the freshwater wetlands and/or State open waters on the referenced property.

In accordance with agreements between the State of New Jersey Department of Environmental Protection (NJDEP), the U.S. Army Corps of Engineers (USACOE) Philadelphia and New York Districts, and the U.S. Environmental Protection Agency (USEPA), the NJDEP is the lead agency for establishing the extent of State and Federally regulated wetlands and waters. The USEPA and/or USACOE retain the right to reevaluate and modify the jurisdictional determination at any time should the information prove to be incomplete or inaccurate.

Based upon the information submitted, and upon a site inspection conducted by Division staff on December 3, 2020, the Division has determined that the wetlands and waters boundary line(s) as shown on the plan map entitled: "**ALTA/NSPS LAND TITLE SURVEY BLOCK 93, LOTS 19, 20, 45.01, 46 & 60 HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY**", consisting of 13 sheet(s), dated October 15, 2019, last revised September 29, 2021, and prepared by Martin F. Tirella, P.L.S., of Bowman Consulting Group, is accurate as shown.

The freshwater wetlands and waters boundary line(s), as determined in this letter, must be shown on any future site development plans. The line(s) should be labeled with the above file number and the following note:

"Freshwater Wetlands/Waters Boundary Line as verified by NJDEP"

Wetlands Resource Value Classification (“RVC”)

In addition, the Division has determined that the resource value and the standard transition area or buffer required adjacent to the delineated wetlands are as follows:

Intermediate: All remaining freshwater wetlands shown. [50 foot wetland buffer]

Ordinary: WF-Y6 through WF-Y13: The wetlands have been determined to be a manmade “ditch;” WF-X2 through WF-X7: The wetlands have been determined to be a “swale” [No wetland buffer]

State Open Water: Within wetlands and as shown on the referenced plan. [No wetland buffer]

In addition, the Department has determined that the following wetland areas have been considered by the Department to be isolated wetlands and not part of a surface water tributary system: WF-W1 through WF-W6. RVC may affect requirements for wetland and/or transition area permitting. This classification may affect the requirements for an Individual Wetlands Permit (see N.J.A.C. 7:7A-9 and 10), the types of Statewide General Permits available for the property (see N.J.A.C. 7:7A-5 and 7) and any modification available through a transition area waiver (see N.J.A.C. 7:7A-8). Please refer to the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and implementing rules for additional information.

Wetlands resource value classification is based on the best information available to the Division. The classification is subject to reevaluation at any time if additional or updated information is made available, including, but not limited to, information supplied by the applicant.

General Information

Pursuant to the Freshwater Wetlands Protection Act Rules, you are entitled to rely upon this jurisdictional determination for a period of five years from the date of this letter unless it is determined that the letter is based on inaccurate or incomplete information. Should additional information be disclosed or discovered, the Division reserves the right to void the original letter of interpretation and issue a revised letter of interpretation.

Regulated activities proposed within a wetland, wetland transition area or water area, as defined by N.J.A.C. 7:7A-2.2 and 2.3 of the Freshwater Wetlands Protection Act rules, require a permit from this office unless specifically exempted at N.J.A.C. 7:7A-2.4. The approved plan and supporting jurisdictional limit information are now part of the Division's public records.

Please be advised that any surface water features on the site or adjacent to the site may possess flood hazard areas and/or riparian zones and development within these areas may be subject to the Flood Hazard Area Control Act rules at N.J.A.C. 7:13. The Division can verify the extent of flood hazard areas and/or riparian zones through a flood hazard area verification under the application procedures set forth at N.J.A.C. 7:13-5.1.

This letter in no way legalizes any fill which may have been placed, or other regulated activities which may have occurred on-site. This determination of jurisdiction extent or presence does not make a finding that wetlands or water areas are “isolated” or part of a surface water tributary system unless specifically called out in this letter as such. Furthermore, obtaining this determination does not affect your responsibility to obtain any local, State, or Federal permits which may be required.

Recording

Within 90 calendar days of the date of this letter, the applicant shall submit the following information to the clerk of each county in which the site is located, and shall send proof to the Division that this information is recorded on the deed of each lot referenced in the letter of interpretation:

1. The Department file number for the letter of interpretation;
2. The approval and expiration date of the letter of interpretation;
3. A metes and bounds description of the wetland boundary approved under the letter of interpretation;
4. The width and location of any transition area approved under the letter of interpretation; and
5. The following statement: "The State of New Jersey has determined that all or a portion of this lot lies in a freshwater wetland and/or transition area. Certain activities in wetlands and transition areas are regulated by the New Jersey Department of Environmental Protection and some activities may be prohibited on this site or may first require a freshwater wetland permit. Contact the Division of Land Use Regulation at (609) 777-0454 or <http://www.nj.gov/dep/landuse> for more information prior to any construction onsite."

Failure to have this information recorded in the deed of each lot and/or to submit proof of recording to the Division constitutes a violation of the Freshwater Wetlands Protection Act rules and may result in suspension or termination of the letter of interpretation and/or subject the applicant to enforcement action pursuant to N.J.A.C. 7:7A-22.

Appeal Process

In accordance with N.J.A.C. 7:7A-21, any person who is aggrieved by this decision may request a hearing within 30 days of the date the decision is published in the DEP Bulletin by writing to: New Jersey Department of Environmental Protection, Office of Legal Affairs, Attention: Adjudicatory Hearing Requests, Mail Code 401-04L, P.O. Box 402, 401 East State Street, 7th Floor, Trenton, NJ 08625-0402. This request must include a completed copy of the Administrative Hearing Request Checklist found at www.state.nj.us/dep/landuse/forms. Hearing requests received after 30 days of publication notice may be denied. The DEP Bulletin is available on the Department's website at www.state.nj.us/dep/bulletin. In addition to your hearing request, you may file a request with the Office of Dispute Resolution to engage in alternative dispute resolution. Please see the website www.nj.gov/dep/odr for more information on this process.

Please contact Maxwell Dolphin of our staff by e-mail at maxwell.dolphin@dep.nj.gov or by phone at (609) 777-0454 should you have any questions regarding this letter. Be sure to indicate the Department's file number in all communication.

Sincerely,

Christopher Squazzo, Environmental Specialist III
Division of Land Resource Protection

c: Hopewell Township, Municipal Clerk **w/plan**
Hopewell Township, Municipal Construction Official
Agent (original) Mike Greene **w/plan**

- FINAL PLAT-GUBERLEY HILL - PHASE 1, TOWNSHIP OF HOPEWELL, MERCER COUNTY, NEW JERSEY, PREPARED BY ST. LOUIS & COMPANY, DATED MAY 10, 1991, FILED IN THE MERCER COUNTY CLERK'S OFFICE ON MAY 3, 1991 AS FILED MAP #3196.
- FINAL PLAT-AMENDED, SECTION ONE, OF LOTS 12, 13, 14 & 18, BLOCK 93, TOWNSHIP OF HOPEWELL, MERCER COUNTY, NEW JERSEY, PREPARED BY PRINCETON JUNCTION ENGINEERING, P.C., DATED APRIL 27, 1998, WHICH MAP WAS FILED IN THE MERCER COUNTY CLERK'S OFFICE ON MAY 26, 1998 AS FILED MAP #3341.
- FINAL PLAT - SECTION TWO, OF LOT 18&B, BLOCK -33, FOR BROOKSIDE AT HOPEWELL RIDGE, LLC., HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY, PREPARED BY PRINCETON JUNCTION ENGINEERING, P.C., DATED JULY 15, 1998, WHICH MAP WAS FILED IN THE MERCER COUNTY CLERK'S OFFICE ON FEBRUARY 22, 1999 AS FILED MAP #3375.
- PRELIMINARY /FINAL PLAN OF MAJOR SUBDIVISION LOTS 2, 3 AND 6, BLOCK 93, TOWNSHIP OF HOPEWELL, MERCER COUNTY, NEW JERSEY, DATED JANUARY 28, 2003 WHICH MAP WAS FILED IN THE MERCER COUNTY CLERK'S OFFICE ON MARCH 15, 2003 AS FILED MAP #3392.
- NEW JERSEY DEPARTMENT OF TRANSPORTATION, ENTIRE TRACT MAP, ROUTE 95 (1953) SECTION 2, FROM ABINGTON ROAD TO DEER VALLEY, BROWNSVILLE, FOR PUBLIC UTILITY EASEMENT, RIGHT OF WAY AND PARCELS TO BE ACQUIRED IN THE TOWNSHIP OF Ewing AND HOPEWELL, COUNTY OF MERCER, OCTOBER 1999, FILED IN THE MERCER COUNTY CLERK'S OFFICE ON APRIL 17, AS FILED MAP #3013.
- PLAN OF SURVEY OF LOTS 14, BLOCK 93, DEER VALLEY REALTY, INC., TOWNSHIP OF HOPEWELL, MERCER COUNTY, NEW JERSEY, PREPARED BY TRENTON ENGINEERING CO., INC. DATED MARCH 18, 2019, AND LAST REVISED ON NOVEMBER 26, 2019 AS REVISION #3.
- PLAN OF SURVEY OF LOT 45.01, BLOCK 93, DEER VALLEY REALTY, INC., TOWNSHIP OF HOPEWELL MERCER COUNTY, NEW JERSEY, PREPARED BY TRENTON ENGINEERING CO., INC. DATED APRIL 07, 2019, AND LAST REVISED ON NOVEMBER 26, 2019 AS REVISION #2.
- PLAN OF SURVEY OF LOTS 32, 44 & 60, BLOCK 93, DEER VALLEY REALTY, INC., TOWNSHIP OF HOPEWELL, MERCER COUNTY, NEW JERSEY, PREPARED BY TRENTON ENGINEERING CO., INC. DATED APRIL 07, 2019, AND LAST REVISED ON NOVEMBER 26, 2019 AS REVISION #1.

