

TRIBUTARY 3 OF TUCKAHOE CREEK FLOOD STUDY

HENRICO COUNTY, VIRGINIA



TECHNICAL SUPPORT DATA NOTEBOOK

AUGUST 20, 2020

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TIMMONS GROUP

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RICHMOND, VA 23235

TG Project # 45692

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FLOOD STUDY NARRATIVE

1.0 Project Summary

The campus of Lakewood Manor is in need of additional parking at their Lauderdale Drive location. The parking area has been located on the east side of the site and as close as possible to the existing building it is serving. Every attempt has been made to fit the parking on the subject site without any impact to the floodplain associated with Tributary 3 of Tuckahoe Creek, however a crossing of the stream is required. The impacts to the stream and floodplain have been mitigated in the design and no increase in the 100-year base flood elevations have been created with the proposed work.

A FEMA Flood Insurance Study (FIS) data request was submitted on Tributary 3 of Tuckahoe Creek (Trib 3) which returned no model or study on the subject tributary. No study information is included or referenced in the Henrico FIS on Trib 3. With this study a new Existing Conditions model has been created from field surveyed topo and a new hydrologic study. The Existing Condition model is used as the basis for comparison to confirm there is no rise in the water surface from the proposed work.

Tuckahoe Creek was also included in the data request to gather any information on the downstream waters. FEMA has no digital model of Tuckahoe Creek, but supplied the July 1965 study by the U.S. Army Corps of Engineers. The 1965 study is the basis of the current Flood Insurance Rate Maps and information in the Henrico County December 18, 2007 Flood Insurance Study per citation number 12 in the bibliography. As such Base Flood Elevations (BFE) related to Tuckahoe Creek have been taken from Profile 65P and from Table 3-Floodway Data for Tuckahoe Creek. The confluence of Tributary 3 and Tuckahoe Creek is between cross sections H and I which both have BFE elevations of 144.00. It should also be noted that 12,380 linear feet of Tuckahoe Creek, between cross section G and J have no increases. This is typically indicative of a backwater condition created by a downstream constriction such as a roadway crossing in inlet control. This is further confirmed on profile 65P which shows a static water surface between cross sections G and J and a drop in the water surface just downstream of the River Avenue crossing.

2.0 Hydrologic Study Summary

Frequency discharges for the 2-, 10-, 25-, 50-, 100-year and 500-year storm events along the study reach were calculated independently as FEMA has no peak flows reported in the effective FIS for Tributary 3 of Tuckahoe Creek. For this study, hydrology was developed using the SCS Curve Number Method.

The drainage areas utilized in this flood study were delineated based on 1-ft topography generated from a composite Digital Terrain Model (DTM). The DTM was developed using field surveyed data (2020), LiDAR data (2015) and USGS contours (dated 2015). Aerial photography streamed from ArcGIS and Henrico County GIS stormwater infrastructure data was also referenced as part of the drainage area delineation. Refer to EXBT-1 in Appendix 3 for a map illustrating the drainage areas developed for the project. These drainage areas were used for each of the hydrological models evaluated in this study.

Aerial photography and available Henrico GIS data was used as the basis for establishing land use classifications within each drainage area. Soils data defining Hydrology Soils Group (HSG) within each drainage area was downloaded from the NRCS Soils Survey website. The predominant hydrological soil type of the Tributary 3 watershed is soil type D which was conservatively applied to all land cover conditions. Based on the Runoff Curve Number tables provided in NRCS TR-55, a weighted curve number was calculated for each drainage area using the land use classification and soils information, see Appendix 1. It was assumed that all ground cover types were in “good” hydrologic condition when using the TR-55 tables to estimate curve numbers.

Time of concentration was developed for each drainage area using the NRCS methodology for sheet flow, shallow concentrated flow, and channel/pipe reaches, see Appendix 1.

Hydrologic data (time of concentrations, curve numbers and drainage areas) were input into HEC-HMS v4.5 and the hydrographs for each of the design storms were calculated using an SCS Type II storm. Cumulative rainfall depths were determined in accordance with the NOAA Atlas 14 Precipitation Frequency Data Server for Tuckahoe, Virginia are summarized in Table 1 below and provided in Appendix 1. A detailed HEC-HMS report, containing the watershed layout, inputs and results, has been included in Appendix 1 and a brief summary has been included in Table 2.

Table 1: Frequency and Depth of Analyzed Storm Events

Storm Frequency	24-Hour Rainfall Depth (in.)
10-Year	5.04
25-Year	6.23
50-Year	7.25
100-Year	8.38
500-Year	11.50

Table 2. Summary of HEC-HMS Hydrological Parameters and Peak Discharge Rates

Point of Analysis	Area (Ac.)	Curve Number	Tc (Hrs)	100-Yr Peak Flow (cfs)	500-Yr Peak Flow (cfs)
POA -1	135	88.3	0.698	478	586
POA- 2	214.5	86	1.072	683	851.9

The Points of Analysis (POAs) correspond to the flow change locations established for this study, see EXBT-1 in Appendix 3.

3.0 Open Channel Hydraulic Study Summary

The detailed open channel model for this study evaluates Tributary 3 from its confluence with Tuckahoe Creek to the upstream end of the natural channel. A one-dimensional steady flow hydraulic analysis of the study reach was developed using the U.S. Army Corps of Engineers' River Analysis System (HEC-RAS v.5.0.7). First a HEC-RAS Existing Conditions model was developed based on best available data from field surveyed topography within the area of proposed work. The Existing Conditions model was then used as a basis to develop the Proposed Conditions model representing the proposed work associated with the new parking lot. The following summarizes the model progressions evaluated as part of this study.

3.1 Existing Conditions Model

The Existing Conditions model determines the floodplain water surface elevations for the study reach based on the existing topography and new hydrological analysis using SCS Curve Number Method as no study on the tributary exists. Comprehensive HEC-RAS model outputs are provided in Appendix 2.

Although the focus of this study is the upper section of Tributary 3 adjacent to the proposed work, the model has been extended downstream to the confluence with Tuckahoe Creek. The peak flows of Tuckahoe Creek and Tributary 3 are non-coincident and as such the downstream reach boundary condition used is normal depth with a slope of 0.50%. Extending the model to the confluence with Tuckahoe Creek creates a more stable model at the upstream end. The stability is created by HEC-RAS balancing energy across 15 downstream cross sections through the step backwater analysis under the subcritical flow regime to create a very stable energy slope along the project extents.

The river stationing for the model starts at 10+00 at the confluence point with Tuckahoe Creek. Floodplain cross sections were established along the study reach with spacing of the floodplain sections averaging 100 feet along the project extents and 200 feet downstream. Additional sections were added as needed to develop a model that accurately characterized the riverine corridor. Cross section geometry used in this model is based on a composite DTM built from a field survey (2020) and LiDAR data (2015). Cross section locations for the detailed studies are presented on EXBT-2 in Appendix 3.

The Manning's n roughness coefficients for the floodplain overbanks and channel were determined for each cross section by analyzing ArcGIS aerial imagery, field observation and recommendations in the Henrico FIS. The following n values were assigned to the HEC-RAS cross sections for the existing conditions: 0.1 for areas within the wetland floodplain and forested banks, 0.05 for grassy areas within the floodplain, and 0.06 for the main channel.

Peak flows from the developed Hydrological model (see Section 2.0 of this report) were inputted into the Steady Flow Data editor for the 10-, 25-, 50-, 100-, and 500-yr design storm events. Flow change locations in the hydraulic model correspond with locations of POAs, see EXBT-1 in Appendix 3.

3.2 Proposed Conditions Model

The Existing Conditions model served as the basis of analysis for the Proposed Condition model. A new private road crossing Tributary 3 is necessary to access the new parking area located on the elevated site area separated from the rest of the site by the floodplain.

Table 3 below provides a summary of the culverts added for the new private road crossing. This information was manually entered into HEC-RAS using the Bridge/Culvert Data Editor. Ineffective flow areas were updated in the upstream and downstream cross sections for this new crossing. Standard expansion/contraction coefficients and entrance/exit losses were used for the crossing.

Table 3. Summary of Proposed Culvert Configuration

Road Crossing	Culvert Type	Culvert Length	Roadway Width
Private Drive	Twin 8'X6' Conc. Box Culverts with wing walls	55'	35.6'

No increases in the flood elevations were created with this new crossing as the culverts were sized to convey the 100-year flow in outlet control. The culverts mimic the flow area of the existing condition to pass the 100-year flow with as minimal impact to the existing flow characteristic as possible. The new crossing creates a decrease in the water surface elevation by passing all of the 100-year flow through the two 8'X6' box culverts.

The delineation of the Proposed Condition Floodplain also accounts for the static backwater base flood elevation (BFE) of Tuckahoe Creek at elevation 144.00. The Proposed Condition Floodplain delineation plots whichever water surface is higher between the model and the FEMA BFE from Tuckahoe Creek. Upstream of Cross Section 3590.08 the 100-year water surface of the Proposed Condition model is higher than 144.00 and dictates the floodplain boundary. Downstream of Cross Section 3590.08 the static water surface of 144.00 from Tuckahoe Creek has been delineated on EXBT-2 in Appendix 3 as the Proposed Condition Floodplain using the more accurate field run topography. Any fill downstream of Cross Section 3590.08 will not impact the water surface of Tuckahoe Creek as this is an area of inundation and not effective flow area. Flow associated with Tuckahoe Creek becomes effective again downstream of cross section 3000.61. Thus, any fill associated with the project will be analyzed to confirm no increase is created in the Existing Condition flood elevations of Tributary 3.

Table 4 below provides a summary of the revisions made to the existing condition cross sections in creating the Proposed Condition model. Table 5 below provides a summary comparison of the existing and proposed condition base flood elevations.

Table 4. Summary of Model Revisions for the Proposed Condition Model

HEC-RAS RIVER STATION	EDIT #	SUMMARY OF EDITS
3952.9	1	Station-Elevation data updated based on proposed grading.
	2	Manning's n-value updates.
3904.75	1	Section removed – location of new culvert
3852.34	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.
3799.63	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.
3733.79	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.
3628.75	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.
3590.08	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.
3567.08	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.
3506.4	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.
3409.13	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.
3306.96	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.
3195.49	1	Station-Elevation data updated based on proposed grading.
3000.61	1	Station-Elevation data updated based on proposed grading.
	2	LOB Manning's n-value updates.

Table 5. Comparison of Existing and Proposed BFE – Tributary 3 of Tuckahoe Creek

Summary of Proposed 100-Year Water Surface Elevations (WSEs)				
River Station	Profile	Existing Model WSE (ft)	Proposed Model WSE (ft)	Compare Existing to Proposed BFE Δ WSE (ft)
3952.9	100 yr	148.2	147.38	-0.82
3904.75	100 yr	147.69	NA	NA
3852.34	100 yr	146.95	146.9	-0.05
3799.63	100 yr	146.57	146.57	0.00
3733.79	100 yr	146.05	146.05	0.00
3628.75	100 yr	145.01	145.01	0.00
3590.08	100 yr	143.91	143.91	0.00
3567.08	100 yr	143.7	143.7	0.00
3506.4	100 yr	143.21	143.21	0.00
3409.13	100 yr	141.67	141.67	0.00
3306.96	100 yr	140.75	140.75	0.00
3195.49	100 yr	139.25	139.25	0.00
3102.46	100 yr	138.24	138.24	0.00
3000.61	100 yr	137.3	137.3	0.00
See HEC-RAS Summary Tables in Appendix 2 for Downstream Cross Sections				

4.0 Closing Remarks

This report has analyzed existing flooding conditions for Tributary 3 of Tuckahoe Creek within Henrico County, VA. A proposed private road crossing has also been analyzed in the Proposed Conditions model showing no increases in the base flood elevation will occur from the proposed improvements. Lastly, a certificate of no rise has been provided separately per Henrico County requirements for fill in the floodplain to request an exception for the project given the “no rise” results of this study.

The floodplain elevations reflected in this report were determined in accordance with standard hydrologic and hydraulic modeling techniques. However, it is important to note that future changes within the studied drainage area as a result of development, redevelopment, or infrastructure improvements may cause or contribute to flooding not represented in this report. Hydrologic discharge rates and corresponding base flood elevations may be impacted by further urbanization of the study basin.

APPENDIX 1

Hydrological Support Data

WORKSHEET FOR SCS HYDROLOGIC PARAMETERS

Land Use:	X	Existing	Project:	45692 - Tuckahoe Creek Tributary 3 Flood Study	
		Proposed	Subarea Number:	Drainage Area #1	
Off-Site Land Use:	X	Existing	By:	B. Cichocki	
		Proposed	Date:	8/18/2020	

RUNOFF CURVE NUMBER

Soil Group	Land Use or Zoning		Area (acres)	RCN	RCN x Area
	Area	Cover Type			
D	Urban	Residential - 1/4 acre	92.50	87	8047.5
D	Urban	Urban - Commercial and business	17.50	95	1662.5
D	Urban	Urban - Commercial and business	14.00	95	1330.0
D	Urban	Open Space - Good	11.00	80	880.0

Total Area	135 AC	0.211 SQ MI
	54.63 Hectares	

Weighted RCN =	88.3
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TIME OF CONCENTRATION

ID	Type of Flow	n	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)
Sheet Flow (P₂= 3.32 in.)								
1	Grass Dense	0.24	100.0	0.015	$T_t = \frac{0.007 (nL)^{0.8}}{(P_2)^{0.5} S^{0.4}}$			0.262
Shallow Concentrated Flow						Fig. 3.1, TR-55		T _t =L/(3600V)
2	Unpaved		150.0	0.018			2.16	0.019
Channel Flow								T _t =L/(3600V)
3*			3315	ASSUMED 3 FT/S THRU PIPE			3.00	0.307
4**		0.06	850.0	0.0070	85	81	2.15	0.110
Total T_c =								0.698
T_L =								0.419

*Pipe velocity assumed to be 4 ft/s

**Velocity calculated using a triangular cross section with 3:1 side slopes

WORKSHEET FOR SCS HYDROLOGIC PARAMETERS

Land Use:	X	Existing	Project:	45692 - Tuckahoe Creek Tributary 3 Flood Study	
		Proposed	Subarea Number:	Drainage Area #2	
Off-Site Land Use:	X	Existing	By:	B. Cichocki	
		Proposed	Date:	8/18/2020	

RUNOFF CURVE NUMBER

Soil Group	Land Use or Zoning		Area (acres)	RCN	RCN x Area
	Area	Cover Type			
D	Urban	Residential - 1/4 acre	31.00	87	2697.0
D	Other Agricultural	Woods/Grass - Good	48.50	79	3831.5

Total Area	79.5 AC	0.124 SQ MI
	32.17 Hectares	

Weighted RCN =	82.1
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TIME OF CONCENTRATION

ID	Type of Flow	n	Length (ft)	Slope (ft/ft)	Area (sf)	Wet P (ft)	Velocity (fps)	Tc (hrs)
Sheet Flow (P₂= 3.32 in.)								
1	Woods	0.8	100.0	0.017				0.653
Shallow Concentrated Flow						Fig. 3.1, TR-55		T _c =L/(3600V)
2	Unpaved		980.0	0.050			3.61	0.075
Channel Flow								T _c =L/(3600V)
3*			0	ASSUMED 3 FT/S THRU PIPE			3.00	0.000
4**		0.06	1850.0	0.0050	200	254	1.50	0.343

*Pipe velocity assumed to be 4 ft/s

**Velocity calculated using a triangular cross section with 3:1 side slopes

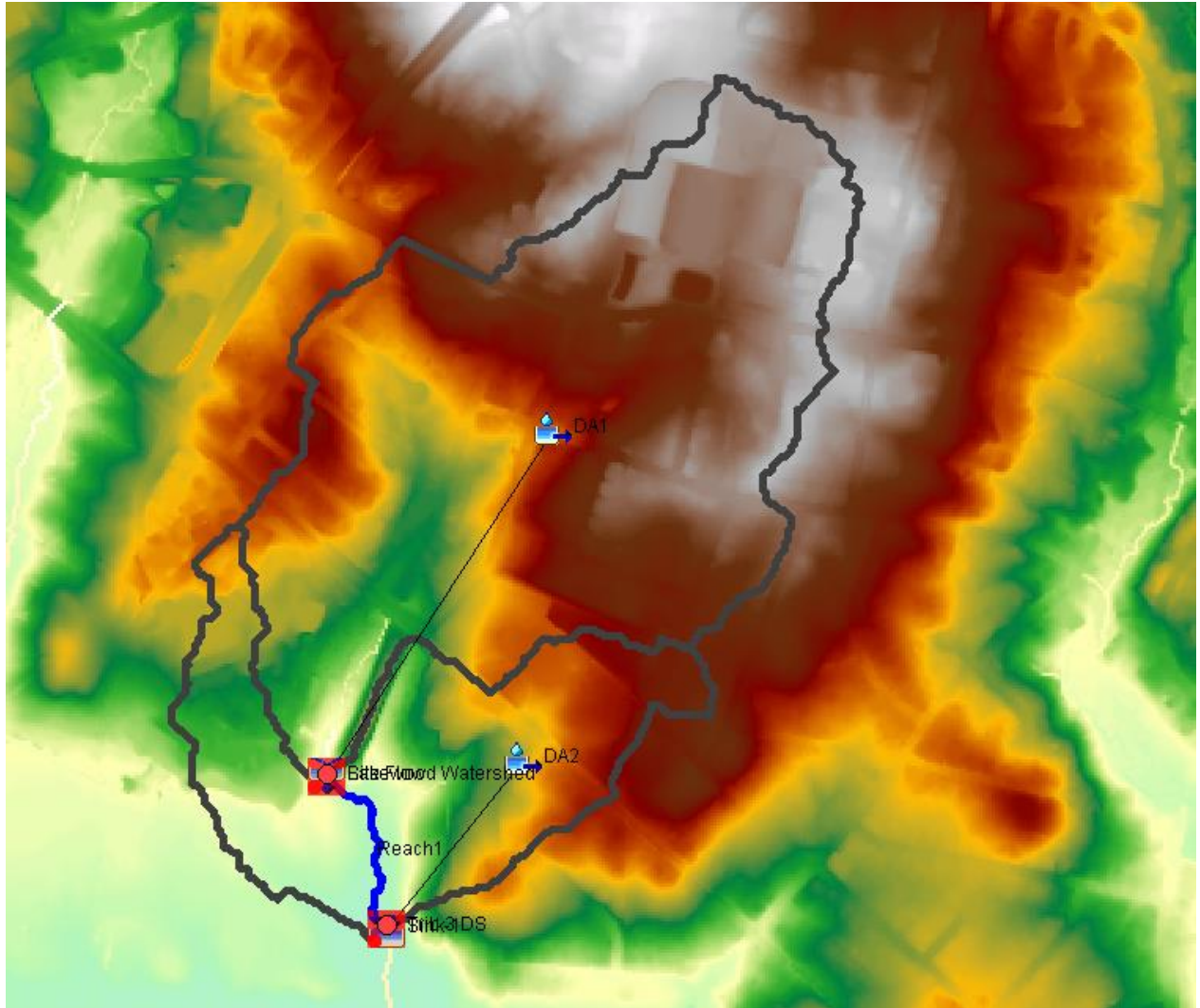
Total T_c =	1.072
T_L =	0.643



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August 2020
Tuckahoe Creek Tributary 3 HEC-HMS Analysis
Basin Model