NOTES:

I DECLARE THAT, TO THE BEST OF MY KNOWLEDGE AND BELIEF, THIS MAP AND SURVEY WERE MADE BY ME OR UNDER MY IMMEDIATE SUPERVISION IN ACCORDANCE WITH N.J.S.A. 13:4C-5.1 AND THE INFORMATION SHOWN HEREON CORRECTLY REPRESENTS THE CONDITIONS FOUND AT THE DATE OF THE SURVEY. I HEREBY STATE THAT NO EASEMENTS, IF ANY, BELOW THE SURFACE AND NOT VISIBLE AND IN SUBJECT TO FEDERAL, STATE, COUNTY, AND/OR MUNICIPAL RESTRICTIONS, INCLUDED IN THIS DECLARATION ARE THE FOLLOWING NOTES:

- THE MAKER OF THIS MAP IS NOT QUALIFIED TO MAKE A DETERMINATION AS TO THE ABSENCE OR PRESENCE OF ANY WETLANDS, CONTAMINATION OR OTHER ENVIRONMENTAL CONDITION WHICH MAY AFFECT THE PROPERTY. THEREFORE, NO STATEMENT IS BEING MADE OR IMPLIED BY THE FACT THAT EVERY MARK-OUT, OCCUPATION, CONNECTION AND OTHER ENVIRONMENTAL CONDITION IS BEING SHOWN ON THIS MAP EXCEPT AS NOTED BELOW.
- IF THIS SURVEY DOES NOT CONTAIN THE RAISED SEAL OF THE SURVEYOR, IT IS AN UNAUTHORIZED REPRODUCTION OF THE SURVEY.
- UTILITIES SHOWN HEREON ARE BASED ON ABOVE GROUND OBSERVATIONS ONLY IN ACCORDANCE WITH FIELD MARK-OUTS AND/OR PHYSICAL LOCATIONS. CONNECTIONS BETWEEN STRUCTURES, IF SHOWN, ARE BASED ON SAID MARK-OUTS, OCCUPATIONS AND REFERENCES NOTED HEREON AND MAY NOT REPRESENT ACTUAL BELOW GROUND CONDITIONS.
- PROPERTY BEING KNOWN AS BLOCK 93, LOTS 19, 20, 45.01, 46 & 60, TOWNSHIP OF HOPEWELL, MERCER COUNTY SHEET NO. 22.
- THIS SURVEY IS MADE SOLELY FOR THE PARTIES NAMED HEREON AND IS NOT TRANSFERABLE, EXCEPT TO THE MORTGAGE HOLDER, WHICH SHALL SURVIVE TO ITS SUCCESSOR OR ASSIGNEE.
- THE PROPERTIES SHOWN IN THIS PLAN SHALL NOT BE USED AS THE BASIS FOR THE CONSTRUCTION OF FENCES OR ANY OTHER PERMANENT STRUCTURES.
- THE SURVEY HAS BEEN PREPARED WITH REFERENCE TO A TITLE REPORT PREPARED BY FIRST AMERICAN TITLE INSURANCE COMPANY, FILE NO. 115900-000702-NJ DRAFT (4), WITH AN EFFECTIVE DATE OF JUNE 17, 2019.
- CURRENT OWNER DEED WAS RECORDED IN THE FOLLOWING DEED BOOK, PAGE:

 - DEED BOOK 6367, PAGE 1787 (LOT 19)
 - DEED BOOK 6330, PAGE 884 (LOT 20)
 - DEED BOOK 3610, PAGE 93 (LOT 45.01)
 - DEED BOOK 3610, PAGE 100 (LOT 46)
 - DEED BOOK 3404, PAGE 119 (LOT 60)

- NO INVESTIGATION OR DELINEATION OF WETLANDS WAS PERFORMED AS PART OF THIS SURVEY.
- IF THIS PLAN DOES NOT CONTAIN THE RAISED SEAL OF THE SURVEYOR, IT IS AN UNAUTHORIZED REPRODUCTION OF THE SURVEY.
- HORIZONTAL DATUM IS BASED UPON THE NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD83), PER GPS OBSERVATIONS UTILIZING TOPNET.
- VERTICAL DATUM IS BASED UPON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), PER GPS OBSERVATIONS UTILIZING TOPNET.
- 50 FEET WIDE RIGHT-OF-WAY EASEMENT ON LOT 19 IN FAVOR OF SUNUCO, BASED ON DOCUMENTS PROVIDED BY FOX ROTHSCHILD LLP DATED OCTOBER 31, 2019.
- WETLAND FLAGS L6 TO L17 PROVIDED BY OTHERS AND NOT FIELD LOCATED BY BOWMAN CONSULTING.
- WETLAND FLAGS L7(NEW) TO L9(NEW), X9(NEW), X10(NEW) X47A, X48(NEW) TO X50(NEW), X50A, X51, X73, X81, X85A, X11A, W2, W2A, W5A, W5B & W5C WERE PROVIDED BY BOWMAN CONSULTING INC., DATED JULY 26, 2021 AND NOT FIELD LOCATED BY BOWMAN CONSULTING.

PARKING SPACES

NONE OBSERVED

CURRENT DEED OF RECORD

BLOCK 93, LOT 19, 20, 45.01, 46 & 60 CURRENT IN THE FOLLOWING DEED BOOK AND PAGE

DEED BOOK 6164, PAGE 1488
DEED BOOK 6161, PAGE 100
DEED BOOK 3404, PAGE 119
DEED BOOK 3610, PAGE 93

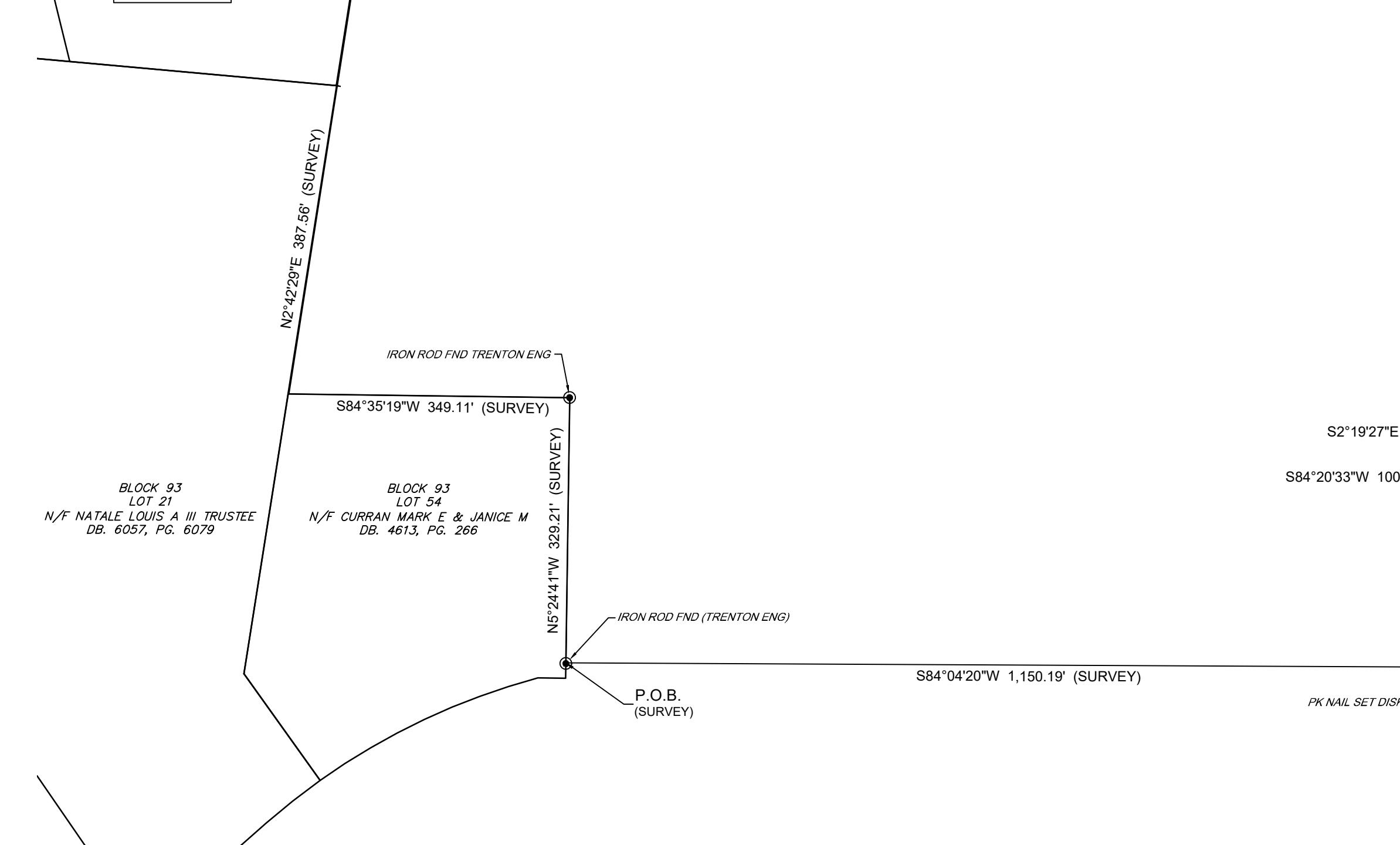
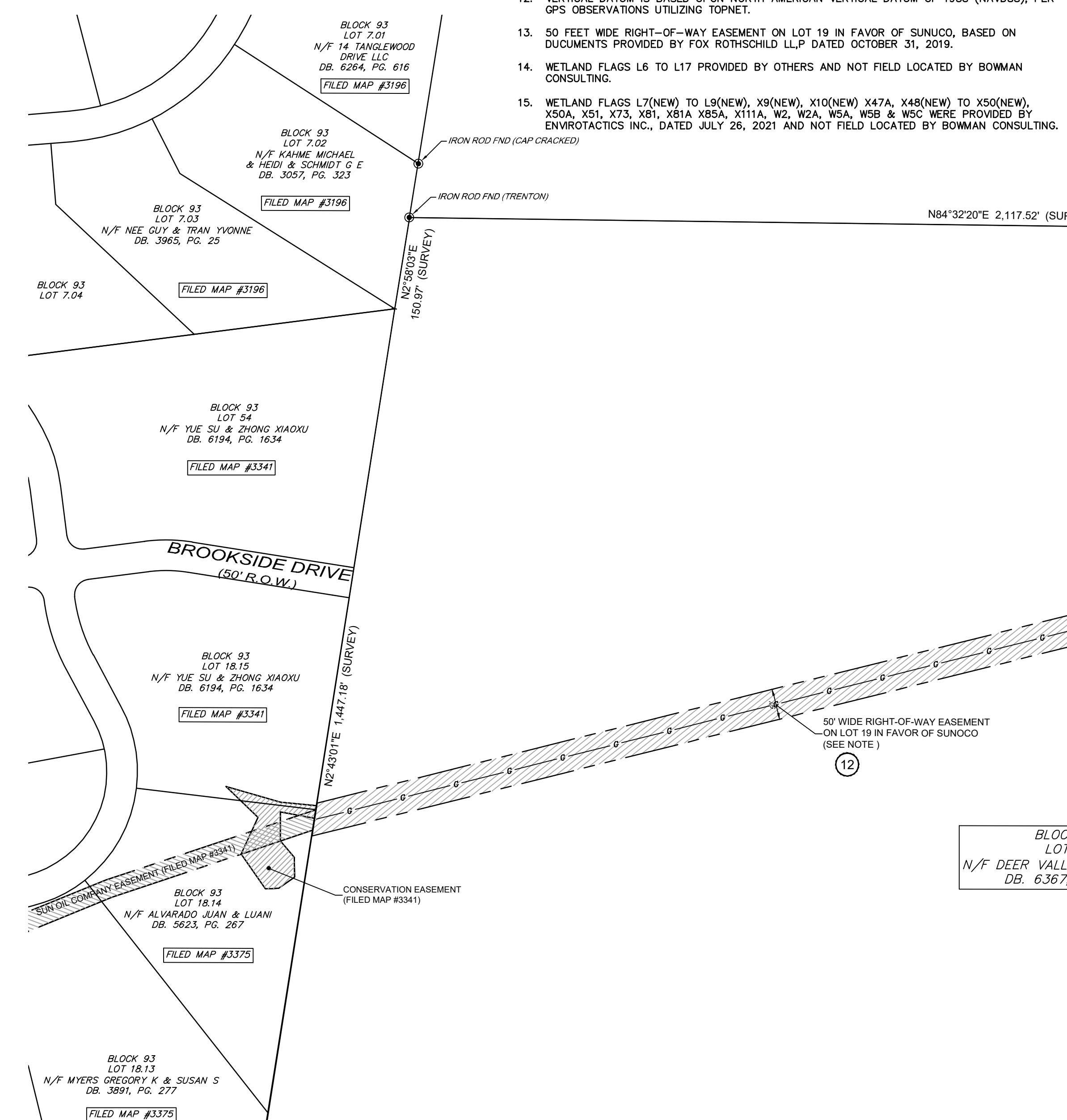
CERTIFIED TO:

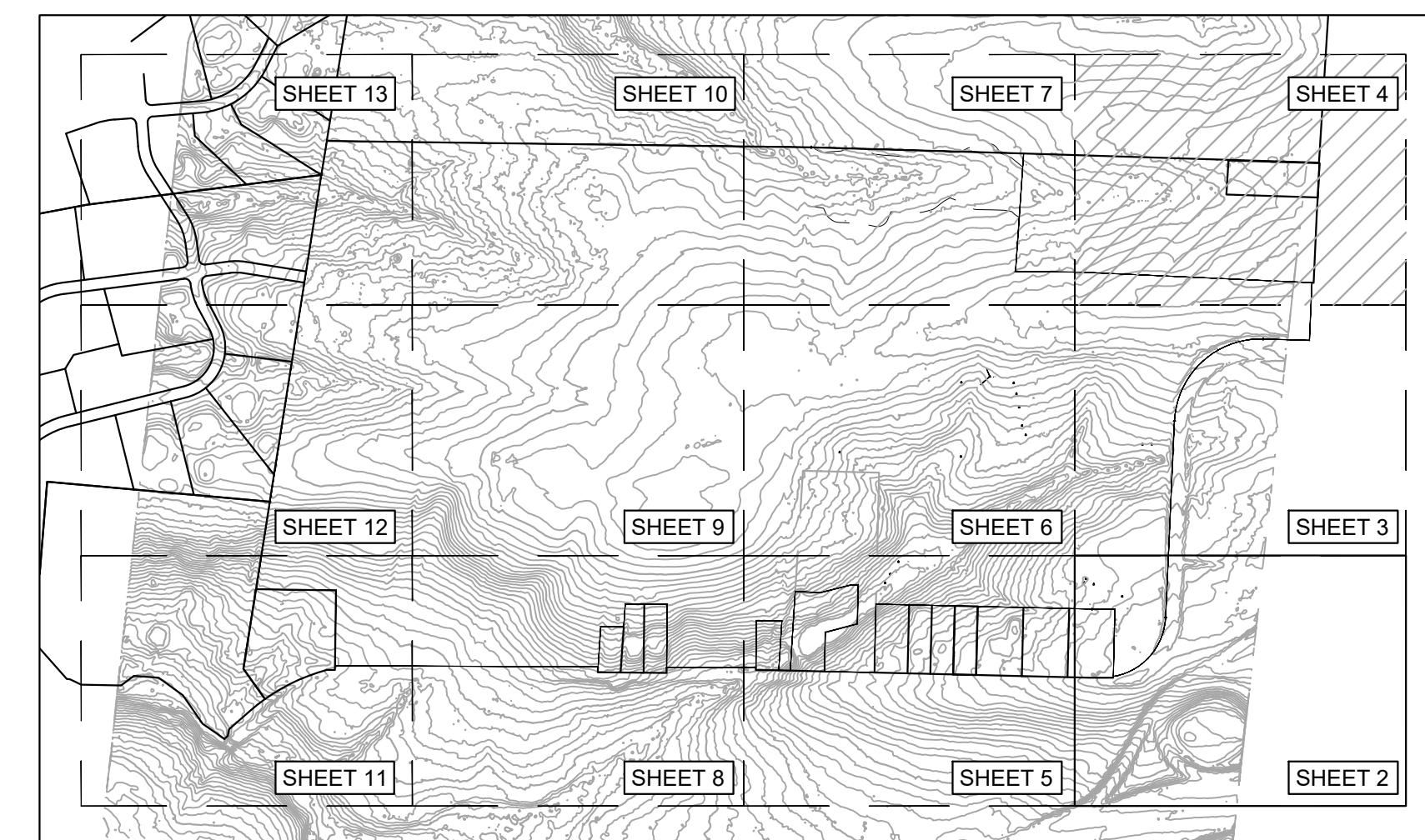
U.S. HOME CORPORATION D/B/A LENNAR, A DELAWARE CORPORATION, ITS SUCCESSORS AND ASSIGNS, AS THEIR RESPECTIVE INTERESTS MAY APPEAR FROM TIME TO TIME.
FOR XIAOYU ZHANG, CAL ATLANTIC TITLE, INC.
FIRST AMERICAN TITLE INSURANCE COMPANY

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 "MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS", JOINTLY ESTABLISHED AND ADOPTED BY ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2, 3, 4, 5, 7(a), 8, 13, 14, 16, AND 17 OF TABLE A THEREOF. THE FIELDWORK WAS COMPLETED ON OCTOBER 08, 2019.

MARTIN F. TIROLA
NEW JERSEY P.L.S.
LICENSE No. 27477

DATE OF PLAT:




KEY MAP

SCALE: 1"=700'

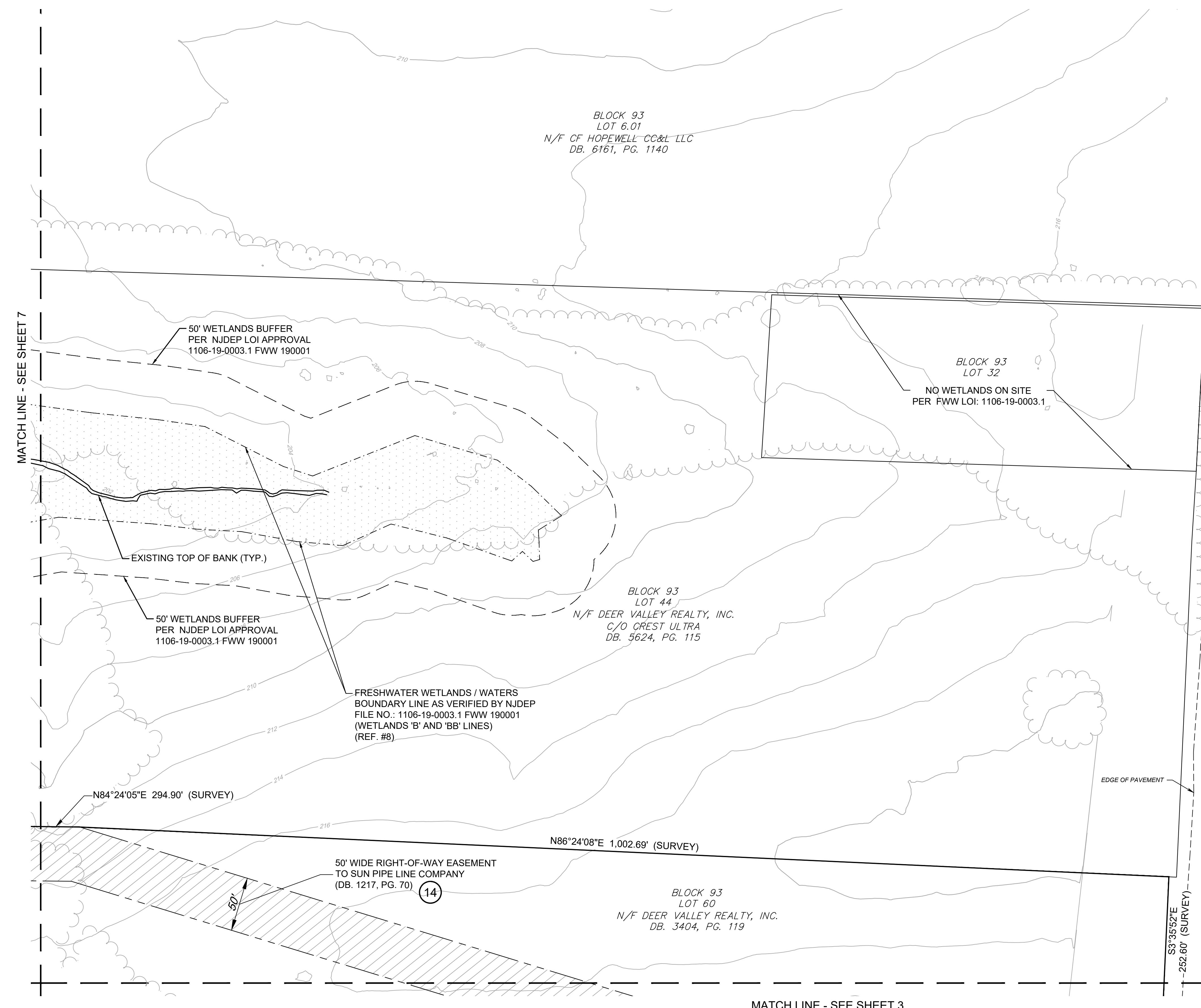
MUSPOS

LEGEND

- D Drainage Manhole
- SHD State Highway
- T Department Manhole
- T Telephone Manhole
- Guy Pole
- Grate or Inlet
- Gas Valve (DOT)
- Water Valve
- Guy Wire
- Hydrant
- Iron Rod Found
- Light Pole
- Mailbox
- Monument Found
- Mile Marker Post
- Signs
- Utility Pole
- DOT NJ DOT Utility Box

SCALE: 1"=50'

0 50 100 200 ft.



MATCH LINE - SEE SHEET 3

SCOTCH ROAD
(VARIABLE WIDTH R.O.W.)

SEE SHEET 1 OF 13 FOR NOTES & REFERENCES

ALTA/NSPS LAND TITLE SURVEY
BLOCK 93, LOTS 19, 20, 45, 01, 46 & 60
HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY

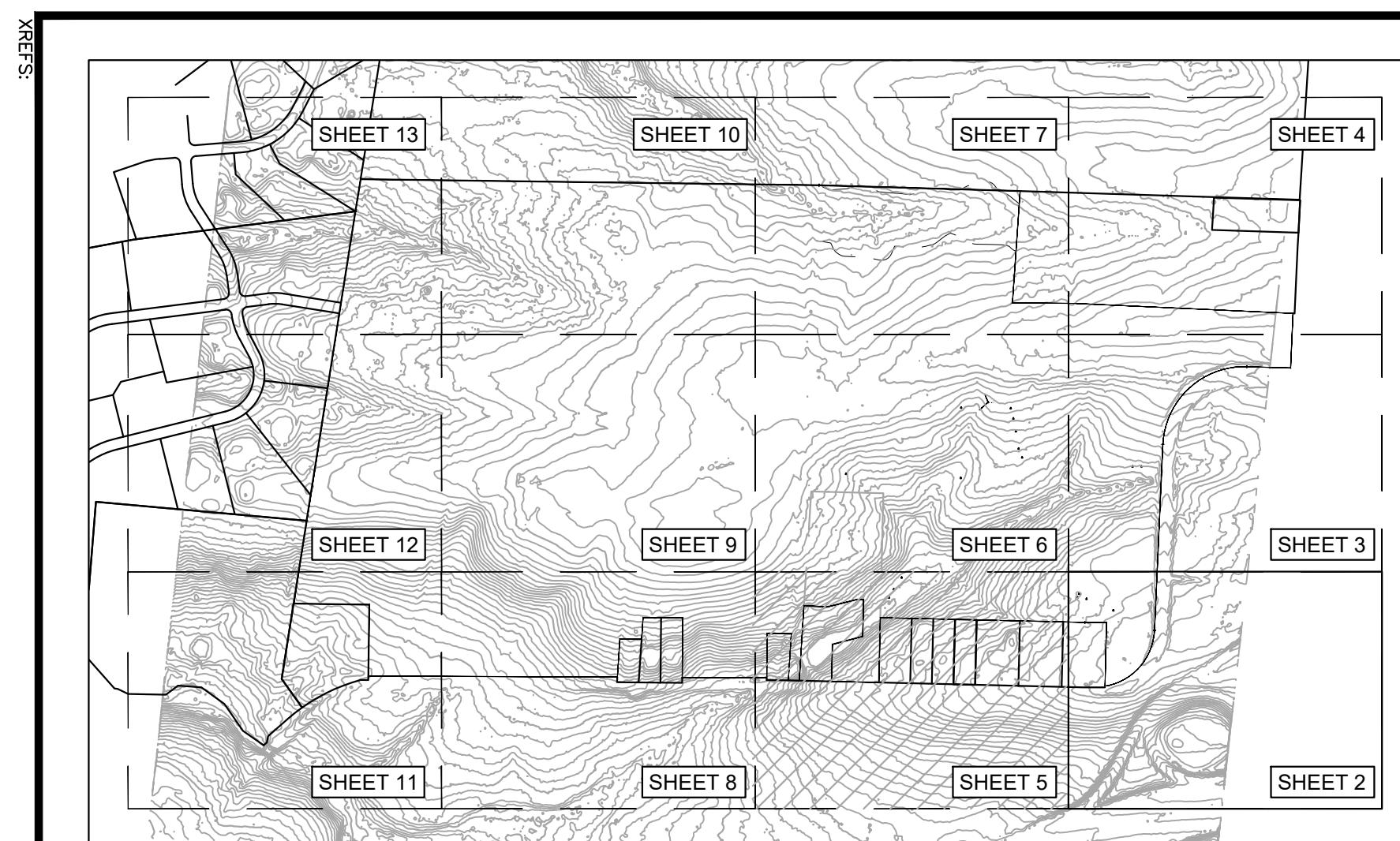
 SHEET No. 4
OF 13

Bowman CONSULTING
Draque

 Bowman Consulting Group, Ltd.
Phone: 732-365-5300
133 W Main Street
Email: www.bowmanconsulting.com
NJ Certificate of Authorization No. 2642822500
E-mail: NAB@bowmanconsulting.com

12	11	10	9	8	7
12	11	10	9	8	7
12	11	10	9	8	7
12	11	10	9	8	7
12	11	10	9	8	7

DATE: 08/07/2019
CHD:
4 REVISED PER NJDEP COMMENTS
3 REVISED SURVEY TO ADD WETLANDS BY OTHERS
2 EDI WETLANDS DATA
1 REVISED SURVEY MAP BASED ON ATTORNEY'S COMMENTS
10/11/19
REVISION
DATE: CHD



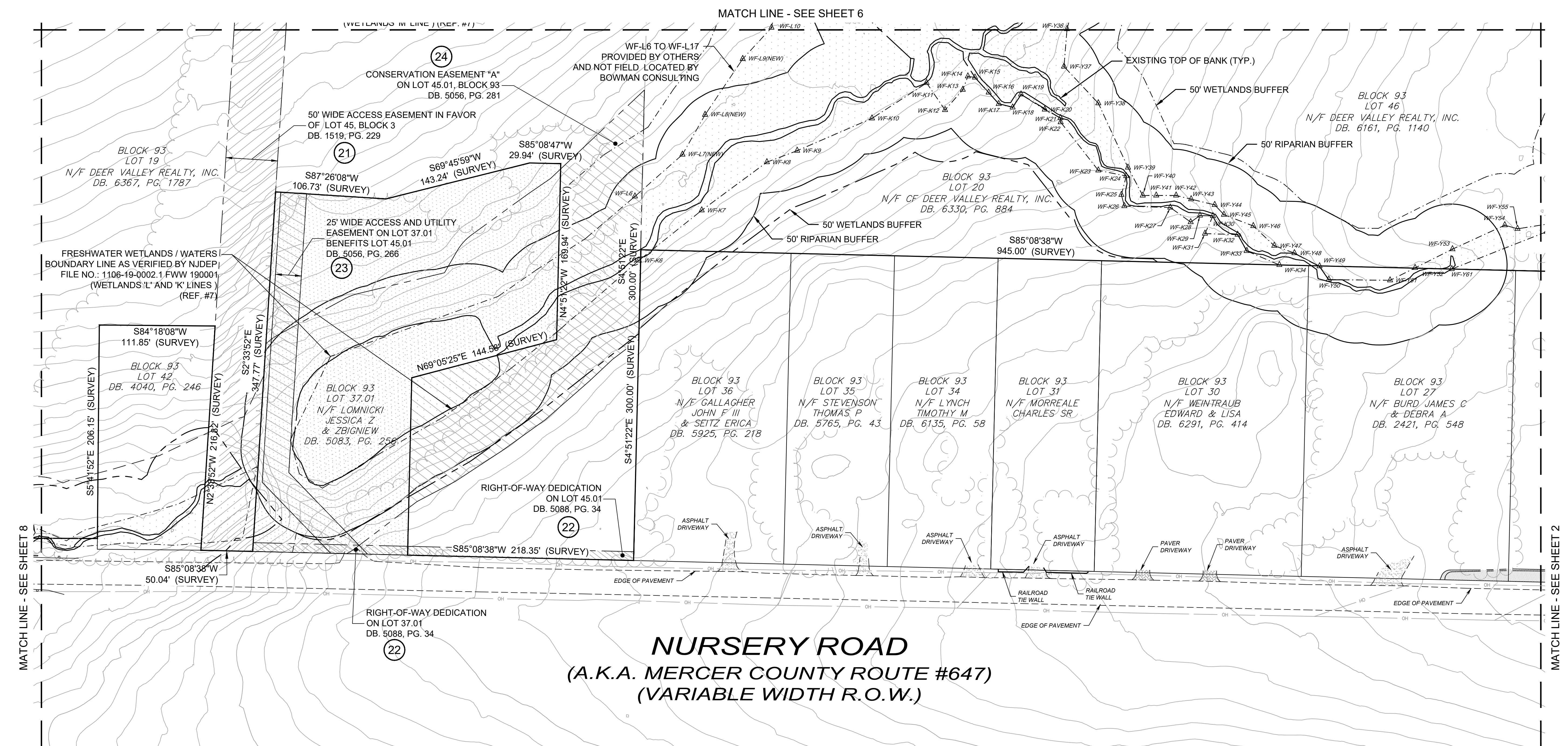
KEY MAP
SCALE: 1"=700'