Tuckahoe Creek Tributary 3 HEC-HMS Analysis Drainage Area Inputs

Subbasin Loss Transform Options

Basin Name: Tuckahoe CK Trib 3
Element Name: DA1

Description:

Downstream: Lakewood Watershed

*Area (MI2) 0.2109

Latitude Degrees: 37

Latitude Minutes: 36

Latitude Seconds: 36

Longitude Degrees: -77

Longitude Minutes: 37

Longitude Seconds: 40

Canopy Method: --None--

Surface Method: --None--

Loss Method: SCS Curve Number

Transform Method: SCS Unit Hydrograph

Baseflow Method: --None--

Subbasin Loss Transform Options

Basin Name: Tuckahoe CK Trib 3
Element Name: DA2

Description:

Downstream: Tributary 3

*Area (MI2) 0.1242

Latitude Degrees: 37

Latitude Minutes: 36

Latitude Seconds: 20

Longitude Degrees: -77

Longitude Minutes: 37

Longitude Seconds: 49

Canopy Method: --None--

Surface Method: --None--

Loss Method: SCS Curve Number

Transform Method: SCS Unit Hydrograph

Baseflow Method: --None--

Subbasin Loss Transform Options

Basin Name: Tuckahoe CK Trib 3
Element Name: DA1

Initial Abstraction (IN)

*Curve Number: 88

*Impervious (%) 0.0

Subbasin Loss Transform Options

Basin Name: Tuckahoe CK Trib 3
Element Name: DA2

Initial Abstraction (IN)

*Curve Number: 82

*Impervious (%) 0.0

Subbasin Loss Transform Options

Basin Name: Tuckahoe CK Trib 3
Element Name: DA1

Graph Type: Standard (PRF 484)

*Lag Time (MIN) 25

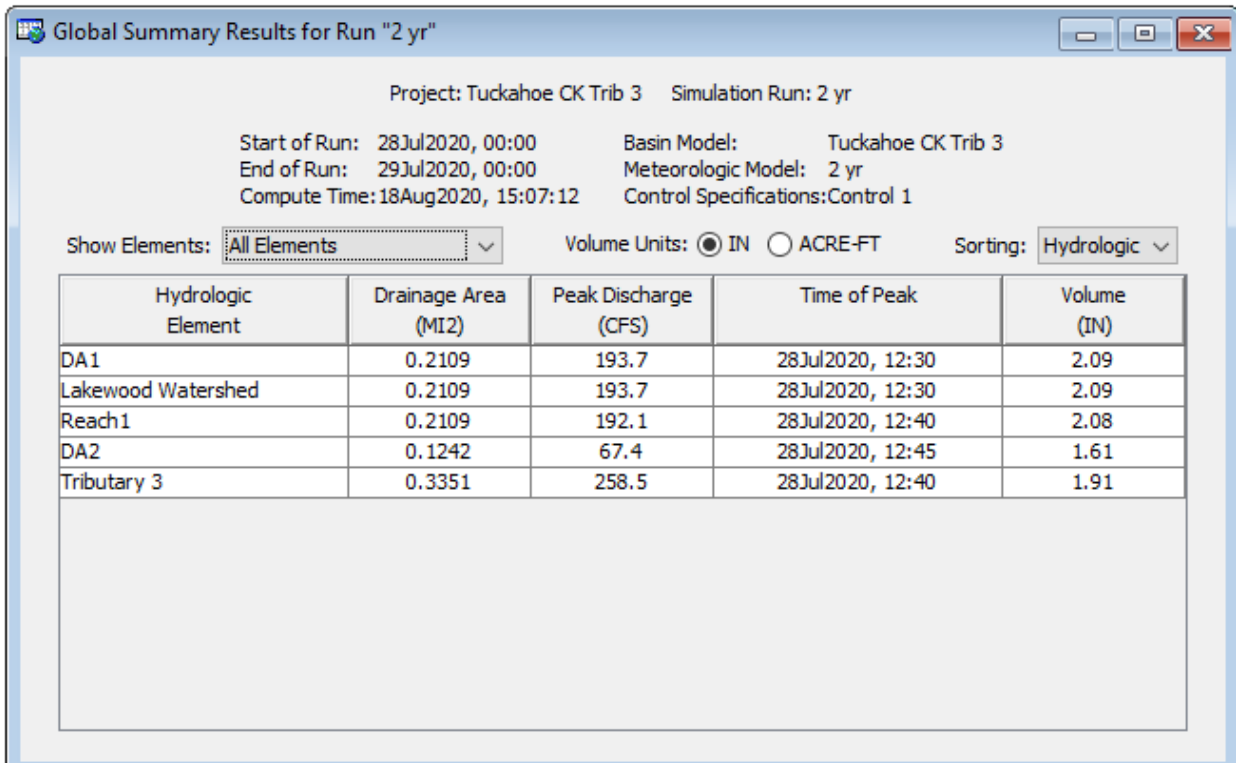
Subbasin Loss Transform Options

Basin Name: Tuckahoe CK Trib 3
Element Name: DA2

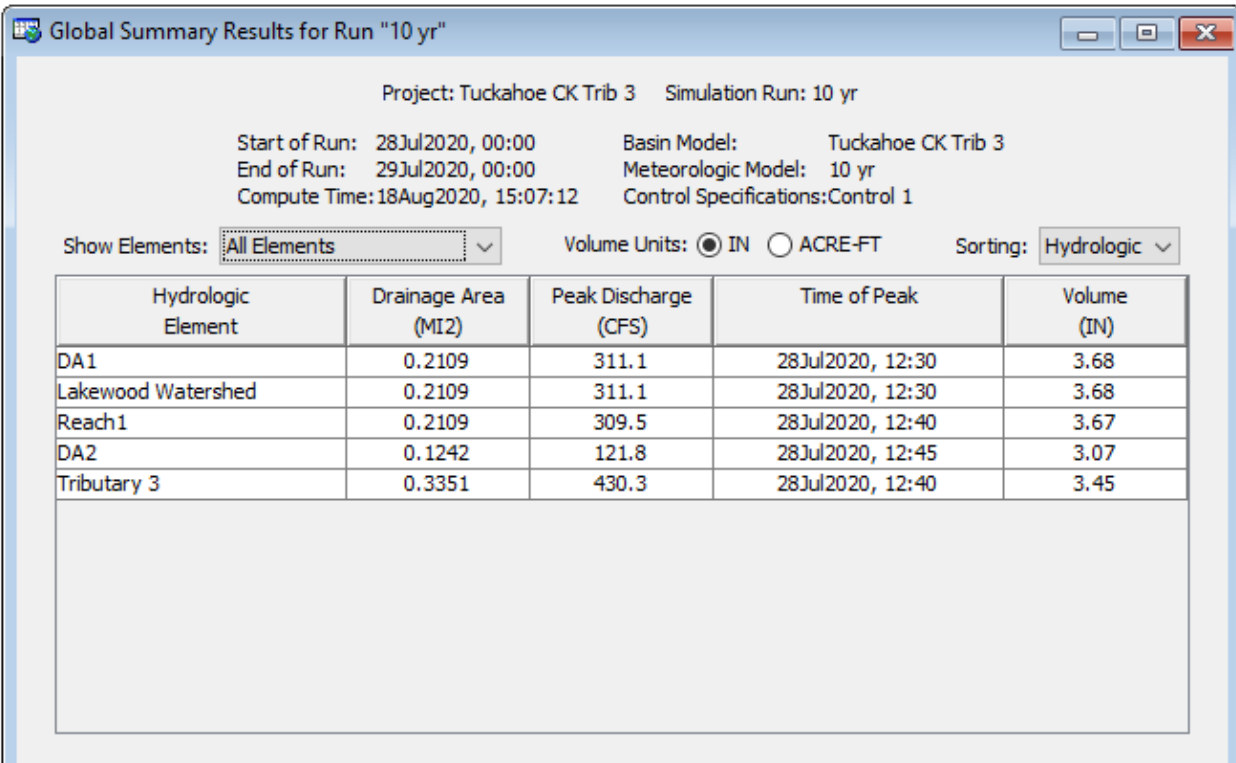
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*Lag Time (MIN) 38.6