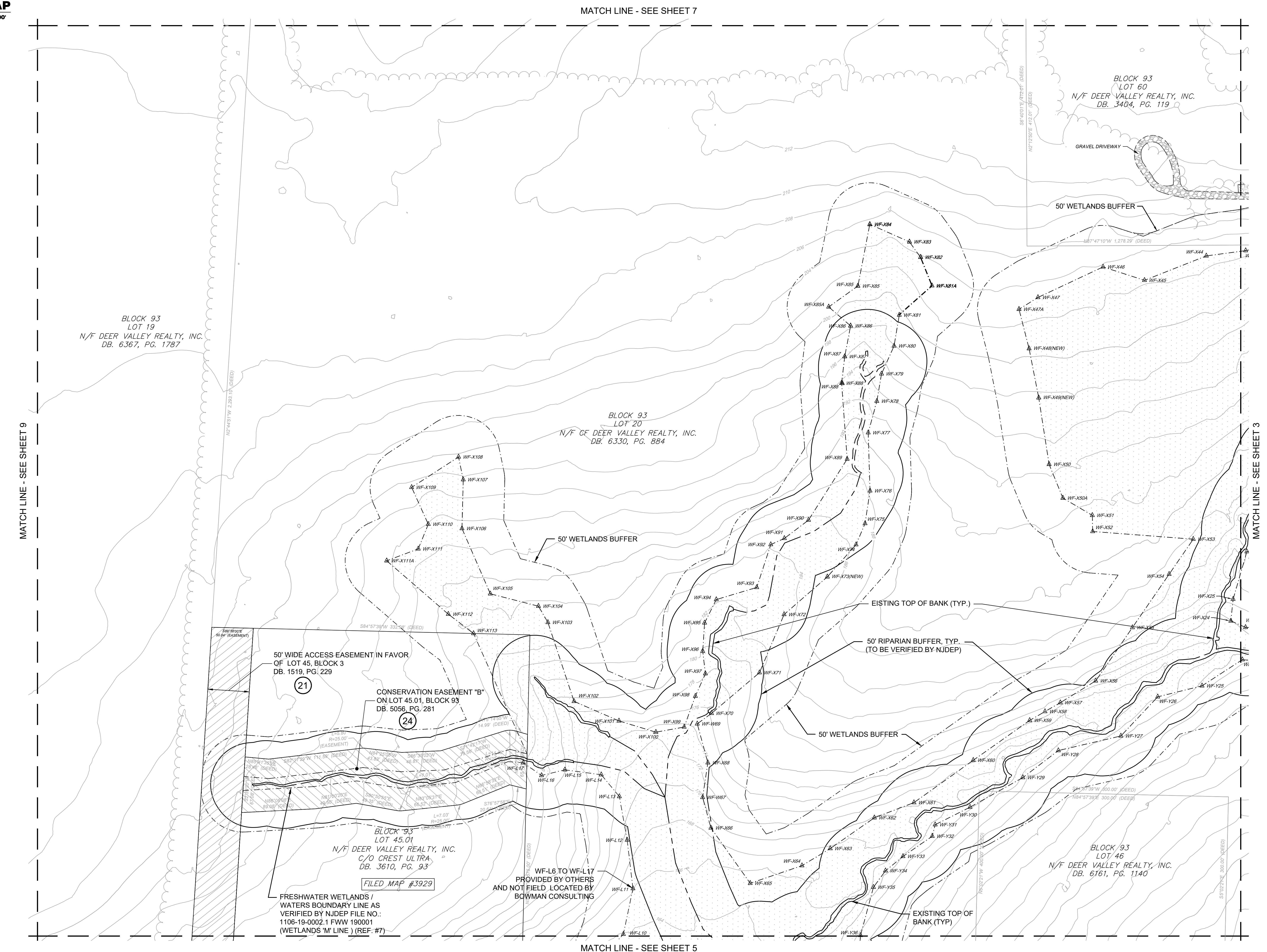
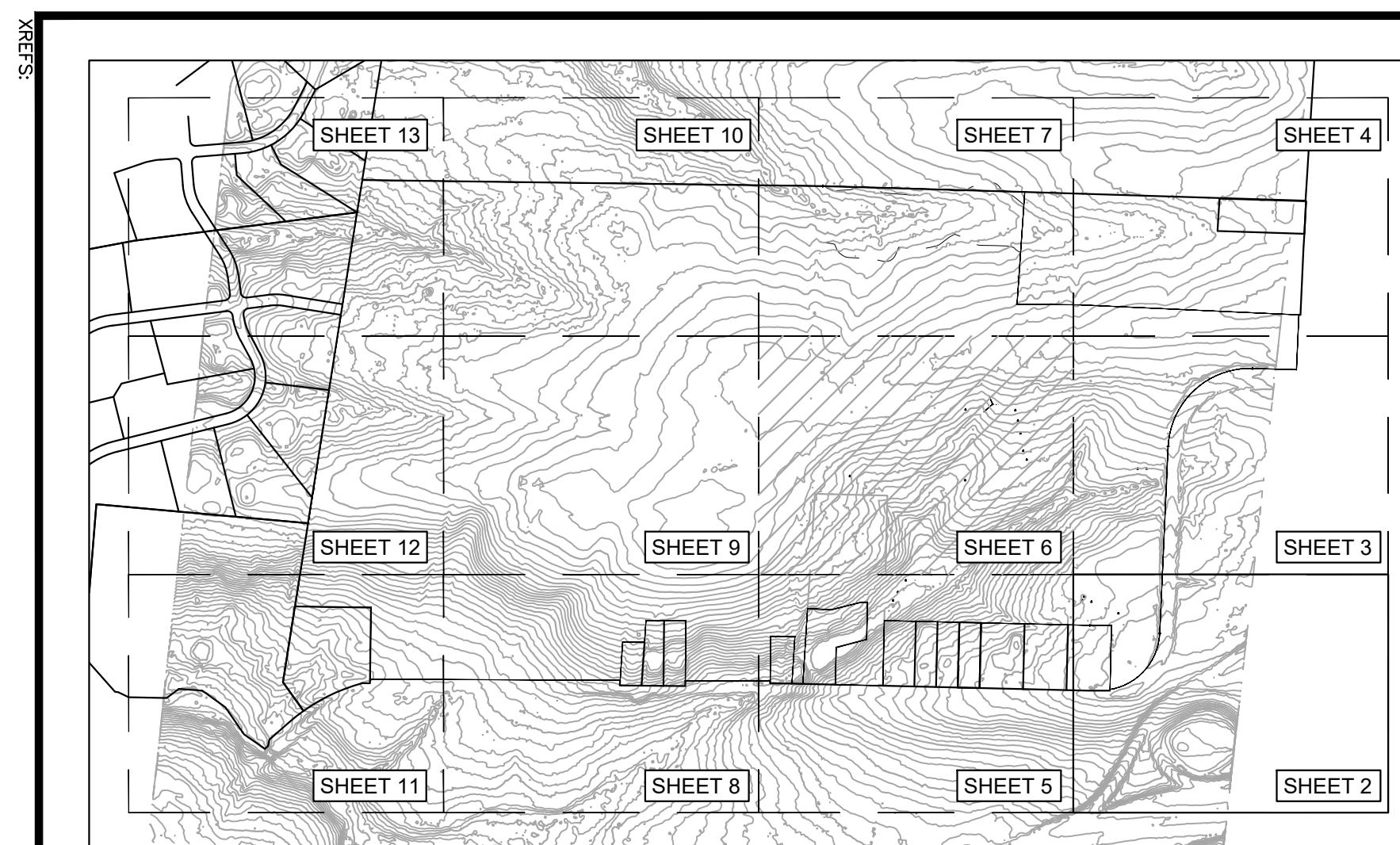
NUSPOS

LEGEND

- D Drainage Manhole
- SHD State Highway Department Manhole
- T Telephone Manhole
- Guy Pole
- Grate or Inlet
- G Gas Valve (DOT)
- W Water Valve
- Guy Wire
- Hydrant
- Iron Rod Found
- Light Pole
- Mailbox
- Monument Found
- Mile Marker Post
- Signs
- Utility Pole
- DOT NJ DOT Utility Box

SCALE: 1"=50'
0 50 100 200 ft.





PROJ. 08/07/2019	DATE: 01/10/2020	CHD:	11
4 REVISED PER INDEP COMMENTS			
3 REVISED SURVEY TO ADD WETLANDS BY OTHERS			
2 EDI WETLANDS DATA			
1 REVISED SURVEY MAP BASED ON ATTORNEY'S COMMENTS			
REVISION			

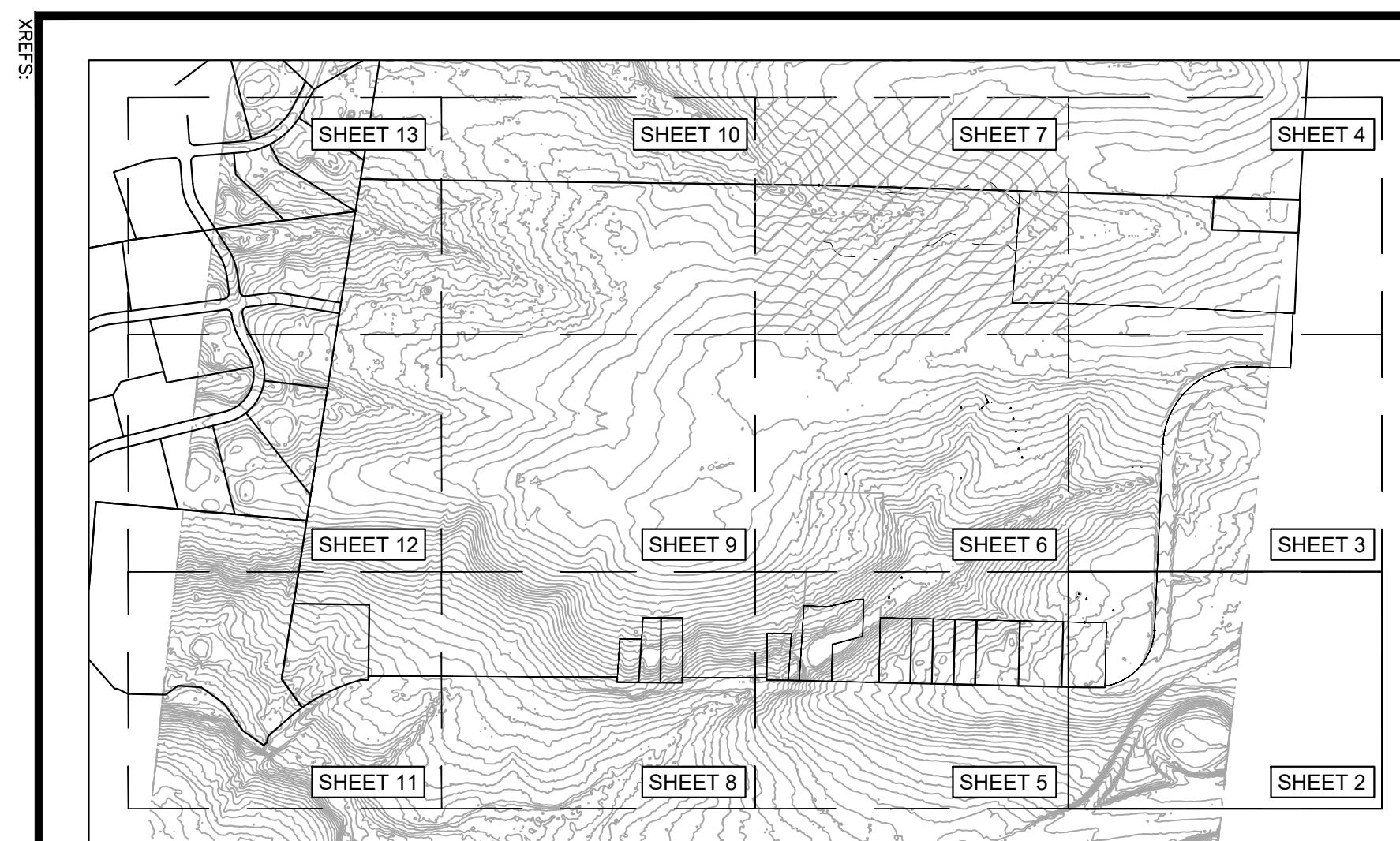
Bowman CONSULTING

LandOne

SEE SHEET 1 OF 13 FOR NOTES & REFERENCES

ALTA/NSPS LAND TITLE SURVEY
BLOCK 93, LOTS 19, 20, 45.01, 46 & 60
HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY

6
13



KEY MAP

SCALE: 1"=700'

1000'

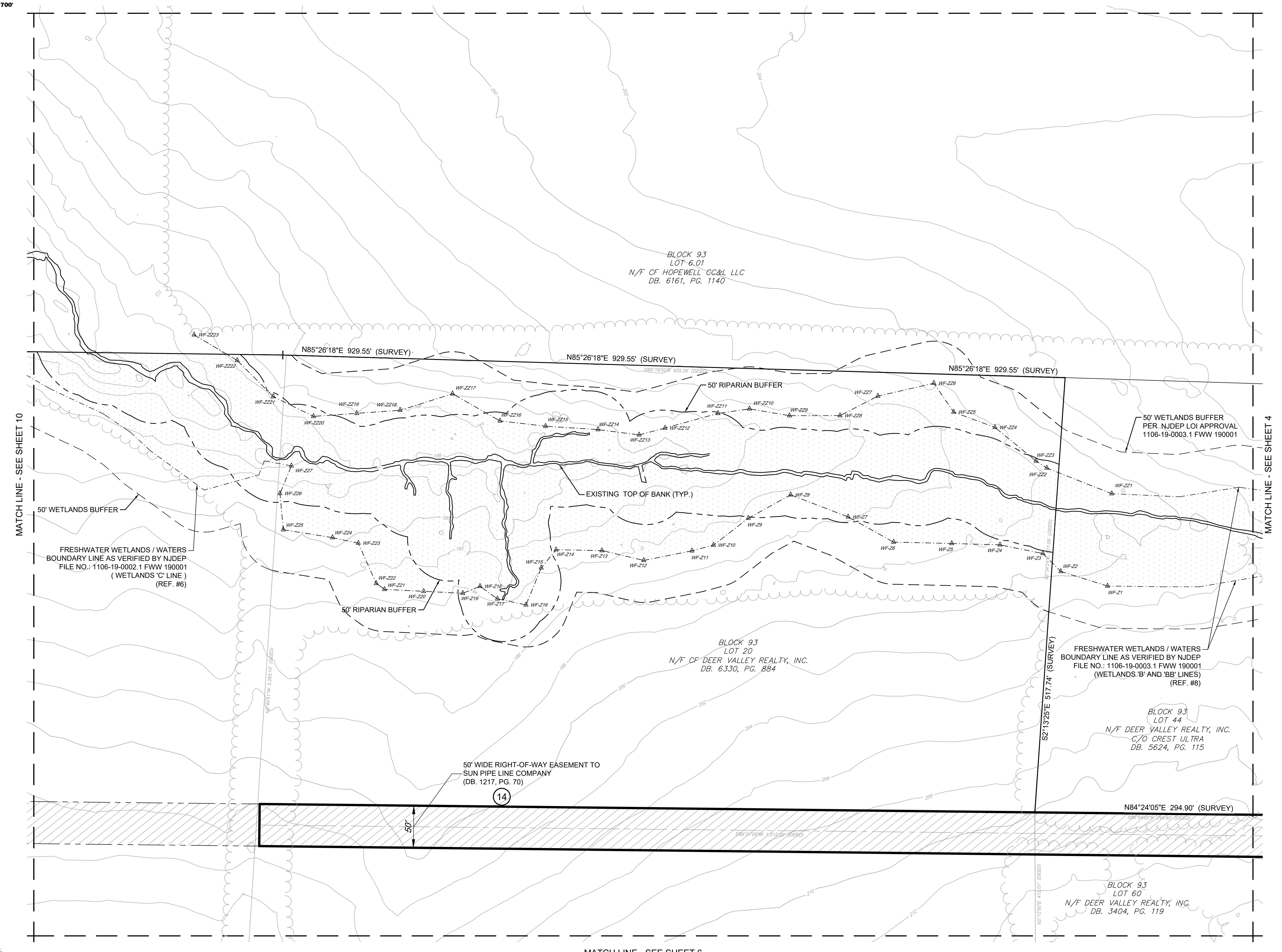
WSPCS

LEGEND

- D Drainage Manhole
- SHD State Highway
- T Department Manhole
- Telephone Manhole
- Guy Pole
- Grate or Inlet
- Gas Valve (DOT)
- Water Valve
- Guy Wire
- Hydrant
- Iron Rod Found
- Light Pole
- Mailbox
- Monument Found
- Mile Marker Post
- Signs
- Utility Pole
- DOT NJ DOT Utility Box

SCALE: 1"=50'

0 50 100 200 ft.