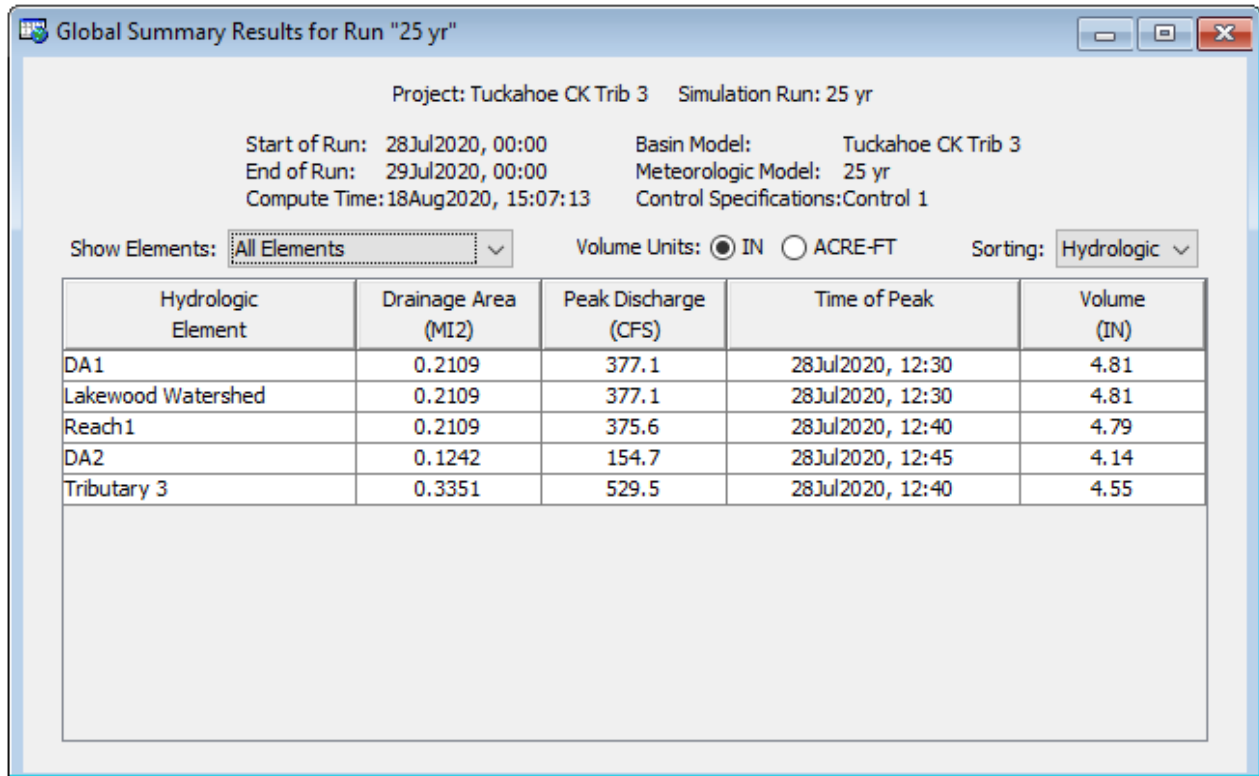
2-Year 24-Hour Results



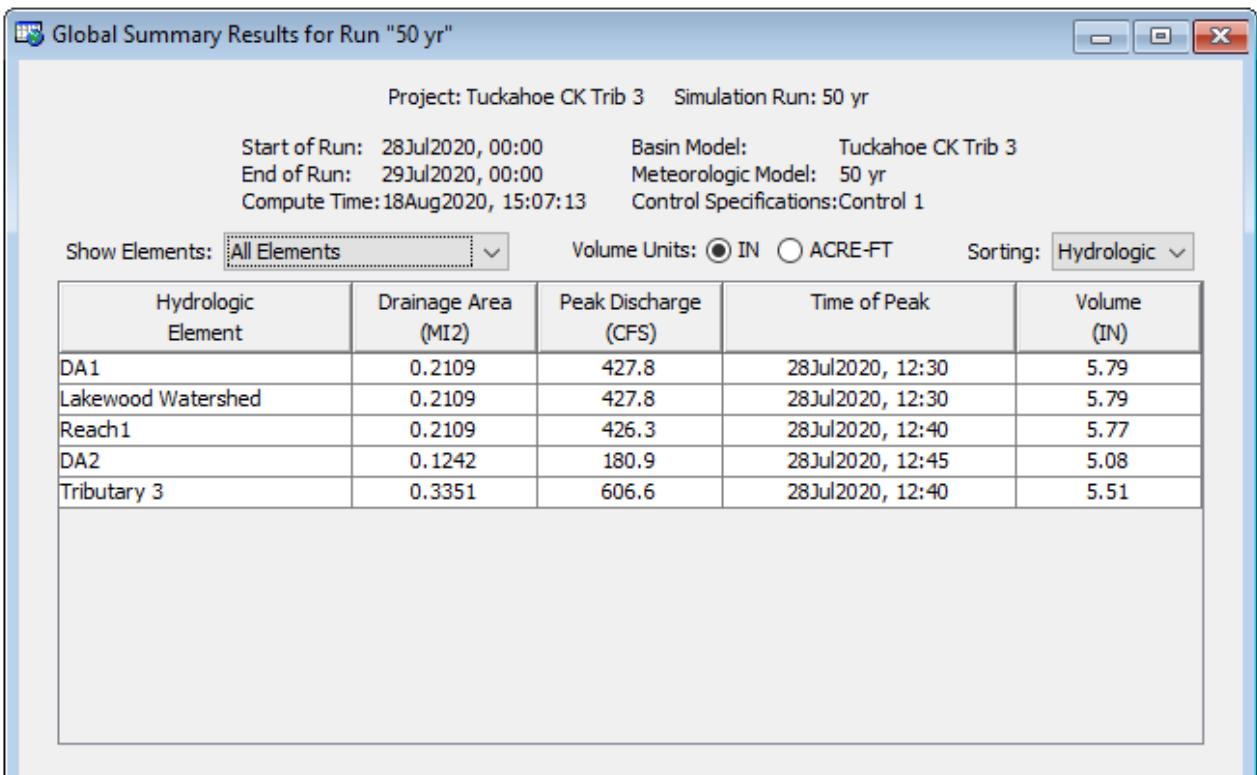
10-Year 24-Hour Results



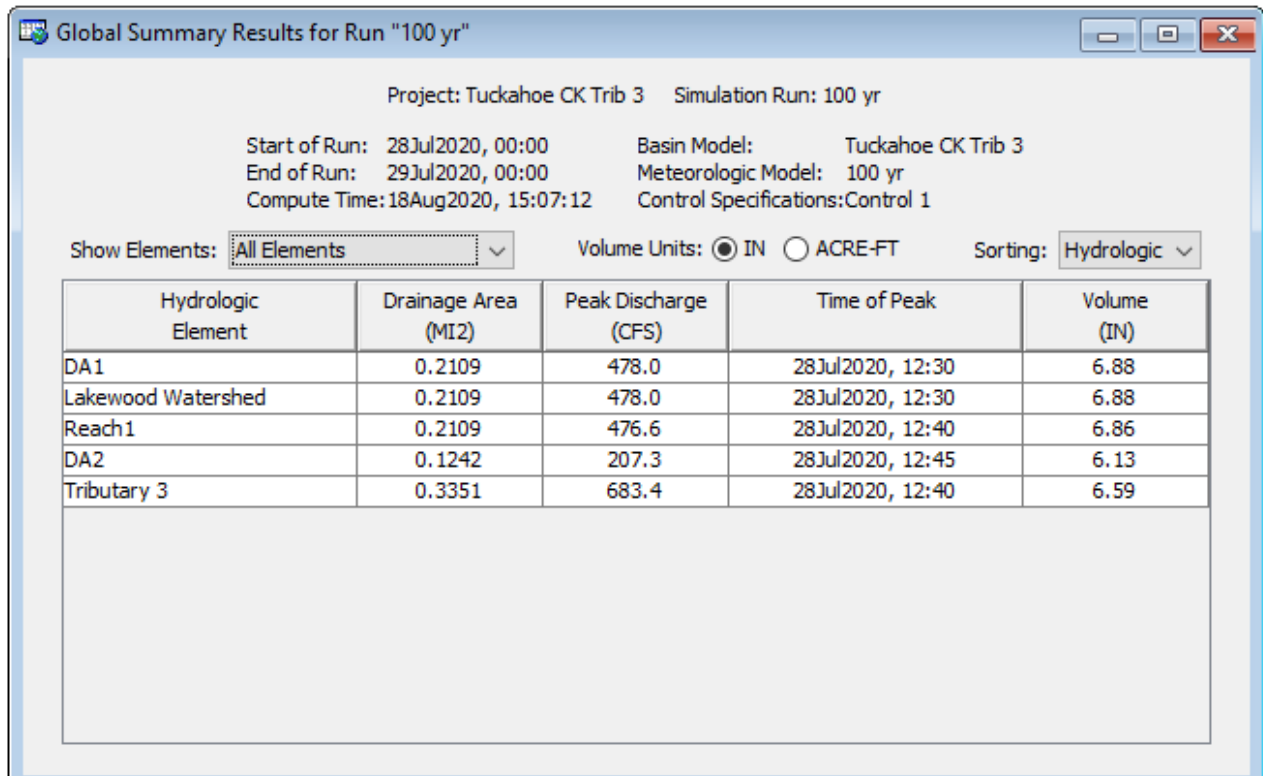
25-Year 24-Hour Results



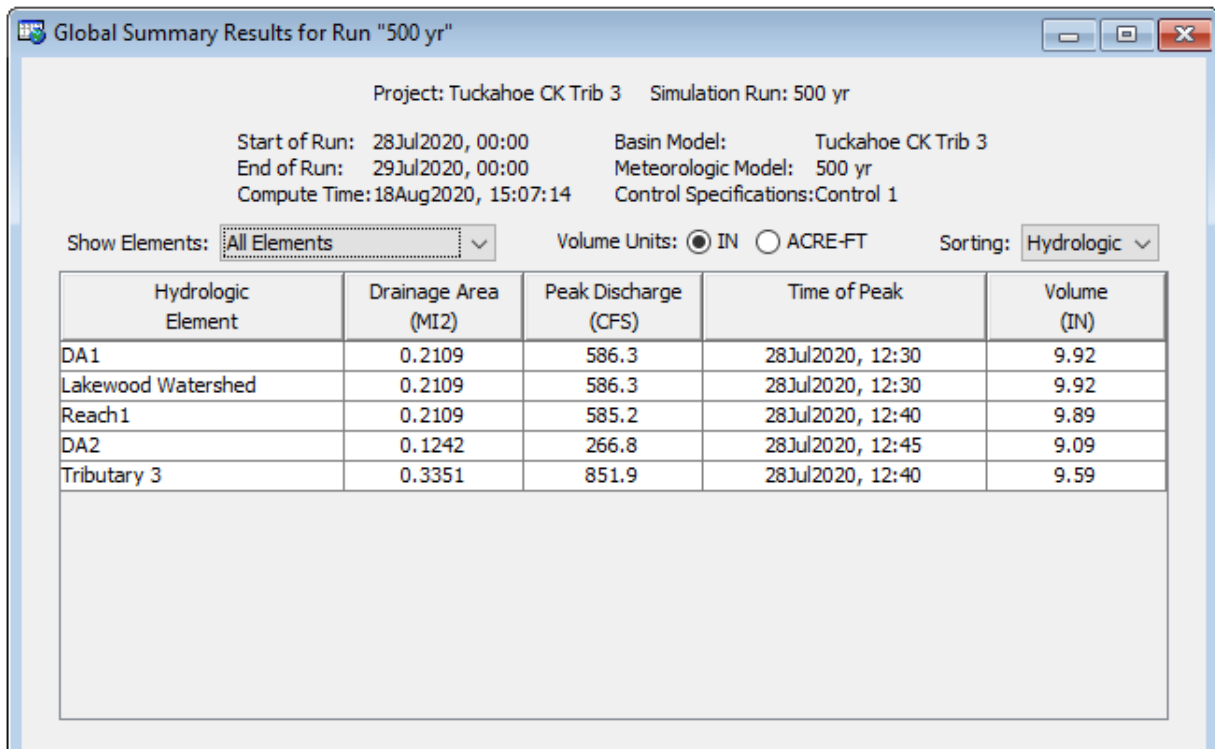
50-Year 24-Hour Results



100-Year 24-Hour Results



500-Year 24-Hour Results





POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.368 (0.330-0.410)	0.435 (0.391-0.484)	0.507 (0.456-0.564)	0.571 (0.512-0.634)	0.641 (0.573-0.710)	0.696 (0.619-0.770)	0.746 (0.661-0.825)	0.791 (0.697-0.875)	0.845 (0.739-0.936)	0.888 (0.771-0.986)
10-min	0.588 (0.527-0.655)	0.695 (0.626-0.773)	0.812 (0.730-0.903)	0.914 (0.820-1.01)	1.02 (0.913-1.13)	1.11 (0.986-1.23)	1.19 (1.05-1.31)	1.25 (1.11-1.39)	1.34 (1.17-1.48)	1.40 (1.21-1.55)
15-min	0.735 (0.659-0.819)	0.874 (0.786-0.972)	1.03 (0.924-1.14)	1.16 (1.04-1.28)	1.30 (1.16-1.44)	1.40 (1.25-1.55)	1.50 (1.33-1.66)	1.58 (1.39-1.75)	1.68 (1.47-1.86)	1.76 (1.52-1.95)
30-min	1.01 (0.904-1.12)	1.21 (1.09-1.34)	1.46 (1.31-1.62)	1.68 (1.50-1.86)	1.92 (1.72-2.13)	2.11 (1.88-2.34)	2.29 (2.03-2.54)	2.46 (2.17-2.73)	2.68 (2.34-2.97)	2.84 (2.47-3.16)
60-min	1.26 (1.13-1.40)	1.51 (1.36-1.69)	1.87 (1.68-2.08)	2.18 (1.96-2.42)	2.56 (2.28-2.83)	2.86 (2.55-3.17)	3.16 (2.80-3.50)	3.46 (3.04-3.82)	3.84 (3.36-4.26)	4.15 (3.60-4.61)
2-hr	1.49 (1.33-1.67)	1.79 (1.60-2.01)	2.23 (1.99-2.50)	2.62 (2.34-2.94)	3.12 (2.76-3.49)	3.54 (3.12-3.95)	3.96 (3.46-4.41)	4.40 (3.82-4.89)	4.98 (4.28-5.54)	5.46 (4.66-6.09)
3-hr	1.61 (1.43-1.81)	1.94 (1.72-2.18)	2.41 (2.14-2.72)	2.84 (2.51-3.19)	3.38 (2.98-3.80)	3.84 (3.36-4.30)	4.31 (3.74-4.82)	4.78 (4.13-5.35)	5.42 (4.64-6.07)	5.96 (5.05-6.67)
6-hr	1.95 (1.73-2.22)	2.34 (2.07-2.67)	2.91 (2.57-3.31)	3.44 (3.03-3.91)	4.14 (3.62-4.69)	4.74 (4.12-5.36)	5.37 (4.63-6.07)	6.04 (5.16-6.82)	6.97 (5.88-7.86)	7.77 (6.47-8.75)
12-hr	2.35 (2.09-2.68)	2.82 (2.51-3.22)	3.52 (3.12-4.02)	4.20 (3.70-4.77)	5.11 (4.47-5.79)	5.93 (5.14-6.70)	6.80 (5.83-7.65)	7.74 (6.56-8.68)	9.09 (7.57-10.2)	10.3 (8.45-11.5)
24-hr	2.74 (2.50-3.03)	3.32 (3.03-3.68)	4.25 (3.87-4.71)	5.04 (4.58-5.57)	6.23 (5.61-6.86)	7.25 (6.48-7.97)	8.38 (7.42-9.20)	9.63 (8.45-10.5)	11.5 (9.95-12.6)	13.1 (11.2-14.3)
2-day	3.19 (2.91-3.52)	3.86 (3.53-4.26)	4.92 (4.49-5.43)	5.81 (5.28-6.39)	7.09 (6.41-7.79)	8.18 (7.35-8.98)	9.36 (8.35-10.3)	10.6 (9.42-11.7)	12.5 (10.9-13.8)	14.1 (12.2-15.5)
3-day	3.37 (3.09-3.71)	4.09 (3.74-4.49)	5.20 (4.75-5.71)	6.13 (5.59-6.72)	7.48 (6.78-8.19)	8.62 (7.77-9.44)	9.86 (8.82-10.8)	11.2 (9.94-12.3)	13.2 (11.5-14.4)	14.8 (12.9-16.3)
4-day	3.56 (3.26-3.90)	4.31 (3.95-4.72)	5.48 (5.02-6.00)	6.45 (5.89-7.05)	7.86 (7.15-8.59)	9.06 (8.19-9.89)	10.4 (9.29-11.3)	11.8 (10.5-12.8)	13.8 (12.1-15.1)	15.5 (13.5-17.0)
7-day	4.10 (3.78-4.47)	4.93 (4.54-5.38)	6.17 (5.68-6.73)	7.21 (6.62-7.85)	8.70 (7.95-9.46)	9.95 (9.04-10.8)	11.3 (10.2-12.3)	12.7 (11.4-13.9)	14.8 (13.2-16.2)	16.6 (14.6-18.2)
10-day	4.66 (4.31-5.05)	5.58 (5.17-6.05)	6.91 (6.39-7.49)	7.99 (7.38-8.66)	9.53 (8.76-10.3)	10.8 (9.88-11.7)	12.1 (11.0-13.1)	13.6 (12.3-14.7)	15.6 (13.9-16.9)	17.2 (15.3-18.7)
20-day	6.26 (5.85-6.72)	7.47 (6.97-8.01)	9.03 (8.42-9.68)	10.3 (9.55-11.0)	11.9 (11.1-12.8)	13.3 (12.3-14.2)	14.6 (13.5-15.7)	16.0 (14.7-17.2)	17.9 (16.3-19.3)	19.4 (17.5-20.9)
30-day	7.76 (7.28-8.27)	9.19 (8.62-9.80)	10.9 (10.2-11.6)	12.2 (11.4-13.0)	13.9 (13.0-14.8)	15.2 (14.2-16.2)	16.5 (15.3-17.6)	17.8 (16.5-19.0)	19.5 (17.9-20.8)	20.7 (19.0-22.2)
45-day	9.78 (9.18-10.4)	11.5 (10.8-12.3)	13.5 (12.7-14.3)	15.0 (14.0-15.9)	16.9 (15.8-17.9)	18.3 (17.1-19.4)	19.6 (18.3-20.9)	20.9 (19.5-22.3)	22.6 (20.9-24.1)	23.8 (22.0-25.5)
60-day	11.6 (10.9-12.3)	13.6 (12.8-14.4)	15.7 (14.8-16.6)	17.3 (16.3-18.3)	19.3 (18.2-20.4)	20.8 (19.5-22.0)	22.2 (20.8-23.5)	23.6 (22.0-25.0)	25.3 (23.5-26.8)	26.5 (24.6-28.1)

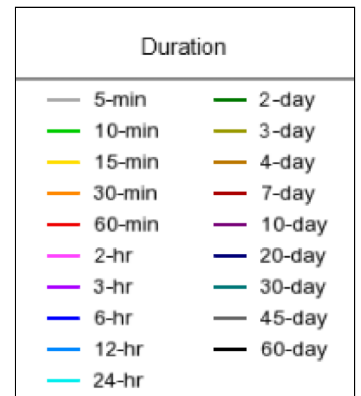
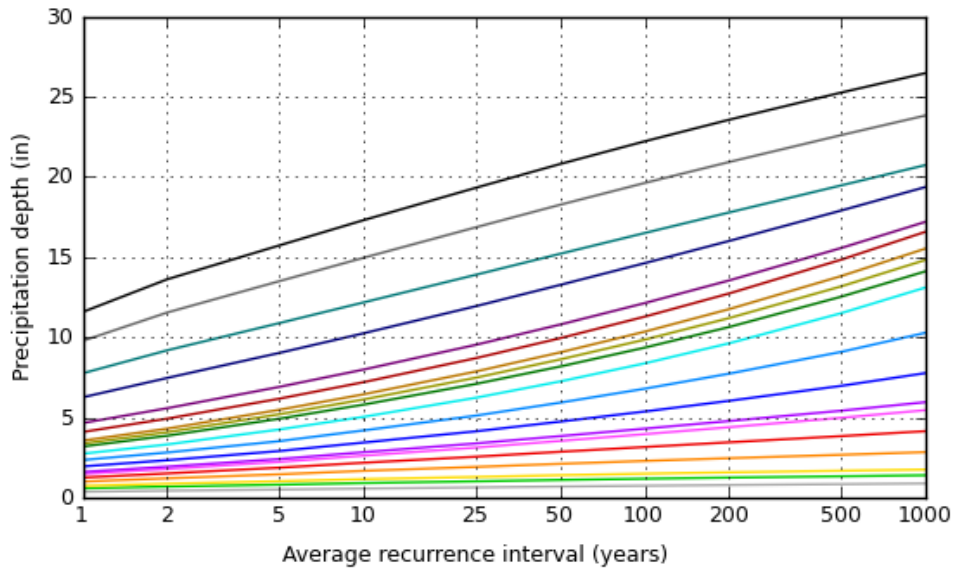
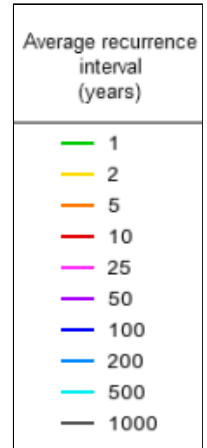
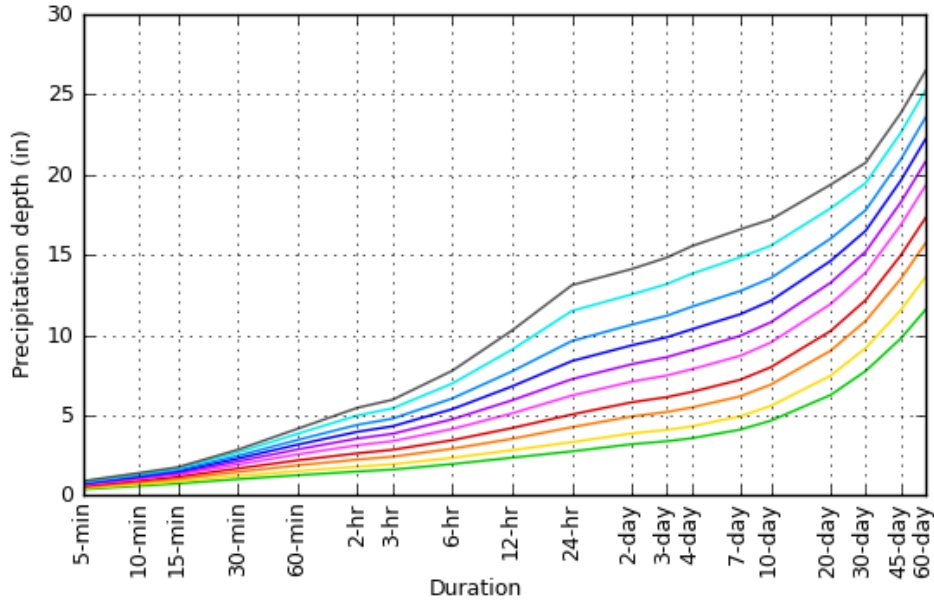
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves

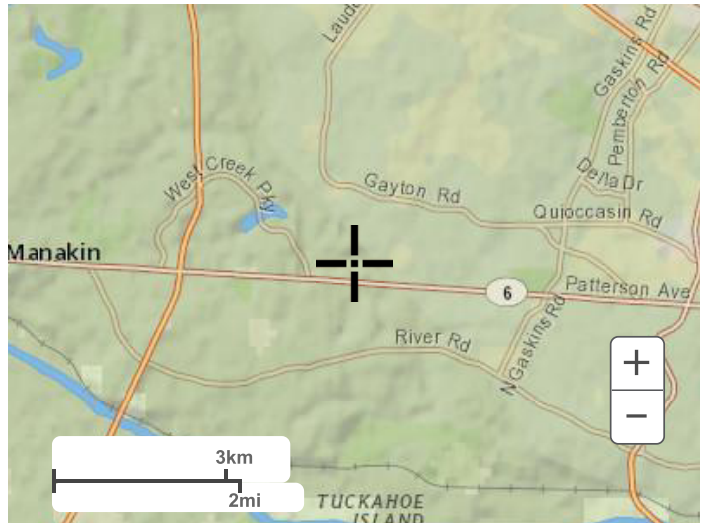
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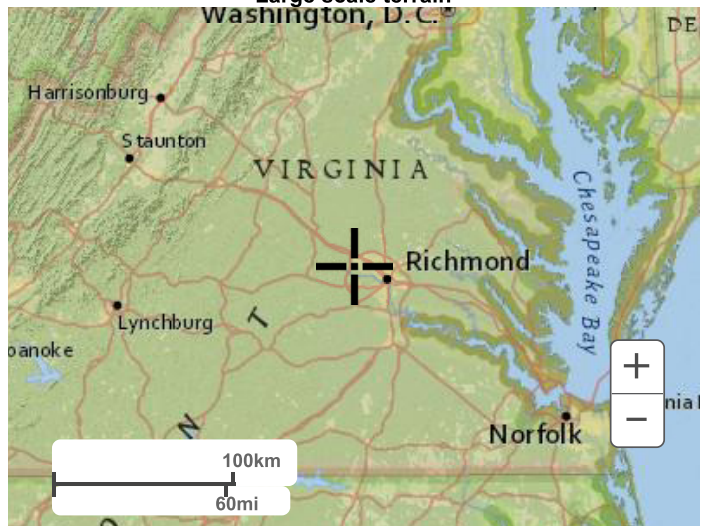
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Maps & aerials

Small scale terrain



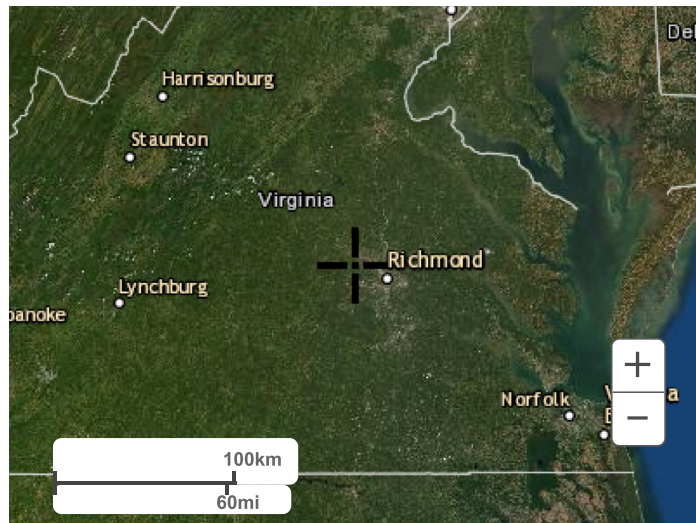
Large scale terrain



Large scale map



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APPENDIX 2

HEC-RAS Detailed Outputs & Results

HEC-RAS Plan: Trib 3 Ex Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib

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
Tuckahoe CK Trib	1013.78	100 yr	684.00	126.70	129.92	129.53	129.97	0.005000	3.24	596.92	664.28	0.35
Tuckahoe CK Trib	1013.78	500 yr	852.00	126.70	130.07	129.61	130.12	0.005004	3.36	698.63	682.91	0.35
Tuckahoe CK Trib	1013.78	50 yr	607.00	126.70	129.84	129.50	129.89	0.005001	3.18	547.80	656.04	0.35
Tuckahoe CK Trib	1013.78	25 yr	530.00	126.70	129.76	129.46	129.81	0.005004	3.11	496.15	647.34	0.35
Tuckahoe CK Trib	1013.78	10 yr	430.00	126.70	129.65	129.40	129.70	0.005000	3.02	424.60	635.07	0.35
Tuckahoe CK Trib	1013.78	2 yr	259.00	126.70	129.42	129.25	129.48	0.005001	2.82	282.28	610.82	0.34
Tuckahoe CK Trib	1099.53	100 yr	684.00	126.70	130.10		130.14	0.003839	3.00	627.91	603.18	0.31
Tuckahoe CK Trib	1099.53	500 yr	852.00	126.70	130.24		130.29	0.004062	3.19	715.74	609.75	0.32
Tuckahoe CK Trib	1099.53	50 yr	607.00	126.70	130.03		130.07	0.003679	2.89	584.77	595.57	0.30
Tuckahoe CK Trib	1099.53	25 yr	530.00	126.70	129.95		129.99	0.003480	2.76	539.80	585.11	0.29
Tuckahoe CK Trib	1099.53	10 yr	430.00	126.70	129.84		129.88	0.003192	2.58	477.95	573.46	0.28
Tuckahoe CK Trib	1099.53	2 yr	259.00	126.70	129.63		129.66	0.002488	2.15	357.04	549.66	0.24
Tuckahoe CK Trib	1201.38	100 yr	684.00	126.70	130.26		130.29	0.003050	2.76	663.29	559.64	0.27
Tuckahoe CK Trib	1201.38	500 yr	852.00	126.70	130.41		130.44	0.003343	2.98	747.21	568.72	0.29
Tuckahoe CK Trib	1201.38	50 yr	607.00	126.70	130.18		130.21	0.002906	2.65	621.23	555.51	0.27
Tuckahoe CK Trib	1201.38	25 yr	530.00	126.70	130.10		130.13	0.002748	2.53	576.63	551.18	0.26
Tuckahoe CK Trib	1201.38	10 yr	430.00	126.70	129.99		130.01	0.002495	2.35	514.37	542.71	0.24
Tuckahoe CK Trib	1201.38	2 yr	259.00	126.70	129.75		129.78	0.001958	1.97	389.19	530.45	0.21
Tuckahoe CK Trib	1406.3	100 yr	684.00	126.80	130.51		130.52	0.000888	1.55	1156.38	831.31	0.15
Tuckahoe CK Trib	1406.3	500 yr	852.00	126.80	130.68		130.69	0.000959	1.67	1297.97	834.69	0.16
Tuckahoe CK Trib	1406.3	50 yr	607.00	126.80	130.42		130.43	0.000853	1.49	1085.18	829.61	0.15
Tuckahoe CK Trib	1406.3	25 yr	530.00	126.80	130.33		130.34	0.000814	1.43	1009.17	827.83	0.14
Tuckahoe CK Trib	1406.3	10 yr	430.00	126.80	130.20		130.21	0.000760	1.34	901.25	825.30	0.14
Tuckahoe CK Trib	1406.3	2 yr	259.00	126.80	129.93		129.94	0.000633	1.15	679.37	809.27	0.12
Tuckahoe CK Trib	1501.43	100 yr	684.00	126.90	130.62		130.62	0.000757	1.43	1333.10	1059.57	0.14
Tuckahoe CK Trib	1501.43	500 yr	852.00	126.90	130.80		130.80	0.000803	1.52	1527.34	1108.51	0.14
Tuckahoe CK Trib	1501.43	50 yr	607.00	126.90	130.53		130.53	0.000747	1.39	1238.12	1055.53	0.14
Tuckahoe CK Trib	1501.43	25 yr	530.00	126.90	130.43		130.44	0.000738	1.35	1136.83	1051.86	0.13
Tuckahoe CK Trib	1501.43	10 yr	430.00	126.90	130.29		130.30	0.000727	1.30	993.11	1046.63	0.13
Tuckahoe CK Trib	1501.43	2 yr	259.00	126.90	130.01		130.01	0.000717	1.21	696.34	1023.36	0.13
Tuckahoe CK Trib	1600.28	100 yr	684.00	127.00	130.72		130.73	0.000591	1.28	1341.00	865.52	0.12
Tuckahoe CK Trib	1600.28	500 yr	852.00	127.00	130.91		130.92	0.000640	1.38	1502.94	870.09	0.13
Tuckahoe CK Trib	1600.28	50 yr	607.00	127.00	130.63		130.63	0.000566	1.23	1260.30	863.24	0.12
Tuckahoe CK Trib	1600.28	25 yr	530.00	127.00	130.53		130.53	0.000539	1.18	1174.17	860.80	0.12

HEC-RAS Plan: Trib 3 Ex Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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
Tuckahoe CK Trib	1600.28	10 yr	430.00	127.00	130.39		130.39	0.000501	1.10	1051.84	857.13	0.11
Tuckahoe CK Trib	1600.28	2 yr	259.00	127.00	130.09		130.10	0.000421	0.94	800.26	849.19	0.10
Tuckahoe CK Trib	1855.43	100 yr	684.00	127.10	130.90		130.93	0.002639	2.64	687.09	549.07	0.25
Tuckahoe CK Trib	1855.43	500 yr	852.00	127.10	131.10		131.13	0.002638	2.74	795.66	554.39	0.26
Tuckahoe CK Trib	1855.43	50 yr	607.00	127.10	130.80		130.84	0.002647	2.59	633.16	546.52	0.25
Tuckahoe CK Trib	1855.43	25 yr	530.00	127.10	130.70		130.73	0.002667	2.54	575.68	543.98	0.25
Tuckahoe CK Trib	1855.43	10 yr	430.00	127.10	130.55		130.58	0.002721	2.49	494.46	541.48	0.25
Tuckahoe CK Trib	1855.43	2 yr	259.00	127.10	130.24		130.28	0.003025	2.43	325.79	536.10	0.26
Tuckahoe CK Trib	2066.3	100 yr	684.00	127.25	131.39		131.41	0.001361	2.11	813.83	498.88	0.19
Tuckahoe CK Trib	2066.3	500 yr	852.00	127.25	131.60		131.63	0.001444	2.25	921.36	502.05	0.20
Tuckahoe CK Trib	2066.3	50 yr	607.00	127.25	131.28		131.30	0.001317	2.03	760.44	497.32	0.19
Tuckahoe CK Trib	2066.3	25 yr	530.00	127.25	131.17		131.19	0.001268	1.95	703.53	495.41	0.18
Tuckahoe CK Trib	2066.3	10 yr	430.00	127.25	131.00		131.01	0.001171	1.82	620.15	475.34	0.17
Tuckahoe CK Trib	2066.3	2 yr	259.00	127.25	130.66		130.67	0.000986	1.55	460.67	460.61	0.16
Tuckahoe CK Trib	2100.19	100 yr	684.00	127.50	131.51		131.59	0.004942	3.36	430.07	338.73	0.35
Tuckahoe CK Trib	2100.19	500 yr	852.00	127.50	131.73		131.82	0.005020	3.56	506.52	354.64	0.36
Tuckahoe CK Trib	2100.19	50 yr	607.00	127.50	131.40		131.48	0.004909	3.26	392.98	332.97	0.35
Tuckahoe CK Trib	2100.19	25 yr	530.00	127.50	131.28		131.36	0.004877	3.15	353.86	326.76	0.35
Tuckahoe CK Trib	2100.19	10 yr	430.00	127.50	131.10		131.17	0.004943	3.03	295.89	317.33	0.35
Tuckahoe CK Trib	2100.19	2 yr	259.00	127.50	130.74		130.80	0.004641	2.63	203.93	236.27	0.33
Tuckahoe CK Trib	2126.75	100 yr	684.00	127.50	131.66		131.67	0.001020	1.50	867.31	496.32	0.16
Tuckahoe CK Trib	2126.75	500 yr	852.00	127.50	131.89		131.90	0.001103	1.65	983.14	512.64	0.17
Tuckahoe CK Trib	2126.75	50 yr	607.00	127.50	131.54		131.56	0.000973	1.42	810.92	487.21	0.16
Tuckahoe CK Trib	2126.75	25 yr	530.00	127.50	131.42		131.43	0.000927	1.34	751.47	479.67	0.15
Tuckahoe CK Trib	2126.75	10 yr	430.00	127.50	131.24		131.25	0.000869	1.24	664.54	466.12	0.15
Tuckahoe CK Trib	2126.75	2 yr	259.00	127.50	130.86		130.86	0.000758	1.02	491.51	443.69	0.13
Tuckahoe CK Trib	2246.04	100 yr	684.00	126.70	131.73		131.78	0.001800	2.62	572.65	314.26	0.23
Tuckahoe CK Trib	2246.04	500 yr	852.00	126.70	131.96		132.02	0.002015	2.87	648.06	347.04	0.24
Tuckahoe CK Trib	2246.04	50 yr	607.00	126.70	131.61		131.65	0.001688	2.49	536.25	304.78	0.22
Tuckahoe CK Trib	2246.04	25 yr	530.00	126.70	131.48		131.52	0.001442	2.25	498.06	291.61	0.20
Tuckahoe CK Trib	2246.04	10 yr	430.00	126.70	131.30		131.33	0.001251	2.03	444.58	277.18	0.18
Tuckahoe CK Trib	2246.04	2 yr	259.00	126.70	130.91		130.93	0.000836	1.55	345.51	224.47	0.15
Tuckahoe CK Trib	2413.06	100 yr	684.00	127.50	132.11		132.20	0.003425	3.40	416.61	227.03	0.30

HEC-RAS Plan: Trib 3 Ex Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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
Tuckahoe CK Trib	2413.06	500 yr	852.00	127.50	132.39		132.48	0.003709	3.70	480.08	238.49	0.32
Tuckahoe CK Trib	2413.06	50 yr	607.00	127.50	131.97		132.05	0.003285	3.25	385.64	216.82	0.29
Tuckahoe CK Trib	2413.06	25 yr	530.00	127.50	131.81		131.88	0.003238	3.13	349.90	211.16	0.29
Tuckahoe CK Trib	2413.06	10 yr	430.00	127.50	131.59		131.65	0.003035	2.90	304.12	200.51	0.28
Tuckahoe CK Trib	2413.06	2 yr	259.00	127.50	131.12		131.17	0.002673	2.47	213.94	182.75	0.25
Tuckahoe CK Trib	2564.96	100 yr	684.00	128.50	132.82		133.16	0.011923	6.15	228.37	148.55	0.55
Tuckahoe CK Trib	2564.96	500 yr	852.00	128.50	133.14		133.49	0.011871	6.47	277.43	164.05	0.55
Tuckahoe CK Trib	2564.96	50 yr	607.00	128.50	132.66		133.01	0.012316	6.08	204.48	146.40	0.55
Tuckahoe CK Trib	2564.96	25 yr	530.00	128.50	132.49		132.85	0.012820	6.01	179.18	144.10	0.56
Tuckahoe CK Trib	2564.96	10 yr	430.00	128.50	132.22	132.14	132.62	0.014156	6.00	141.35	140.58	0.58
Tuckahoe CK Trib	2564.96	2 yr	259.00	128.50	131.68	131.35	132.07	0.014629	5.41	74.48	96.50	0.57
Tuckahoe CK Trib	2690.12	100 yr	684.00	129.50	133.90		134.05	0.006494	4.58	323.89	195.42	0.41
Tuckahoe CK Trib	2690.12	500 yr	852.00	129.50	134.21		134.38	0.006637	4.87	391.98	230.68	0.42
Tuckahoe CK Trib	2690.12	50 yr	607.00	129.50	133.76		133.91	0.006350	4.42	297.38	190.00	0.40
Tuckahoe CK Trib	2690.12	25 yr	530.00	129.50	133.62		133.76	0.006154	4.24	270.34	184.64	0.39
Tuckahoe CK Trib	2690.12	10 yr	430.00	129.50	133.42		133.55	0.005738	3.95	234.85	177.36	0.37
Tuckahoe CK Trib	2690.12	2 yr	259.00	129.50	132.93		133.05	0.005549	3.51	152.91	151.68	0.36
Tuckahoe CK Trib	2799.51	100 yr	684.00	130.00	134.71		135.00	0.011712	6.02	241.54	154.61	0.53
Tuckahoe CK Trib	2799.51	500 yr	852.00	130.00	135.03		135.33	0.011642	6.32	294.54	174.03	0.53
Tuckahoe CK Trib	2799.51	50 yr	607.00	130.00	134.56		134.84	0.011596	5.84	218.95	147.98	0.52
Tuckahoe CK Trib	2799.51	25 yr	530.00	130.00	134.40		134.67	0.011467	5.65	195.69	141.28	0.52
Tuckahoe CK Trib	2799.51	10 yr	430.00	130.00	134.16		134.43	0.011336	5.38	163.68	132.31	0.51
Tuckahoe CK Trib	2799.51	2 yr	259.00	130.00	133.66		133.93	0.011277	4.84	101.90	117.27	0.49
Tuckahoe CK Trib	2885.24	100 yr	684.00	132.49	136.05		136.37	0.014381	6.24	211.67	128.22	0.62
Tuckahoe CK Trib	2885.24	500 yr	852.00	132.49	136.36		136.70	0.013921	6.53	252.65	134.82	0.62
Tuckahoe CK Trib	2885.24	50 yr	607.00	132.49	135.89		136.21	0.014669	6.09	191.88	124.92	0.62
Tuckahoe CK Trib	2885.24	25 yr	530.00	132.49	135.73		136.04	0.014945	5.93	171.67	121.44	0.62
Tuckahoe CK Trib	2885.24	10 yr	430.00	132.49	135.49		135.80	0.015633	5.72	143.16	116.36	0.62
Tuckahoe CK Trib	2885.24	2 yr	259.00	132.49	134.98	134.85	135.30	0.018231	5.35	86.88	103.33	0.65
Tuckahoe CK Trib	3000.61	100 yr	478.00	131.77	137.30		137.65	0.009558	5.43	140.42	72.52	0.44
Tuckahoe CK Trib	3000.61	500 yr	586.00	131.77	137.61		138.00	0.010375	5.90	163.64	78.98	0.46
Tuckahoe CK Trib	3000.61	50 yr	428.00	131.77	137.15		137.47	0.009094	5.18	129.37	69.24	0.43
Tuckahoe CK Trib	3000.61	25 yr	377.00	131.77	136.98		137.27	0.008486	4.88	118.29	65.79	0.41
Tuckahoe CK Trib	3000.61	10 yr	311.00	131.77	136.75		137.00	0.007550	4.44	103.60	60.93	0.38

HEC-RAS Plan: Trib 3 Ex Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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
Tuckahoe CK Trib	3000.61	2 yr	194.00	131.77	136.25		136.41	0.005461	3.47	75.46	50.75	0.32
Tuckahoe CK Trib	3102.46	100 yr	478.00	133.53	138.24		138.69	0.010149	5.71	111.87	60.76	0.51
Tuckahoe CK Trib	3102.46	500 yr	586.00	133.53	138.59		139.10	0.010396	6.13	134.86	67.41	0.52
Tuckahoe CK Trib	3102.46	50 yr	428.00	133.53	138.05		138.48	0.010021	5.49	100.88	57.31	0.50
Tuckahoe CK Trib	3102.46	25 yr	377.00	133.53	137.84		138.24	0.009861	5.24	89.50	53.50	0.49
Tuckahoe CK Trib	3102.46	10 yr	311.00	133.53	137.55		137.90	0.009589	4.87	74.46	47.30	0.48
Tuckahoe CK Trib	3102.46	2 yr	194.00	133.53	136.89		137.13	0.008624	3.96	49.59	24.83	0.44
Tuckahoe CK Trib	3195.49	100 yr	478.00	133.51	139.25		139.88	0.014682	6.80	99.62	54.82	0.55
Tuckahoe CK Trib	3195.49	500 yr	586.00	133.51	139.64		140.31	0.014908	7.22	122.36	62.11	0.56
Tuckahoe CK Trib	3195.49	50 yr	428.00	133.51	139.05		139.65	0.014507	6.57	88.96	51.08	0.54
Tuckahoe CK Trib	3195.49	25 yr	377.00	133.51	138.83		139.39	0.014253	6.29	78.01	46.91	0.54
Tuckahoe CK Trib	3195.49	10 yr	311.00	133.51	138.50		139.01	0.013771	5.87	63.69	40.56	0.52
Tuckahoe CK Trib	3195.49	2 yr	194.00	133.51	137.74		138.09	0.011609	4.74	41.21	16.46	0.46
Tuckahoe CK Trib	3306.96	100 yr	478.00	135.49	140.75		141.01	0.007053	4.73	167.56	92.00	0.42
Tuckahoe CK Trib	3306.96	500 yr	586.00	135.49	141.15		141.41	0.006671	4.91	205.89	102.16	0.42
Tuckahoe CK Trib	3306.96	50 yr	428.00	135.49	140.54		140.80	0.007374	4.66	148.66	86.65	0.43
Tuckahoe CK Trib	3306.96	25 yr	377.00	135.49	140.31		140.56	0.007780	4.59	129.17	80.76	0.43
Tuckahoe CK Trib	3306.96	10 yr	311.00	135.49	139.97		140.23	0.008590	4.50	102.98	72.11	0.45
Tuckahoe CK Trib	3306.96	2 yr	194.00	135.49	139.15		139.44	0.012625	4.45	52.76	49.55	0.52
Tuckahoe CK Trib	3409.13	100 yr	478.00	137.21	141.67	141.52	142.16	0.018486	7.06	137.19	116.19	0.66
Tuckahoe CK Trib	3409.13	500 yr	586.00	137.21	142.01		142.43	0.015541	6.88	180.36	131.10	0.61
Tuckahoe CK Trib	3409.13	50 yr	428.00	137.21	141.50	141.41	142.02	0.019796	7.07	118.26	105.81	0.67
Tuckahoe CK Trib	3409.13	25 yr	377.00	137.21	141.31	141.27	141.86	0.021066	7.03	100.09	94.97	0.69
Tuckahoe CK Trib	3409.13	10 yr	311.00	137.21	141.07	141.05	141.64	0.022205	6.86	78.72	81.03	0.70
Tuckahoe CK Trib	3409.13	2 yr	194.00	137.21	140.62	140.44	141.09	0.020056	5.85	47.93	55.38	0.65
Tuckahoe CK Trib	3506.4	100 yr	478.00	140.26	143.21		143.34	0.008869	3.15	191.18	123.97	0.38
Tuckahoe CK Trib	3506.4	500 yr	586.00	140.26	143.41		143.56	0.009590	3.44	216.32	128.75	0.40
Tuckahoe CK Trib	3506.4	50 yr	428.00	140.26	143.10		143.22	0.008658	3.02	177.50	121.30	0.37
Tuckahoe CK Trib	3506.4	25 yr	377.00	140.26	142.98		143.09	0.008393	2.88	163.14	118.42	0.37
Tuckahoe CK Trib	3506.4	10 yr	311.00	140.26	142.79		142.89	0.008318	2.72	141.30	113.91	0.37
Tuckahoe CK Trib	3506.4	2 yr	194.00	140.26	142.33		142.42	0.009667	2.52	91.38	102.23	0.40
Tuckahoe CK Trib	3567.08	100 yr	478.00	140.12	143.70		143.87	0.008298	3.52	164.13	98.86	0.40
Tuckahoe CK Trib	3567.08	500 yr	586.00	140.12	143.93		144.13	0.008852	3.84	188.00	106.99	0.42