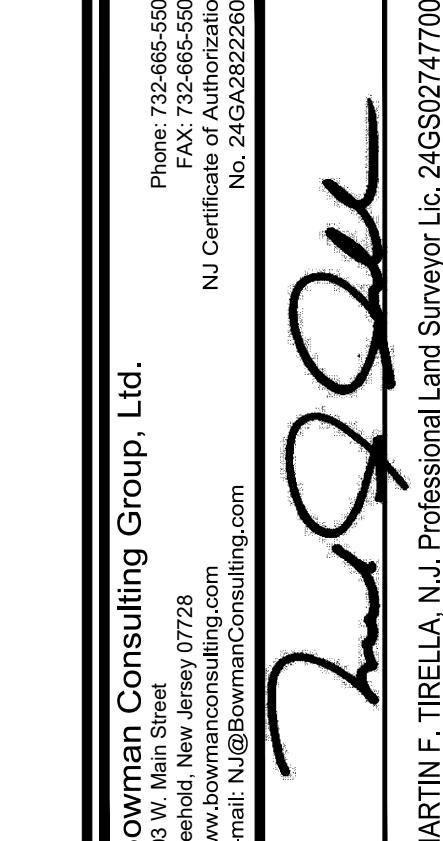


MATCH LINE - SEE SHEET 6

SEE SHEET 1 OF 13 FOR NOTES & REFERENCES

ALTA/NSPS LAND TITLE SURVEY

BLOCK 93, LOTS 19, 20, 45, 01, 46 & 60
HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY



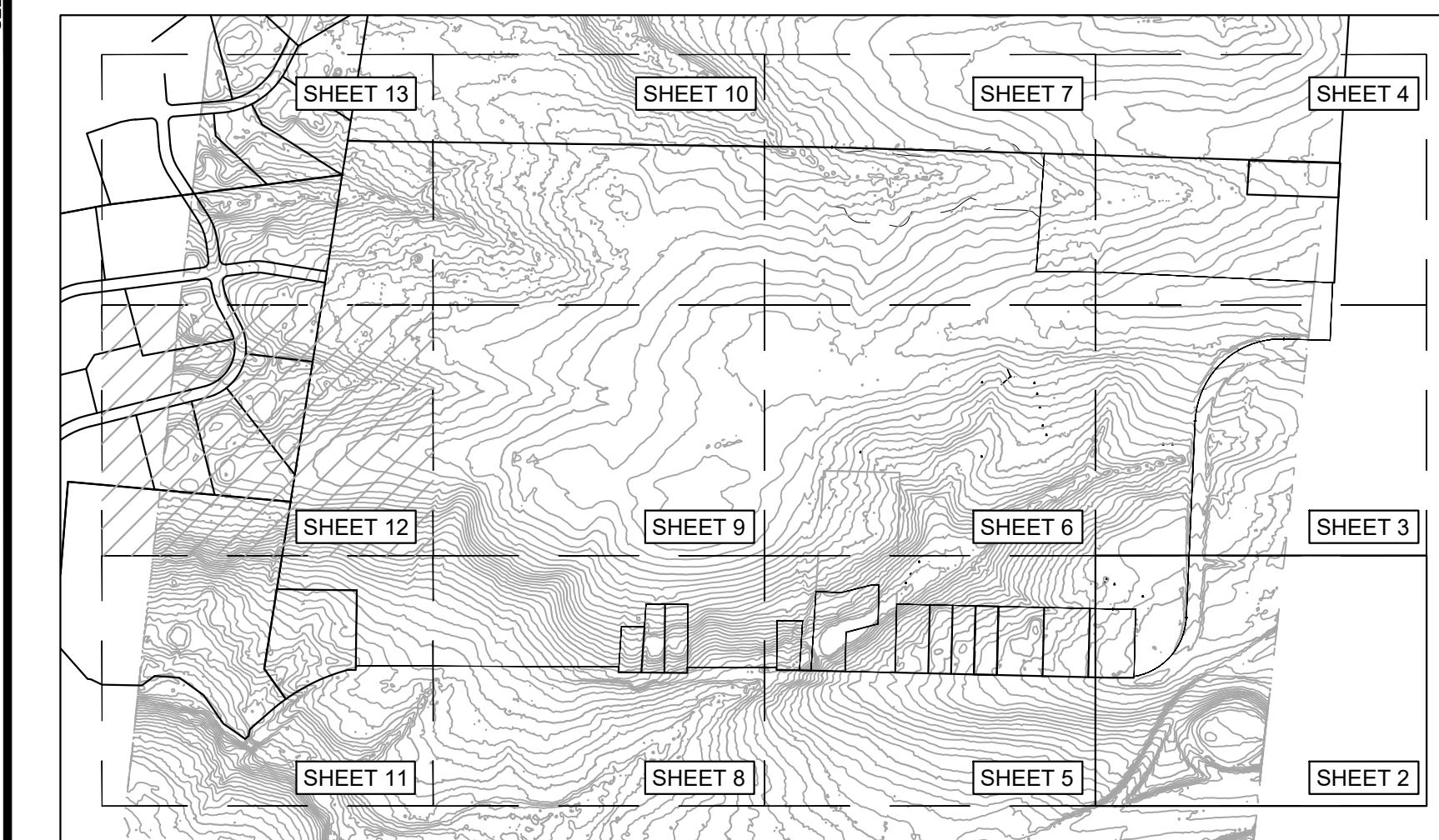
12	11	10	9	8	7
DATE: 08/07/2019	DATE: 01/10/2019	DATE: 05/26/2021	DATE: 04/13/20	DATE: 12/20/19	DATE: 01/11/19
PROJ: 100-0777-01	PROJ: 100-0777-01	PROJ: 100-0777-01	PROJ: 100-0777-01	PROJ: 100-0777-01	PROJ: 100-0777-01
CHD:	CHD:	CHD:	CHD:	CHD:	CHD:
4 REVISED PER INDEP COMMENTS	4 REVISED PER INDEP COMMENTS	3 REVISED SURVEY TO ADD WETLANDS BY OTHERS	2 EDI WETLANDS DATA	1 REVISED SURVEY MAP BASED ON ATTORNEY'S COMMENTS	REVISION
5	6	7	8	9	10

12	11	10	9	8	7
DATE: 08/07/2019	DATE: 01/10/2019	DATE: 05/26/2021	DATE: 04/13/20	DATE: 12/20/19	DATE: 01/11/19
PROJ: 100-0777-01	PROJ: 100-0777-01	PROJ: 100-0777-01	PROJ: 100-0777-01	PROJ: 100-0777-01	PROJ: 100-0777-01
CHD:	CHD:	CHD:	CHD:	CHD:	CHD:
4 REVISED PER INDEP COMMENTS	4 REVISED PER INDEP COMMENTS	3 REVISED SURVEY TO ADD WETLANDS BY OTHERS	2 EDI WETLANDS DATA	1 REVISED SURVEY MAP BASED ON ATTORNEY'S COMMENTS	REVISION
5	6	7	8	9	10

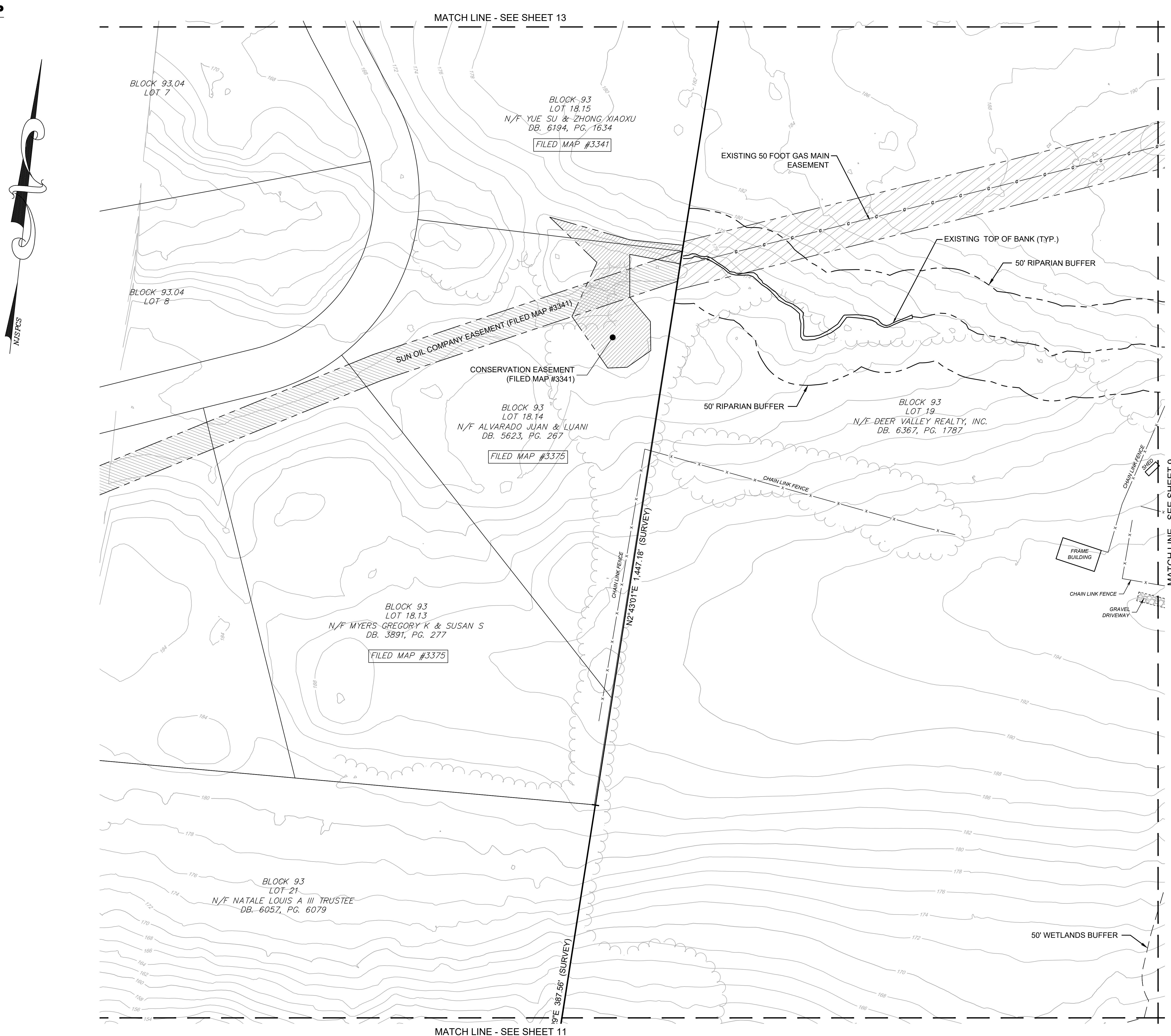
7
13
OF

Bowman CONSULTING

DuQuane


KEY MAP

SCALE: 1"=700'