HEC-RAS Plan: Trib 3 Ex Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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
Tuckahoe CK Trib	3567.08	50 yr	428.00	140.12	143.58		143.74	0.008053	3.36	152.34	94.68	0.39
Tuckahoe CK Trib	3567.08	25 yr	377.00	140.12	143.45		143.59	0.007767	3.19	140.07	90.14	0.38
Tuckahoe CK Trib	3567.08	10 yr	311.00	140.12	143.25		143.38	0.007428	2.95	123.09	85.05	0.37
Tuckahoe CK Trib	3567.08	2 yr	194.00	140.12	142.82		142.91	0.006799	2.46	88.47	75.70	0.35
Tuckahoe CK Trib	3590.08	100 yr	478.00	141.04	143.91	143.91	144.51	0.039426	8.48	110.91	93.07	0.94
Tuckahoe CK Trib	3590.08	500 yr	586.00	141.04	144.17	144.17	144.75	0.035563	8.61	136.86	103.20	0.91
Tuckahoe CK Trib	3590.08	50 yr	428.00	141.04	143.80	143.80	144.38	0.039578	8.25	100.76	88.06	0.94
Tuckahoe CK Trib	3590.08	25 yr	377.00	141.04	143.68	143.68	144.24	0.039365	7.96	90.85	83.62	0.93
Tuckahoe CK Trib	3590.08	10 yr	311.00	141.04	143.55	143.55	144.04	0.036122	7.34	80.41	79.47	0.88
Tuckahoe CK Trib	3590.08	2 yr	194.00	141.04	143.23	143.23	143.64	0.032651	6.27	56.61	69.86	0.81
Tuckahoe CK Trib	3628.75	100 yr	478.00	141.01	145.01	144.38	145.22	0.011104	5.45	183.97	112.46	0.51
Tuckahoe CK Trib	3628.75	500 yr	586.00	141.01	145.23	144.57	145.46	0.011812	5.85	208.57	115.47	0.53
Tuckahoe CK Trib	3628.75	50 yr	428.00	141.01	144.89	144.29	145.09	0.011022	5.31	170.09	110.73	0.50
Tuckahoe CK Trib	3628.75	25 yr	377.00	141.01	144.75	144.18	144.94	0.010827	5.12	155.03	107.05	0.49
Tuckahoe CK Trib	3628.75	10 yr	311.00	141.01	144.54	144.03	144.72	0.010700	4.87	133.09	99.97	0.49
Tuckahoe CK Trib	3628.75	2 yr	194.00	141.01	144.11	143.70	144.26	0.009935	4.25	92.75	86.21	0.46
Tuckahoe CK Trib	3733.79	100 yr	478.00	141.50	146.05	145.40	146.31	0.009106	5.36	170.54	100.78	0.47
Tuckahoe CK Trib	3733.79	500 yr	586.00	141.50	146.32	145.64	146.60	0.009343	5.67	196.59	105.71	0.48
Tuckahoe CK Trib	3733.79	50 yr	428.00	141.50	145.91	145.27	146.17	0.008989	5.21	157.44	98.26	0.46
Tuckahoe CK Trib	3733.79	25 yr	377.00	141.50	145.76	145.12	146.01	0.008930	5.06	142.77	95.43	0.46
Tuckahoe CK Trib	3733.79	10 yr	311.00	141.50	145.53	144.91	145.76	0.008655	4.77	121.38	88.21	0.44
Tuckahoe CK Trib	3733.79	2 yr	194.00	141.50	145.01	144.31	145.21	0.007875	4.11	80.26	71.64	0.41
Tuckahoe CK Trib	3799.63	100 yr	478.00	141.47	146.57	145.63	146.80	0.007997	4.74	166.65	90.80	0.42
Tuckahoe CK Trib	3799.63	500 yr	586.00	141.47	146.85	145.90	147.10	0.008473	5.10	189.25	94.74	0.43
Tuckahoe CK Trib	3799.63	50 yr	428.00	141.47	146.44	145.48	146.65	0.007730	4.57	155.20	88.90	0.41
Tuckahoe CK Trib	3799.63	25 yr	377.00	141.47	146.28	145.33	146.49	0.007414	4.39	142.56	85.54	0.40
Tuckahoe CK Trib	3799.63	10 yr	311.00	141.47	146.04	145.09	146.23	0.007027	4.14	122.68	77.72	0.38
Tuckahoe CK Trib	3799.63	2 yr	194.00	141.47	145.48	143.97	145.63	0.005847	3.48	83.97	62.54	0.34
Tuckahoe CK Trib	3852.34	100 yr	478.00	140.88	146.95	146.47	147.47	0.015674	6.67	115.37	66.79	0.55
Tuckahoe CK Trib	3852.34	500 yr	586.00	140.88	147.25	146.92	147.80	0.016240	7.08	134.92	73.68	0.57
Tuckahoe CK Trib	3852.34	50 yr	428.00	140.88	146.80	146.30	147.29	0.015158	6.41	105.70	63.33	0.54
Tuckahoe CK Trib	3852.34	25 yr	377.00	140.88	146.64	146.10	147.10	0.014305	6.07	95.74	59.57	0.52
Tuckahoe CK Trib	3852.34	10 yr	311.00	140.88	146.38	145.60	146.80	0.013474	5.65	81.09	54.50	0.50
Tuckahoe CK Trib	3852.34	2 yr	194.00	140.88	145.77	144.09	146.10	0.011044	4.73	51.98	40.43	0.44

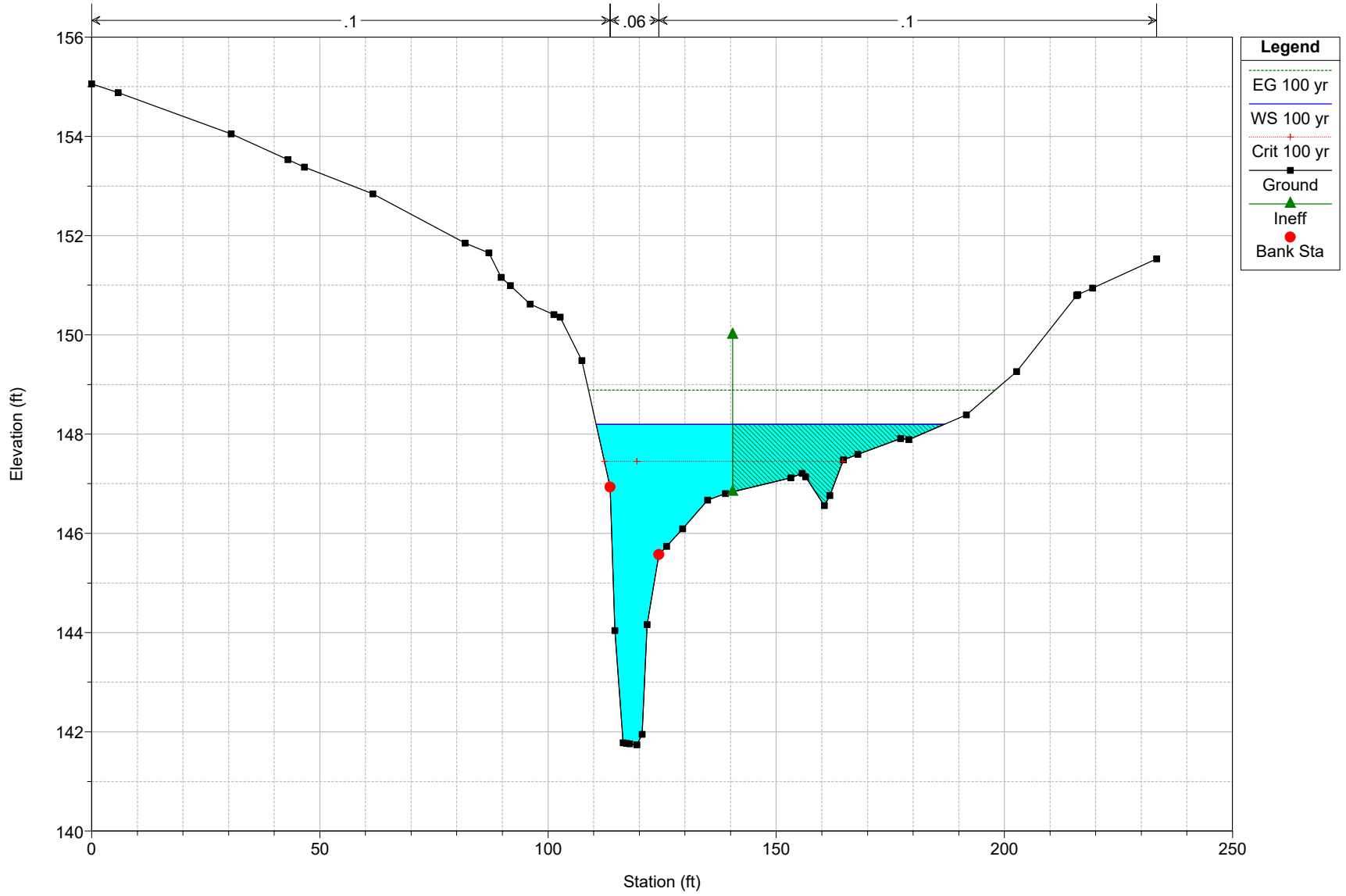
HEC-RAS Plan: Trib 3 Ex Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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
Tuckahoe CK Trib	3904.75	100 yr	478.00	141.98	147.69	146.34	148.16	0.011408	5.93	108.93	58.63	0.48
Tuckahoe CK Trib	3904.75	500 yr	586.00	141.98	147.99	147.06	148.54	0.012776	6.54	123.46	65.95	0.51
Tuckahoe CK Trib	3904.75	50 yr	428.00	141.98	147.52	145.94	147.96	0.010808	5.66	100.73	55.15	0.46
Tuckahoe CK Trib	3904.75	25 yr	377.00	141.98	147.32	145.64	147.73	0.010297	5.40	90.85	50.46	0.45
Tuckahoe CK Trib	3904.75	10 yr	311.00	141.98	147.02	145.26	147.38	0.009319	4.96	77.20	43.54	0.43
Tuckahoe CK Trib	3904.75	2 yr	194.00	141.98	146.33	144.48	146.57	0.007060	3.92	52.68	27.12	0.37
Tuckahoe CK Trib	3952.9	100 yr	478.00	141.74	148.20	147.45	148.89	0.016608	7.26	85.52	76.28	0.57
Tuckahoe CK Trib	3952.9	500 yr	586.00	141.74	148.54	147.86	149.36	0.018603	8.03	95.87	83.84	0.61
Tuckahoe CK Trib	3952.9	50 yr	428.00	141.74	148.01	147.24	148.64	0.015765	6.90	79.99	71.14	0.55
Tuckahoe CK Trib	3952.9	25 yr	377.00	141.74	147.79	146.99	148.37	0.015004	6.52	73.68	62.39	0.54
Tuckahoe CK Trib	3952.9	10 yr	311.00	141.74	147.47	146.29	147.97	0.014171	6.03	64.32	52.34	0.52
Tuckahoe CK Trib	3952.9	2 yr	194.00	141.74	146.67	145.23	147.05	0.012678	5.04	43.16	22.88	0.47

Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

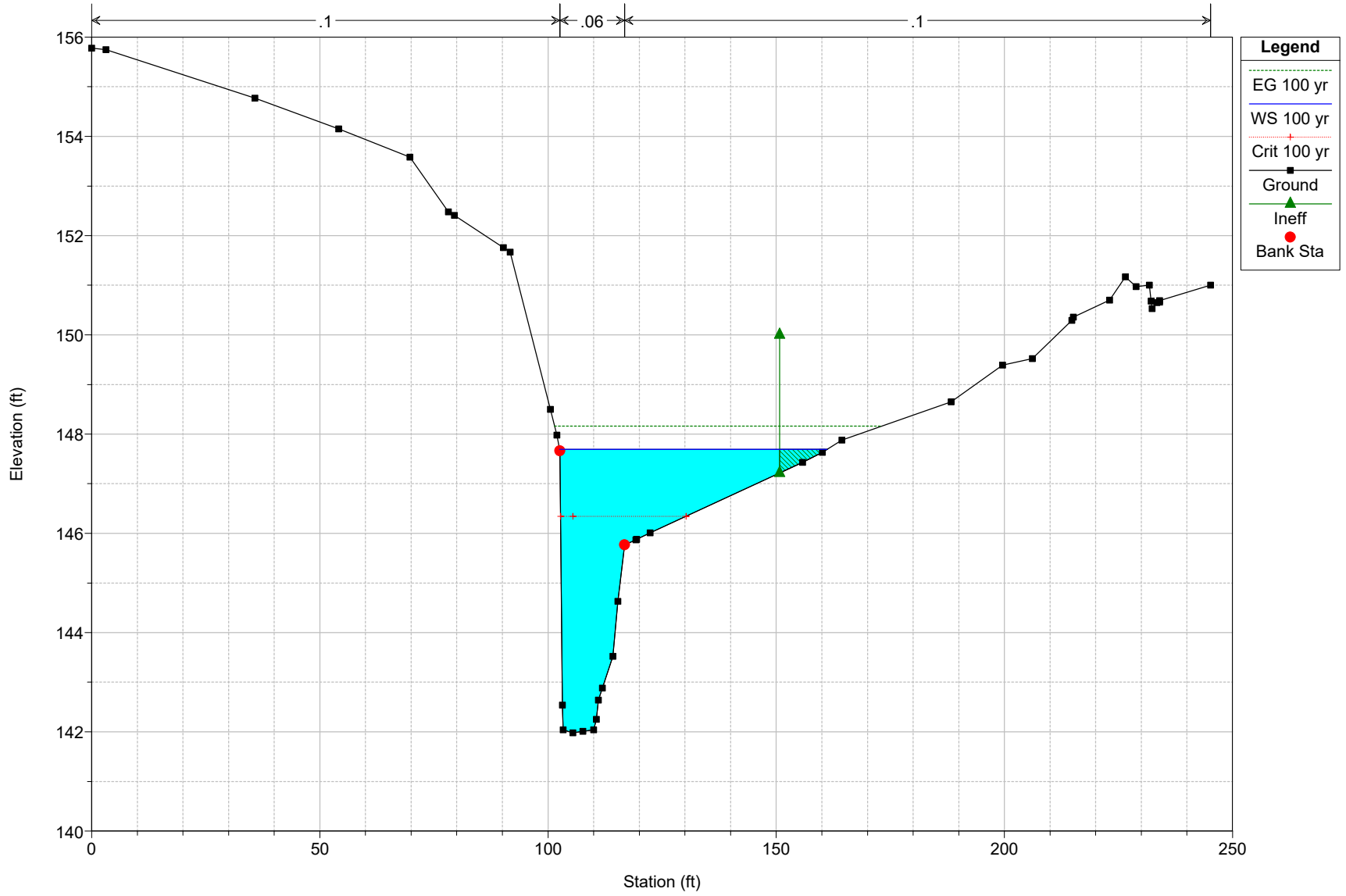
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

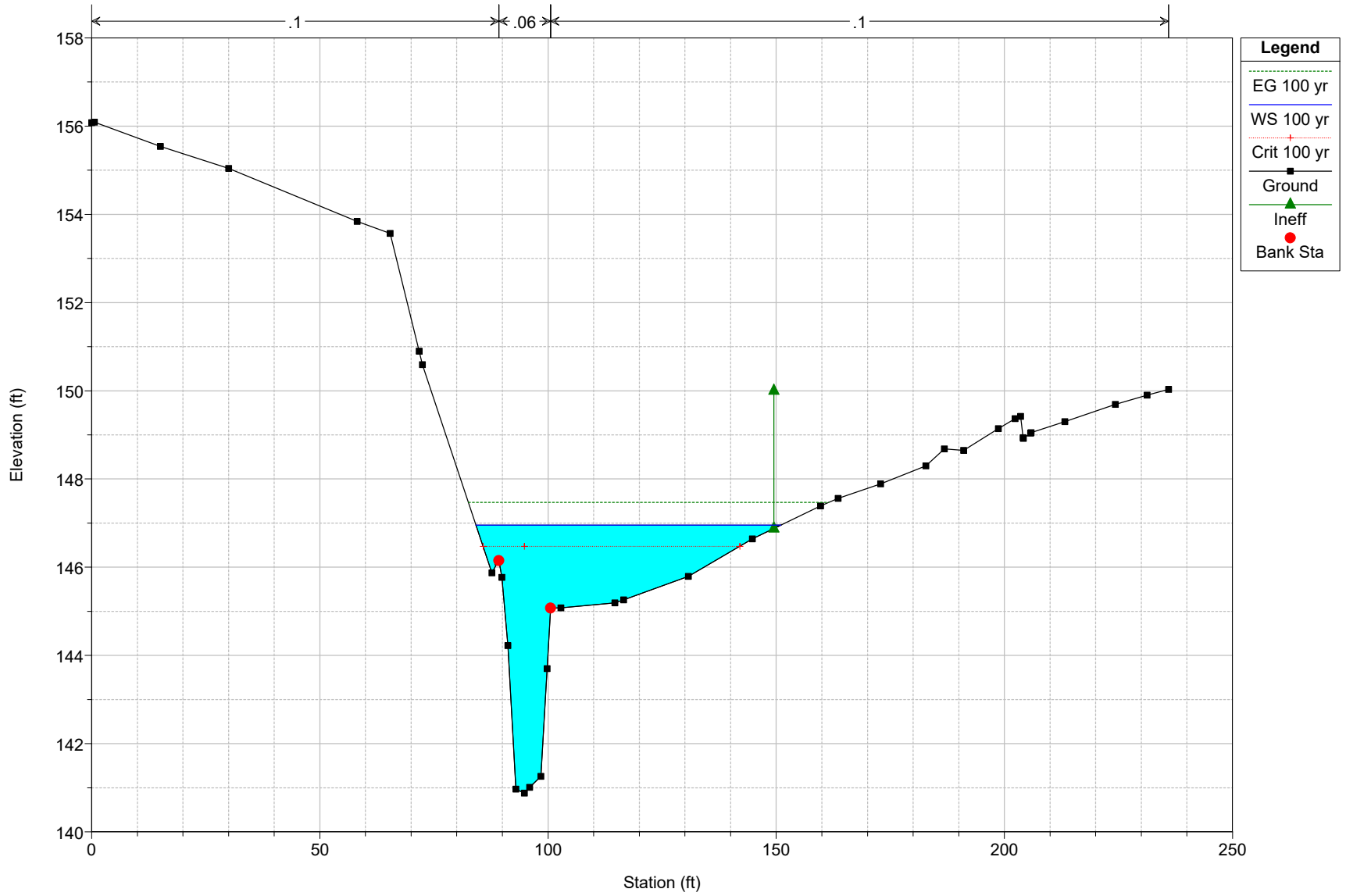
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

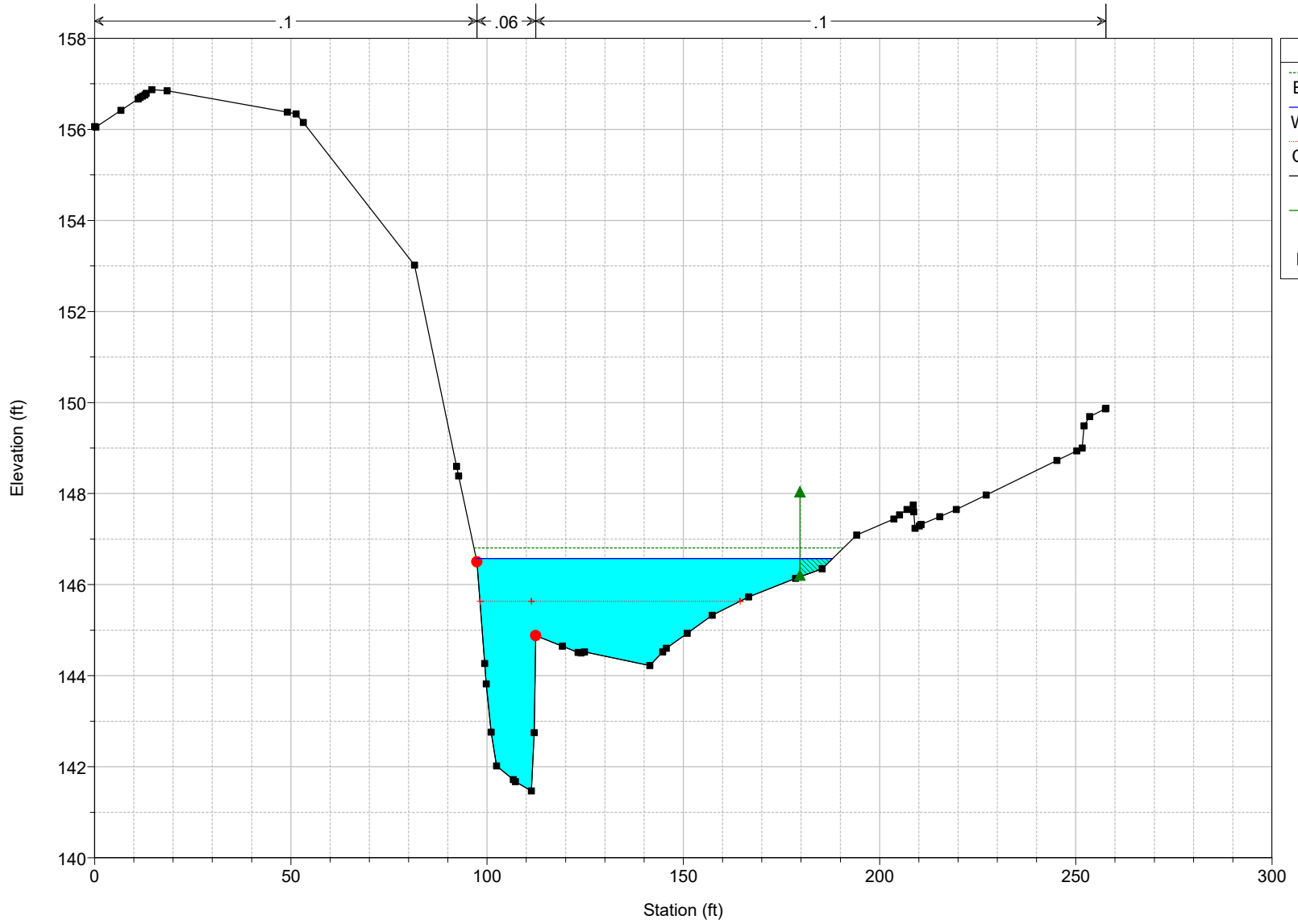
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 3799.63



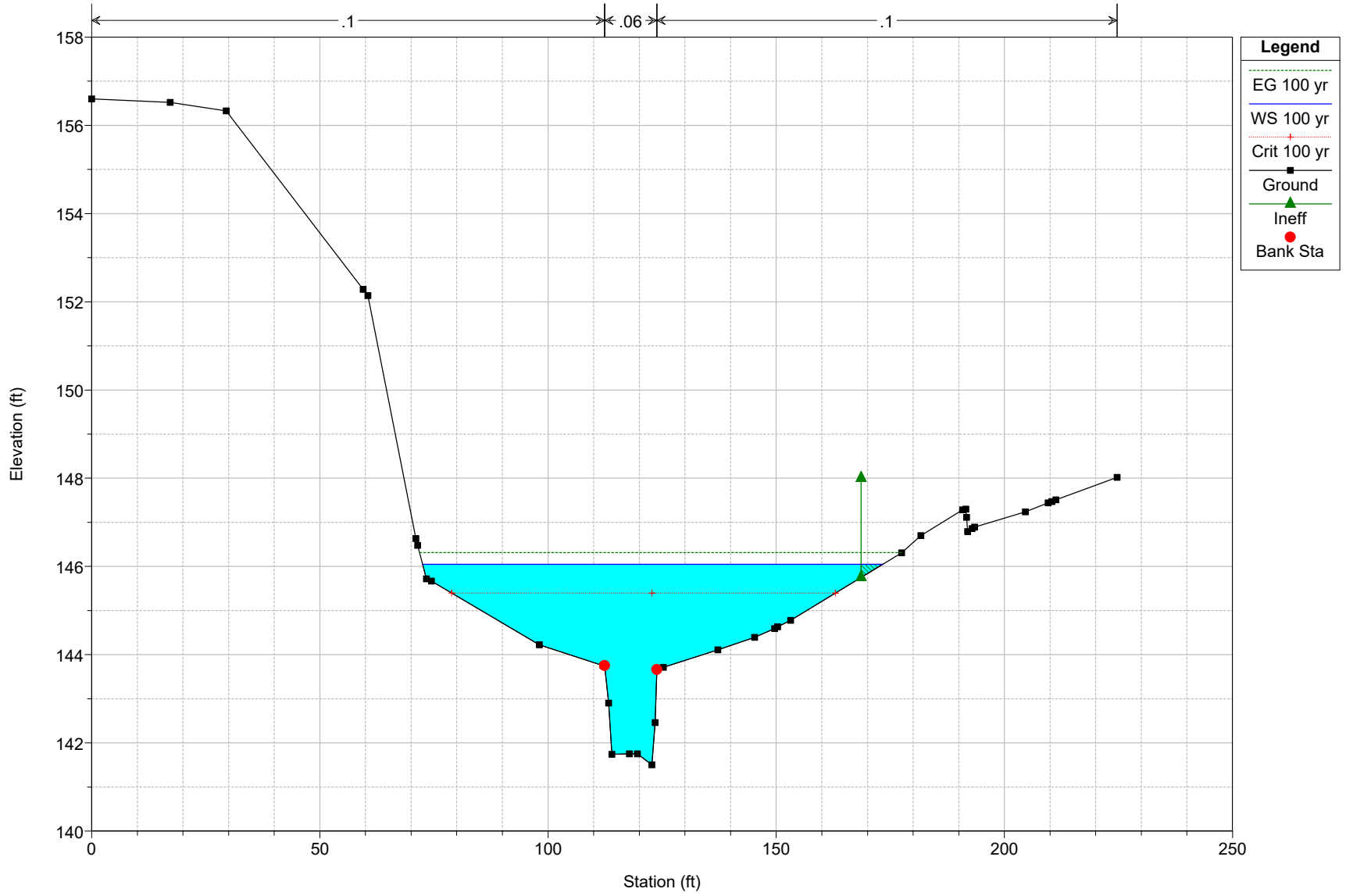
Legend

- EG 100 yr
- WS 100 yr
- Crit 100 yr
- Ground
- Ineff
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

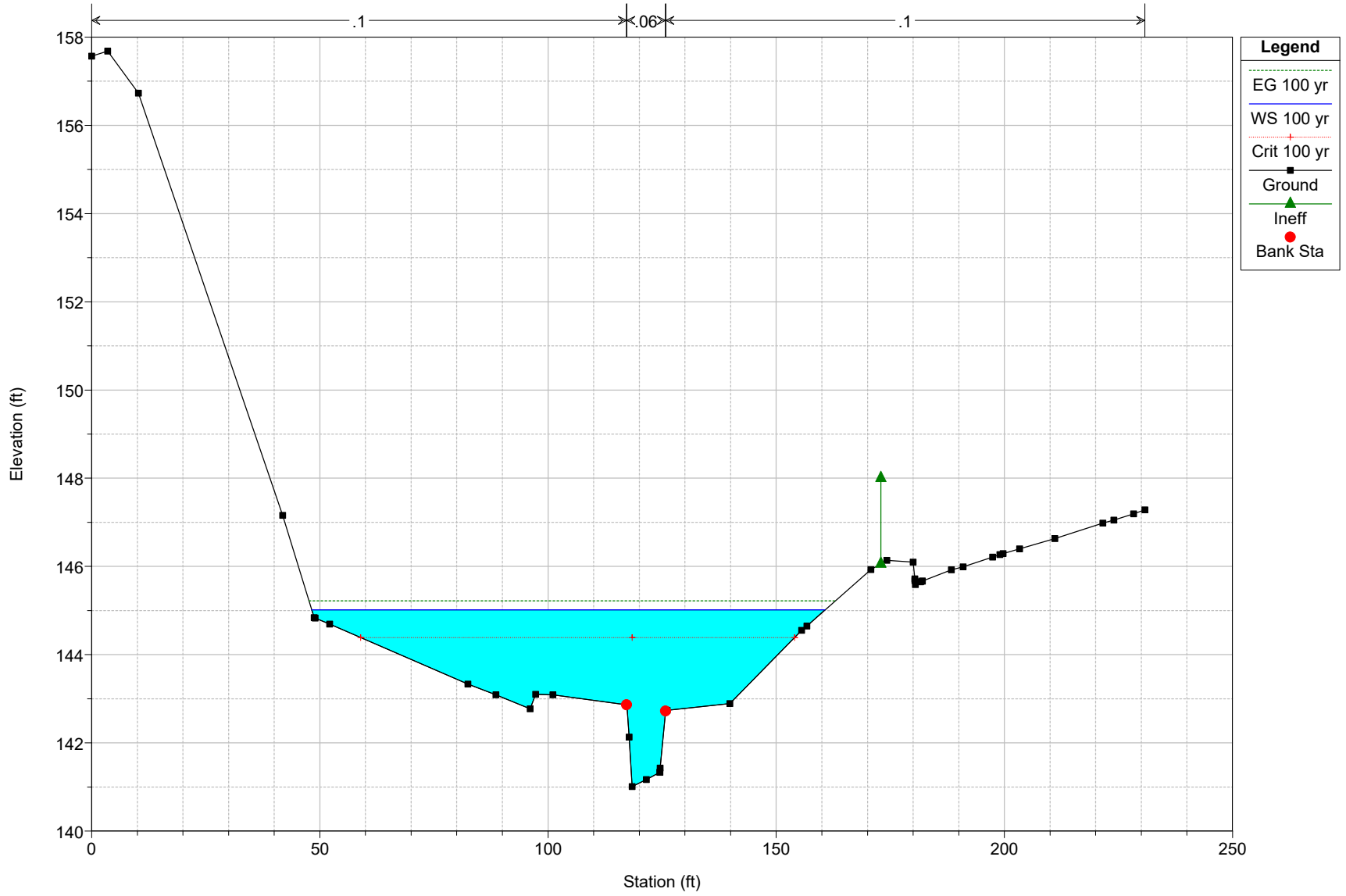
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

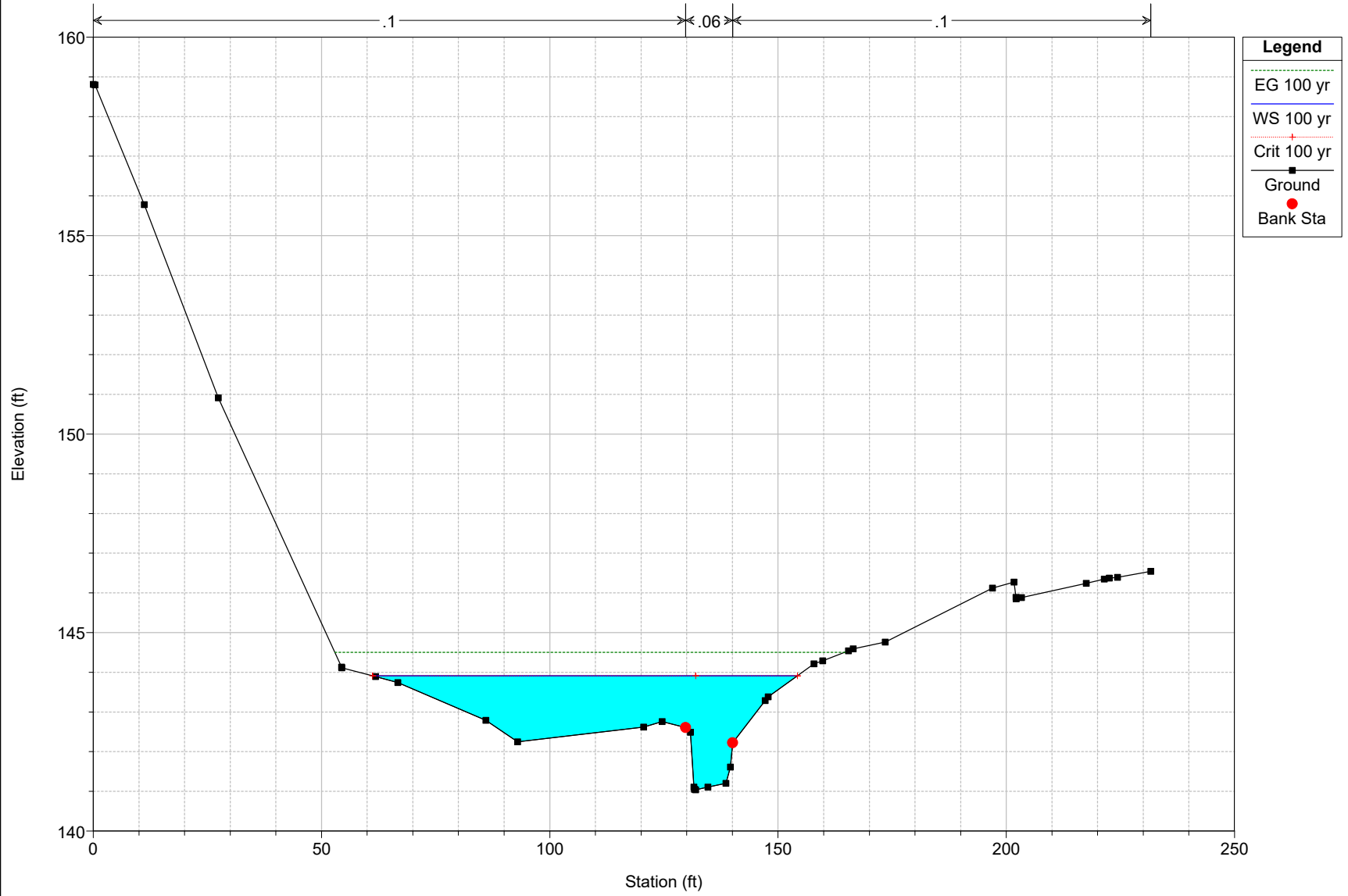
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