LEGEND

- D Drainage Manhole
- SHD State Highway
- T Department Manhole
- Telephone Manhole
- Guy Pole
- Grate or Inlet
- Gas Valve (DOT)
- Water Valve
- Guy Wire
- Hydrant
- Iron Rod Found
- Light Pole
- Mailbox
- Monument Found
- Mile Marker Post
- Signs
- Utility Pole
- DOT NJ DOT Utility Box

SEE SHEET 1 OF 13 FOR NOTES & REFERENCES

ALTA/NSPS LAND TITLE SURVEY
BLOCK 93, LOTS 19, 20, 45, 01, 46 & 60
HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY

Bowman CONSULTING

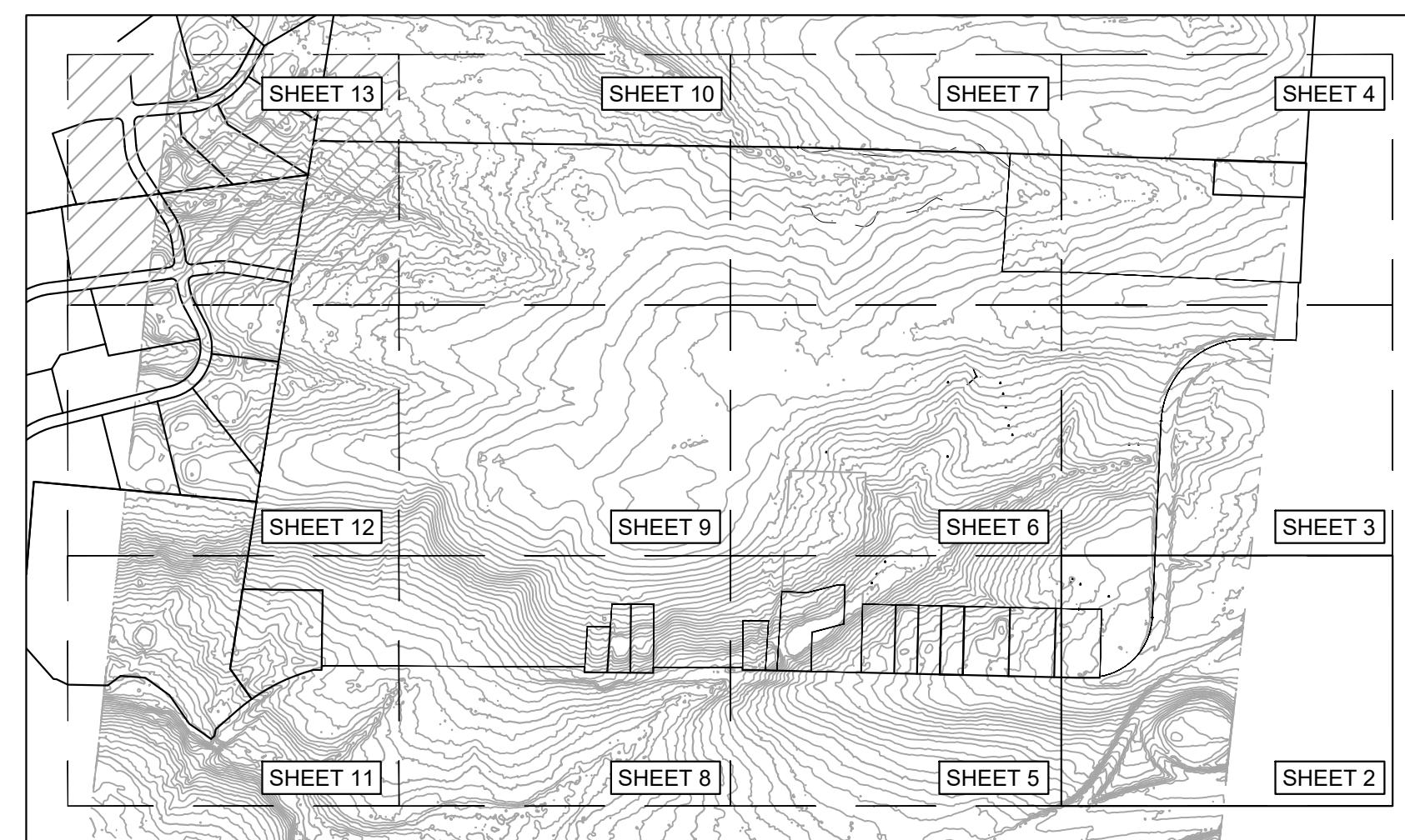
Dougane

MARTIN F. TIRELLA, NJ Professional Land Surveyor, Lic. #4650747700

Bowman Consulting Group, Ltd.
Phone: 732-565-5300
103 W Main Street
Email: NJ@bowmanconsulting.com
Fax: 732-565-5300
N.J. Certificate of Authorization
No. 263825200
Email: NJ@bowmanconsulting.com

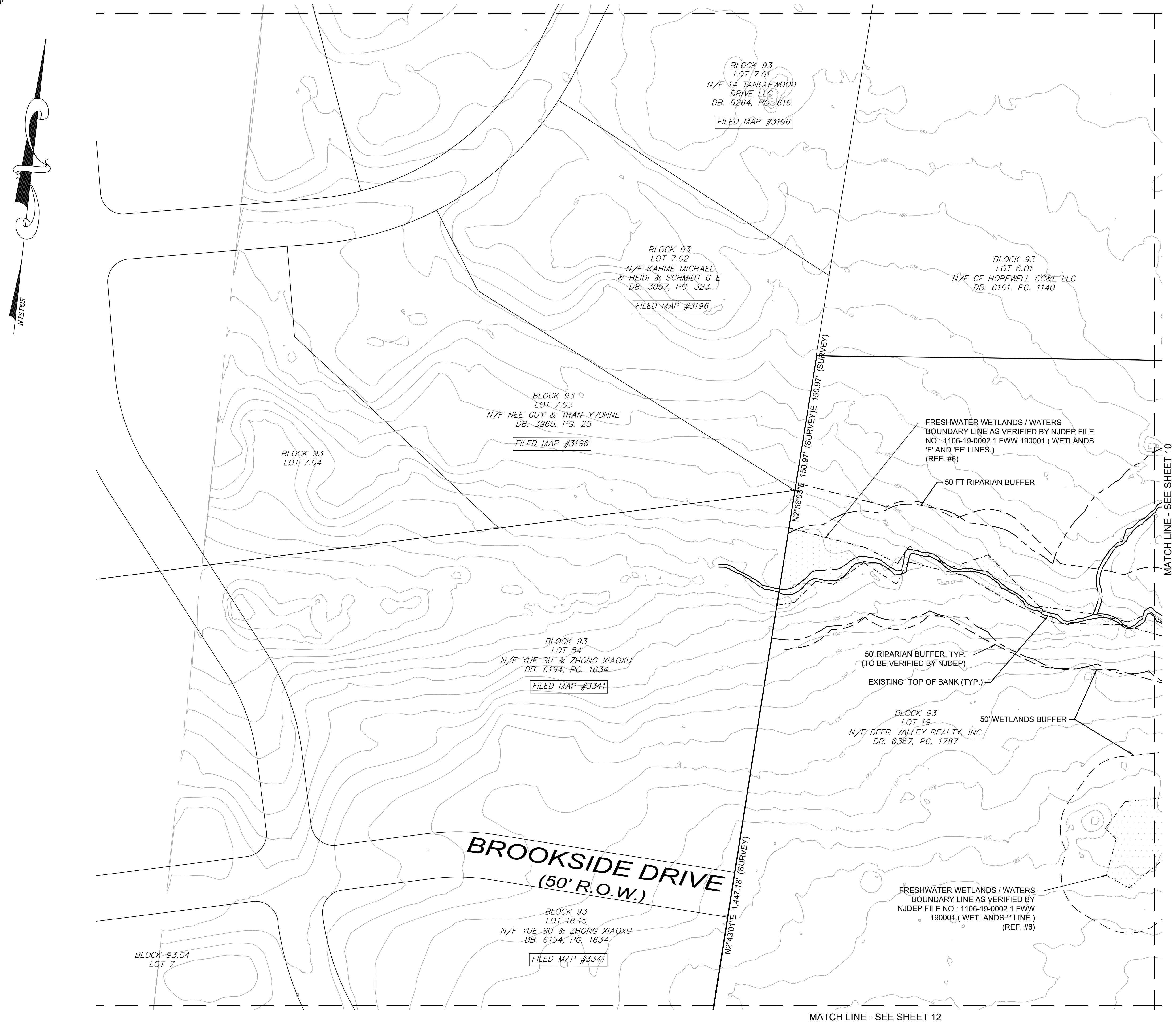
12	11	10	9	8	7
12	11	10	9	8	7
12	11	10	9	8	7
12	11	10	9	8	7
12	11	10	9	8	7

SHEET No.
12
13
OF



KEY M

SCALE: 1"=700'



LEGEND

Drainage Manhole
State Highway
Department Manhole
Telephone Manhole
Guy Pole
Grate or Inlet
Gas Valve (DOT)
Water Valve
Guy Wire
Hydrant
Iron Rod Found
Light Pole
Mailbox
Monument Found
Mile Marker Post
Signs
Utility Pole
NJ DOT Utility Box

SEE SHEET 1 OF 13 FOR NOTES & REFERENCES

**ALTA/NSPS
LAND TITLE SURVEY
BLOCK 93, LOTS 19, 20, 45.01, 46 &**

Bowman Consulting

Bowman Consulting Group, Ltd.
100 Broad Street
New Jersey 07728
BowmanConsulting.com
@BowmanConsulting.com

Phone: 732-665-5500
FAX: 732-665-5501
NU Certificate of Authorization
No. 24GA282222600

Douglas J. Bowman

SHEET No.
13