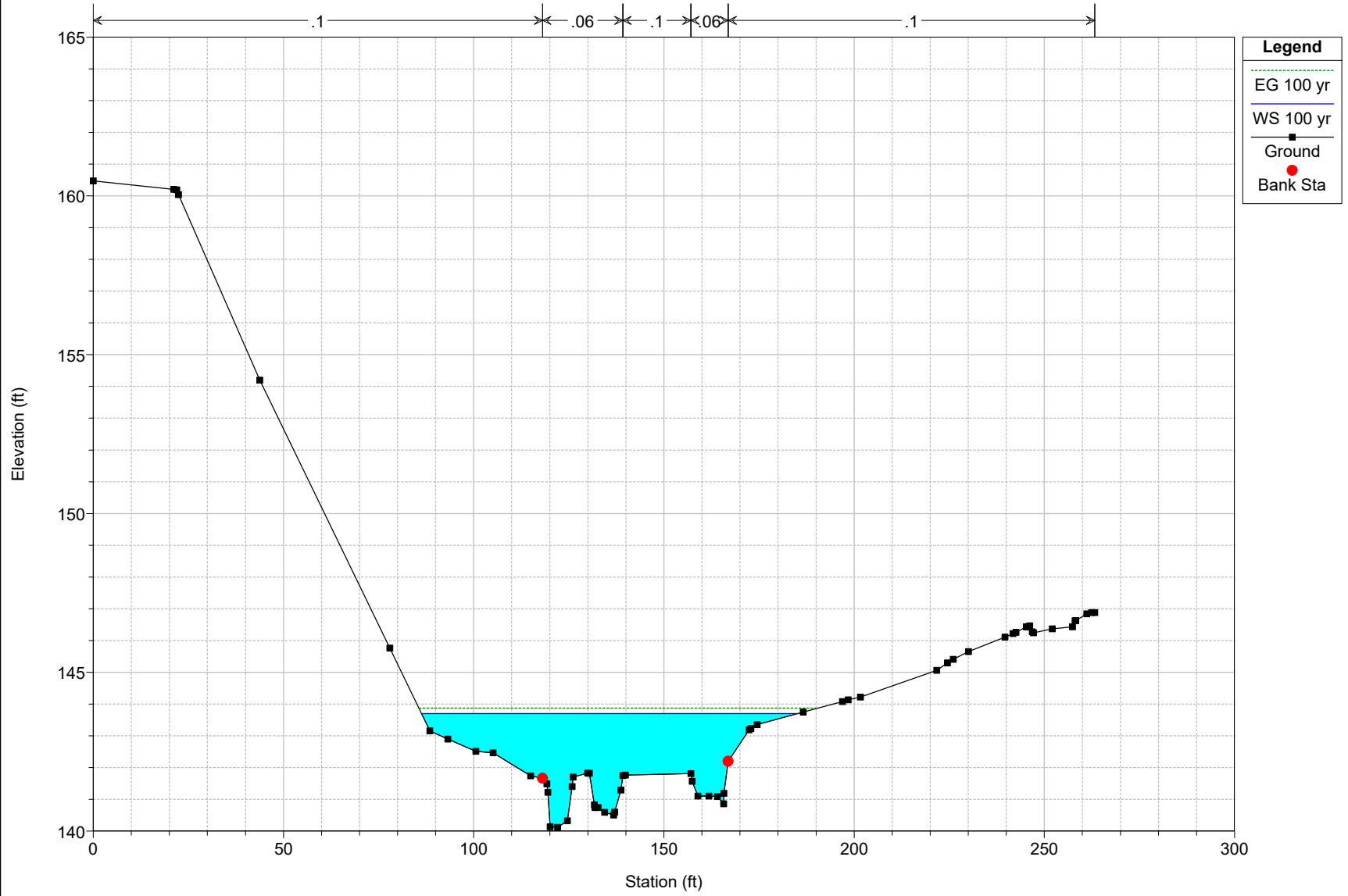
RS = 3590.08



Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

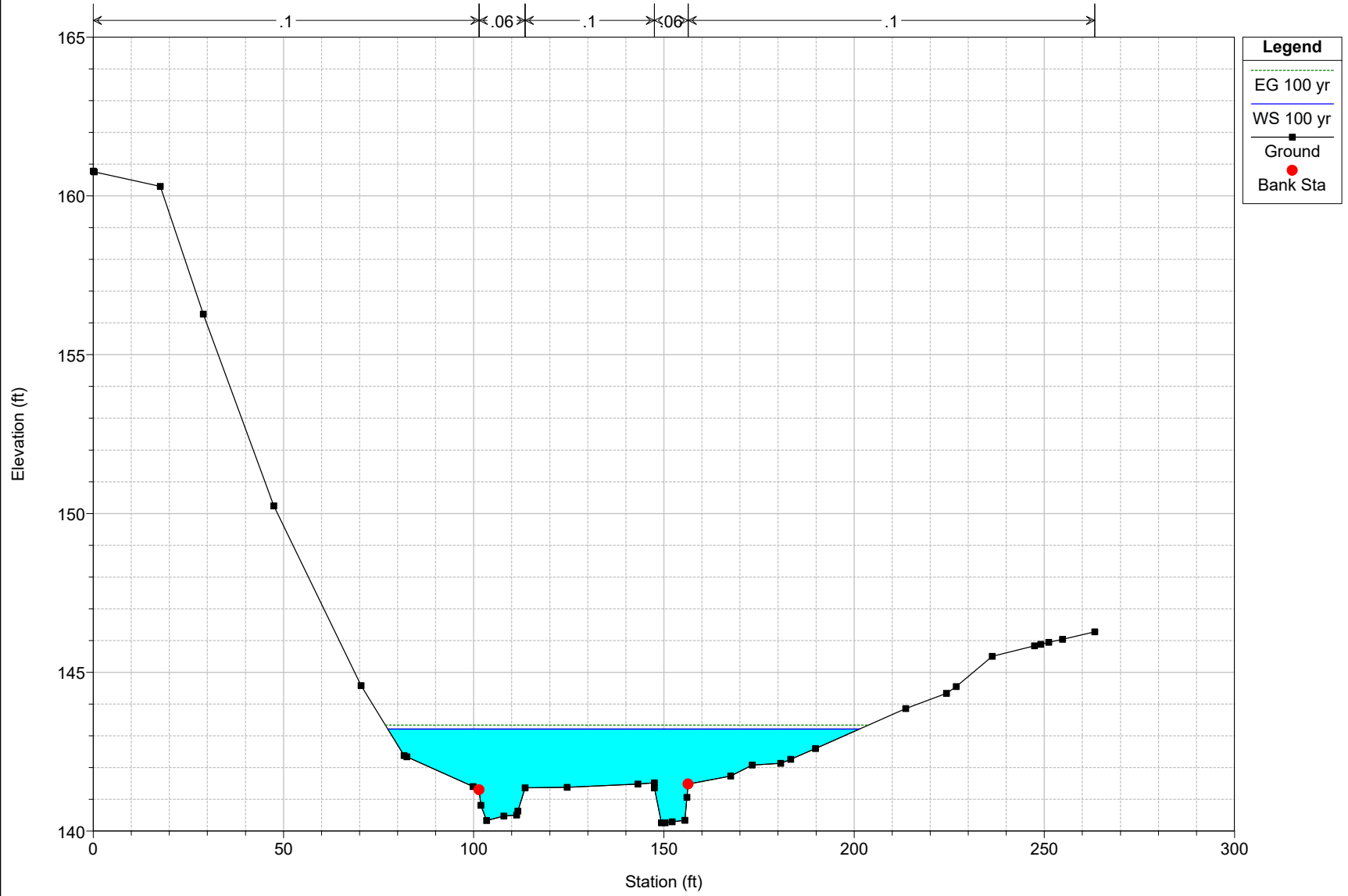
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

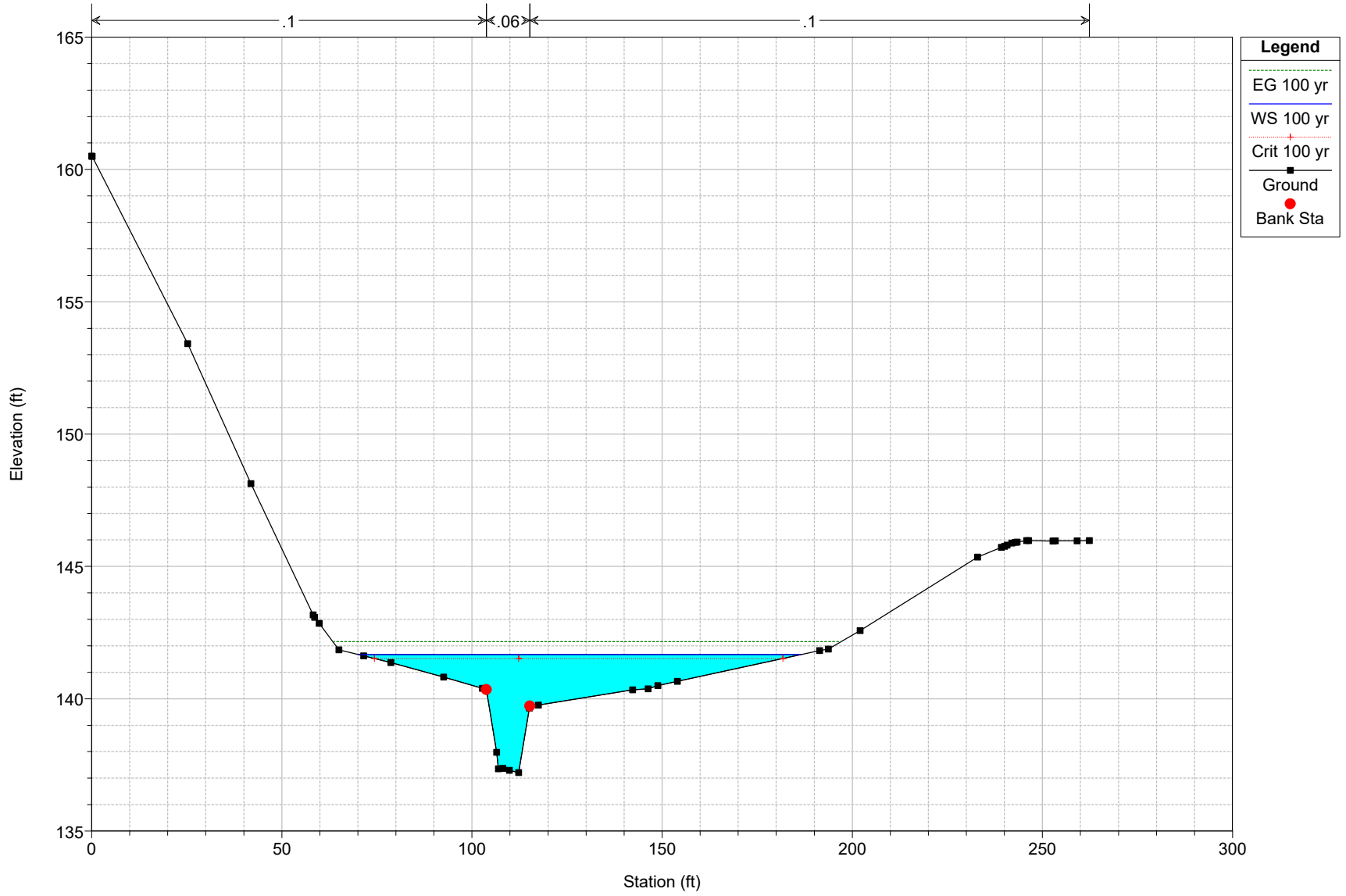
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

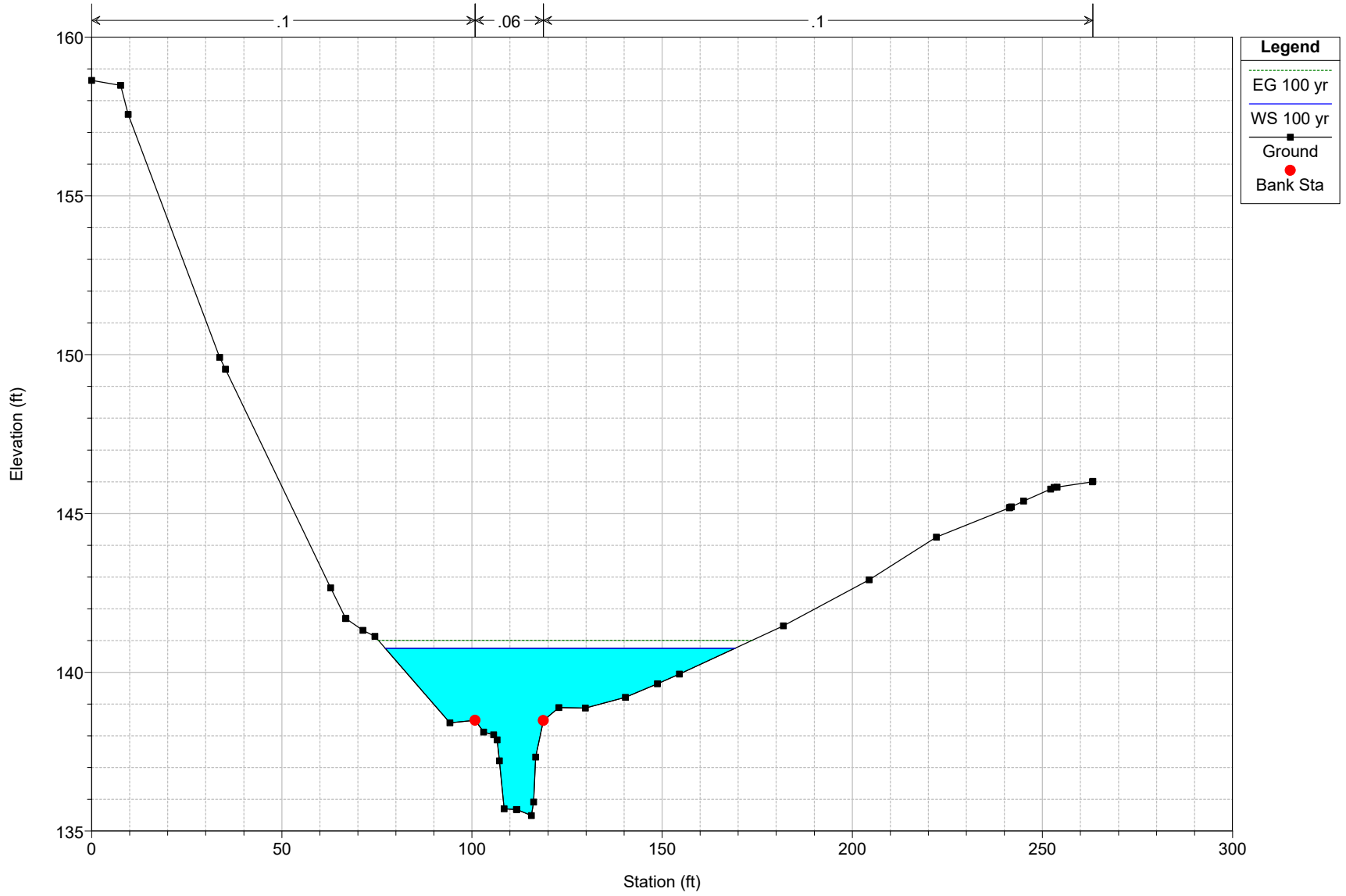
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

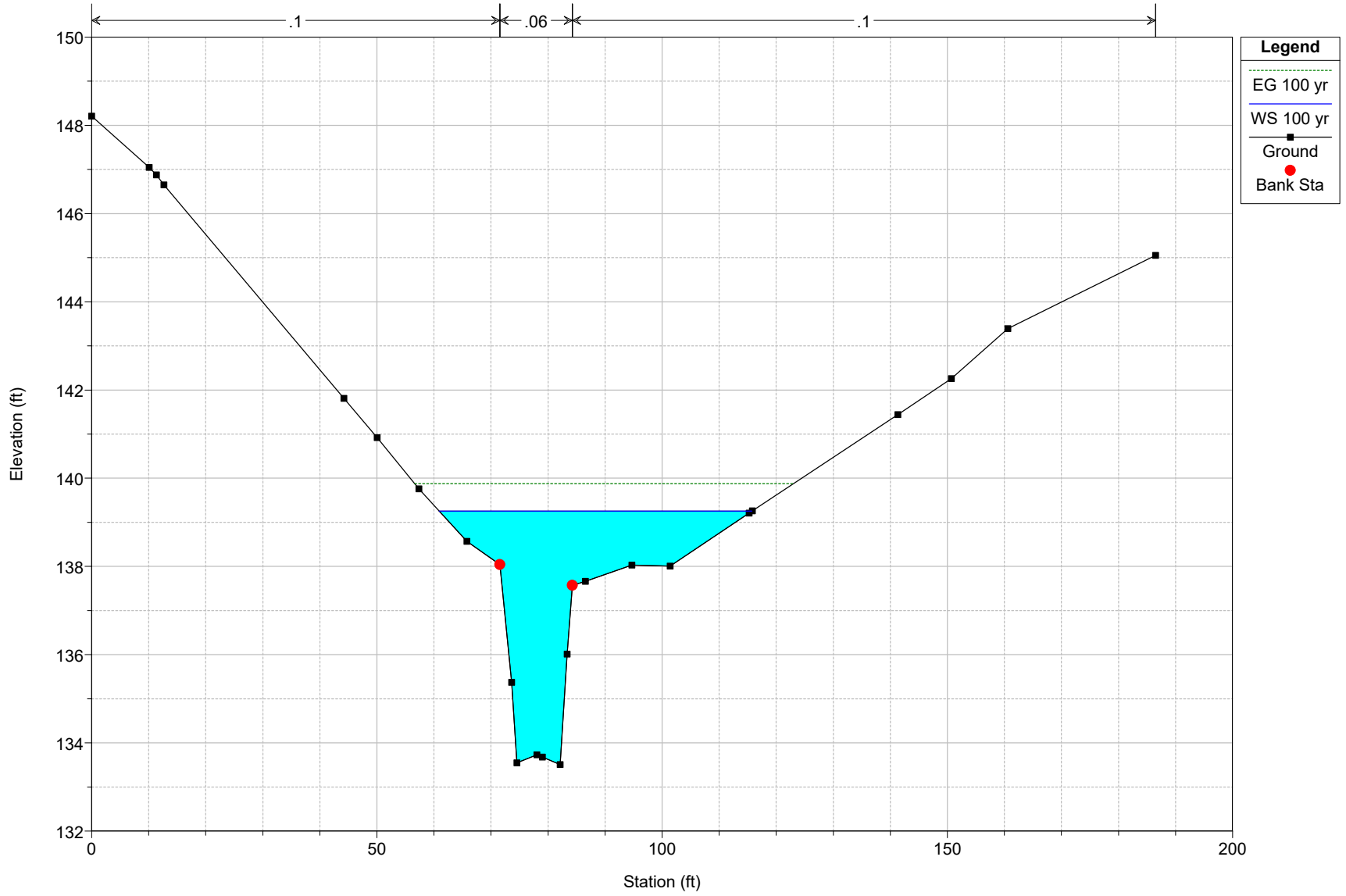
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

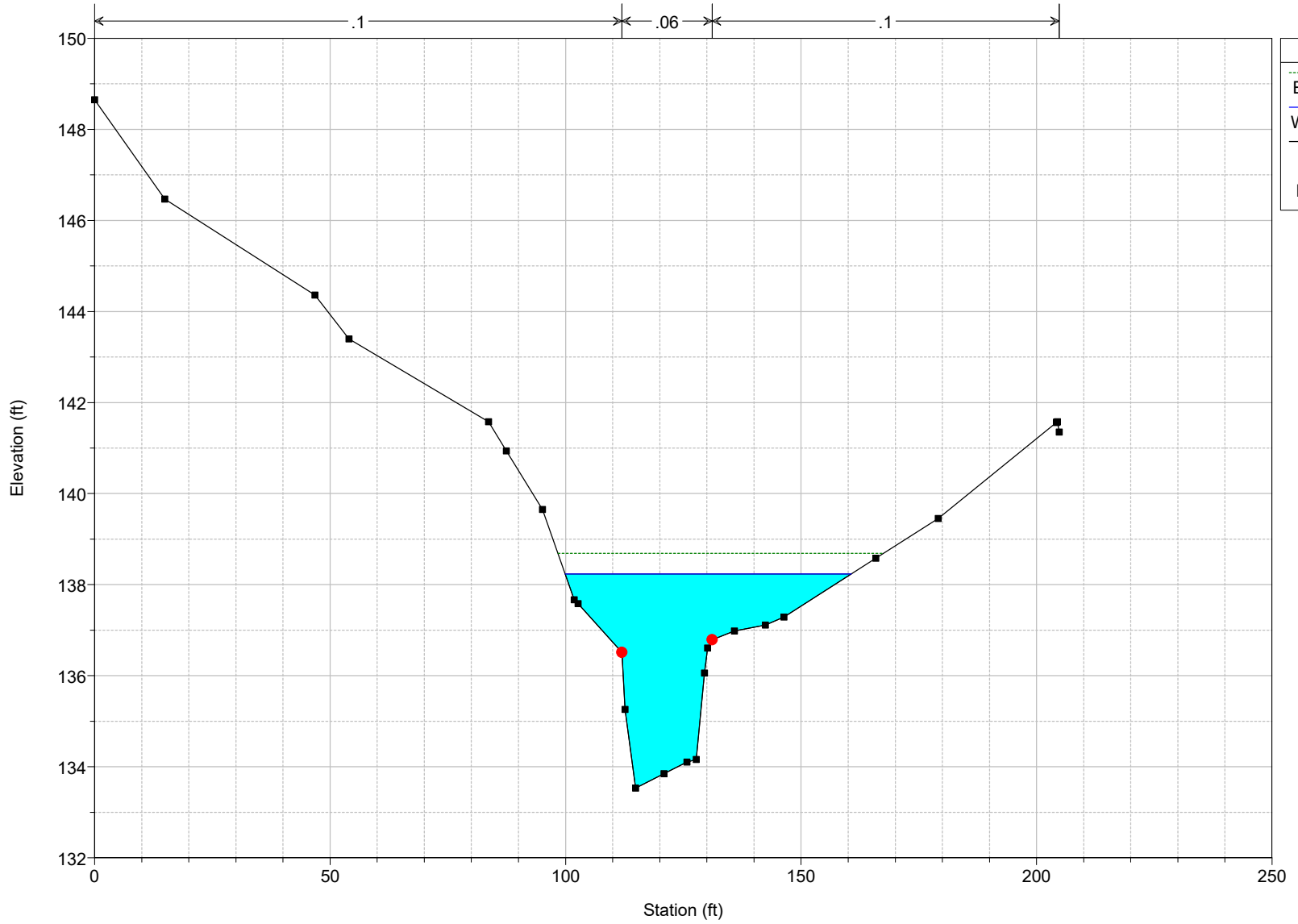
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 3102.46



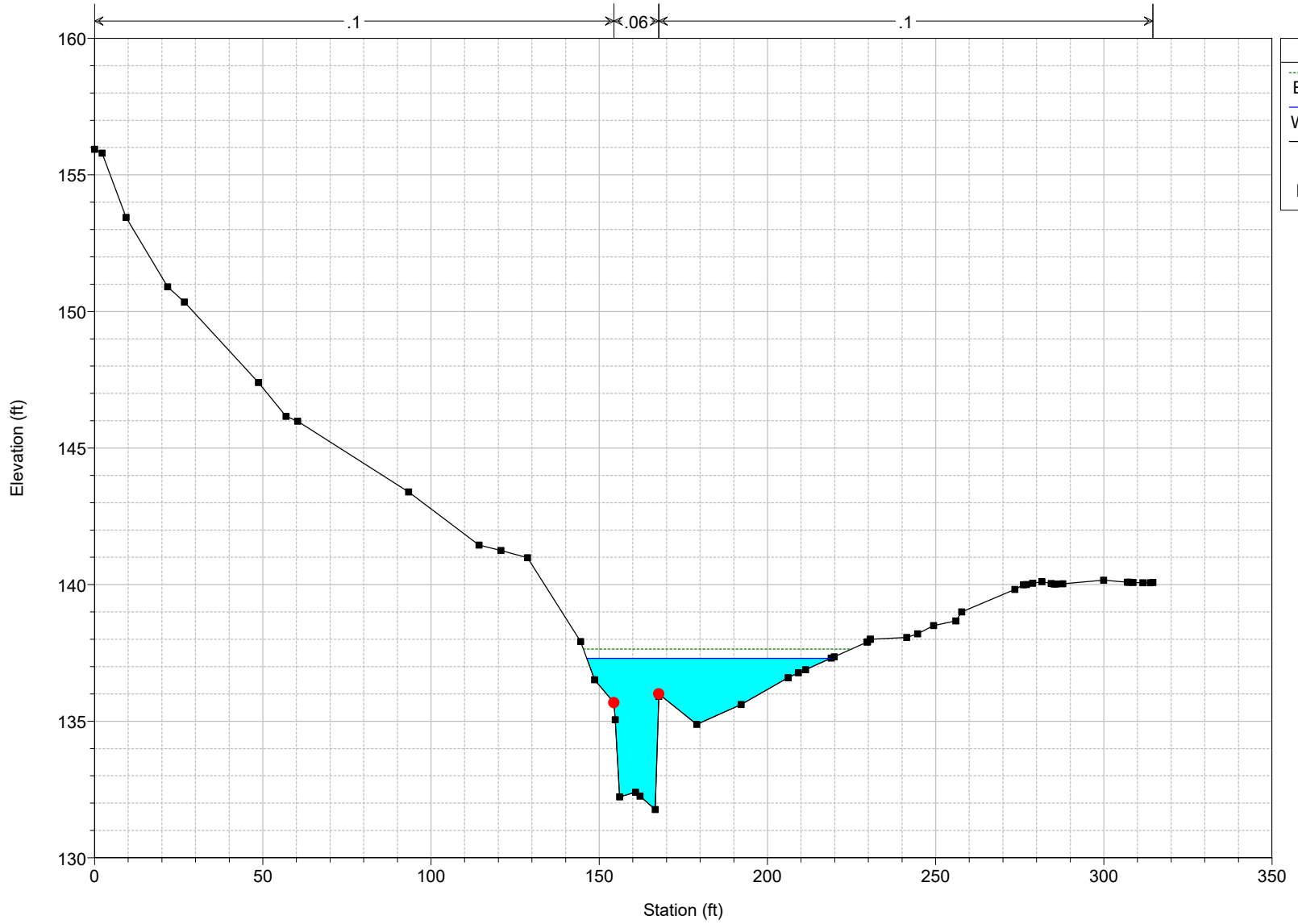
Legend

- EG 100 yr
- WS 100 yr
- Ground
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 3000.61



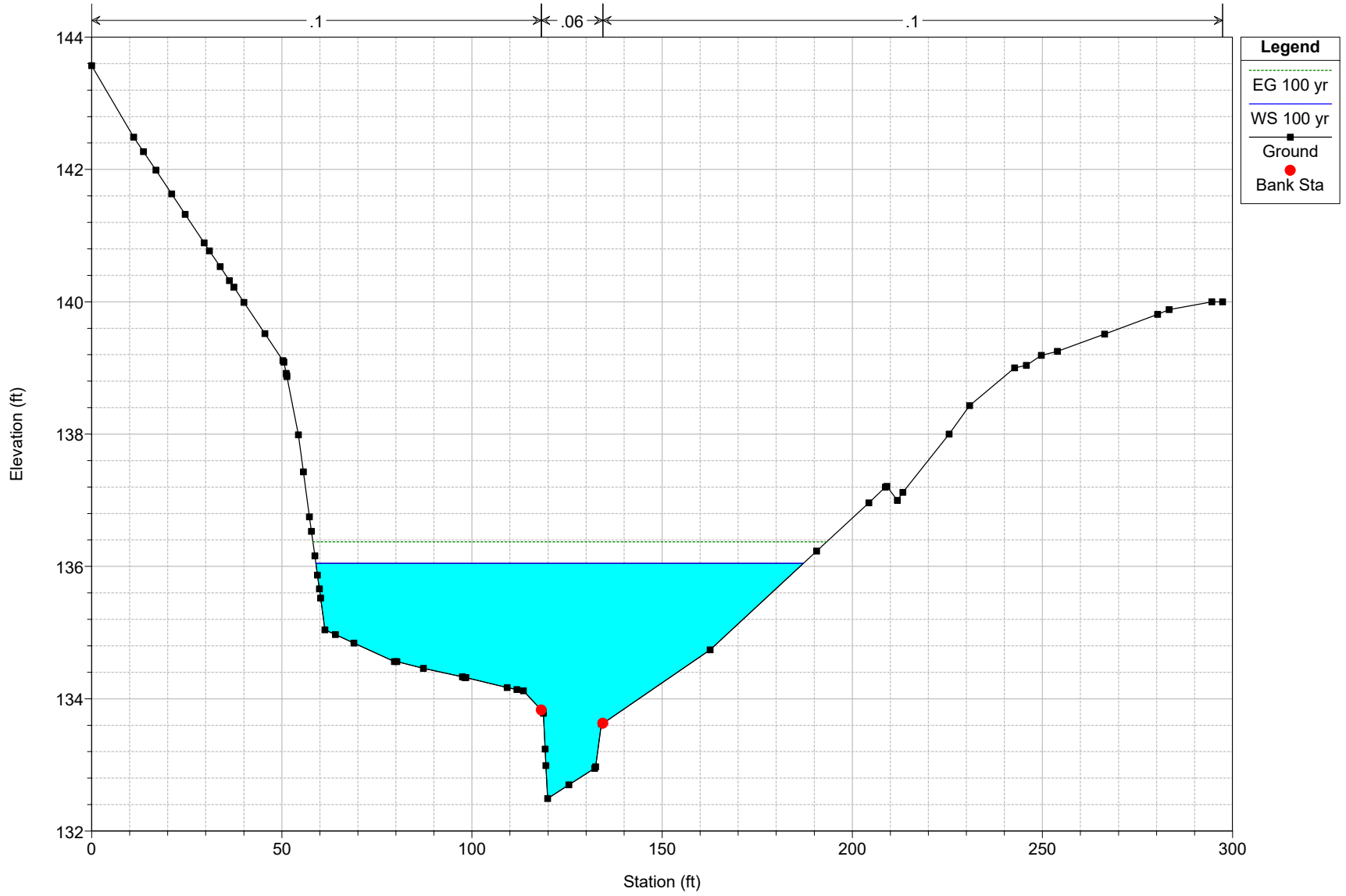
Legend

- EG 100 yr
- WS 100 yr
- Ground
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

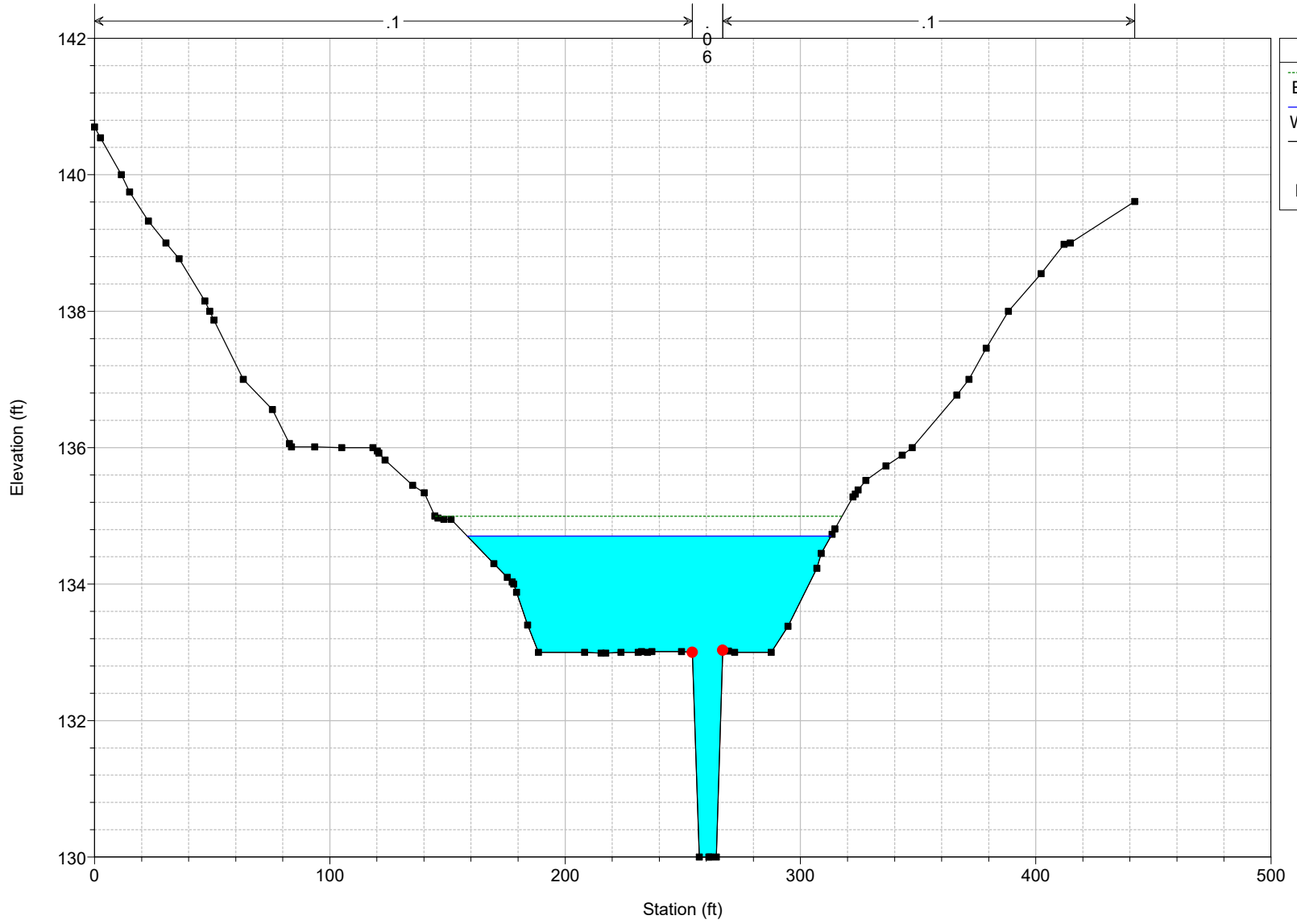
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

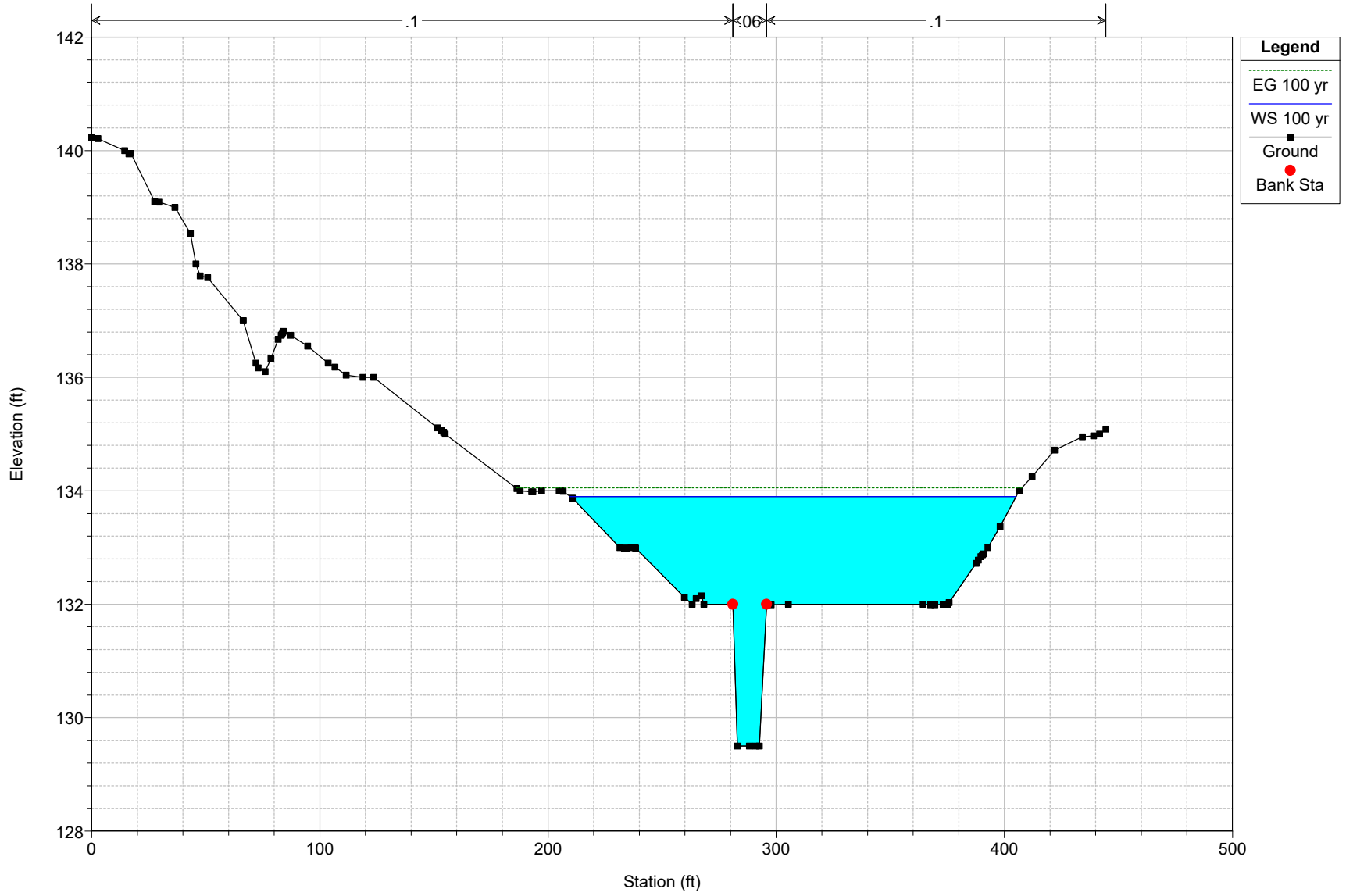
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

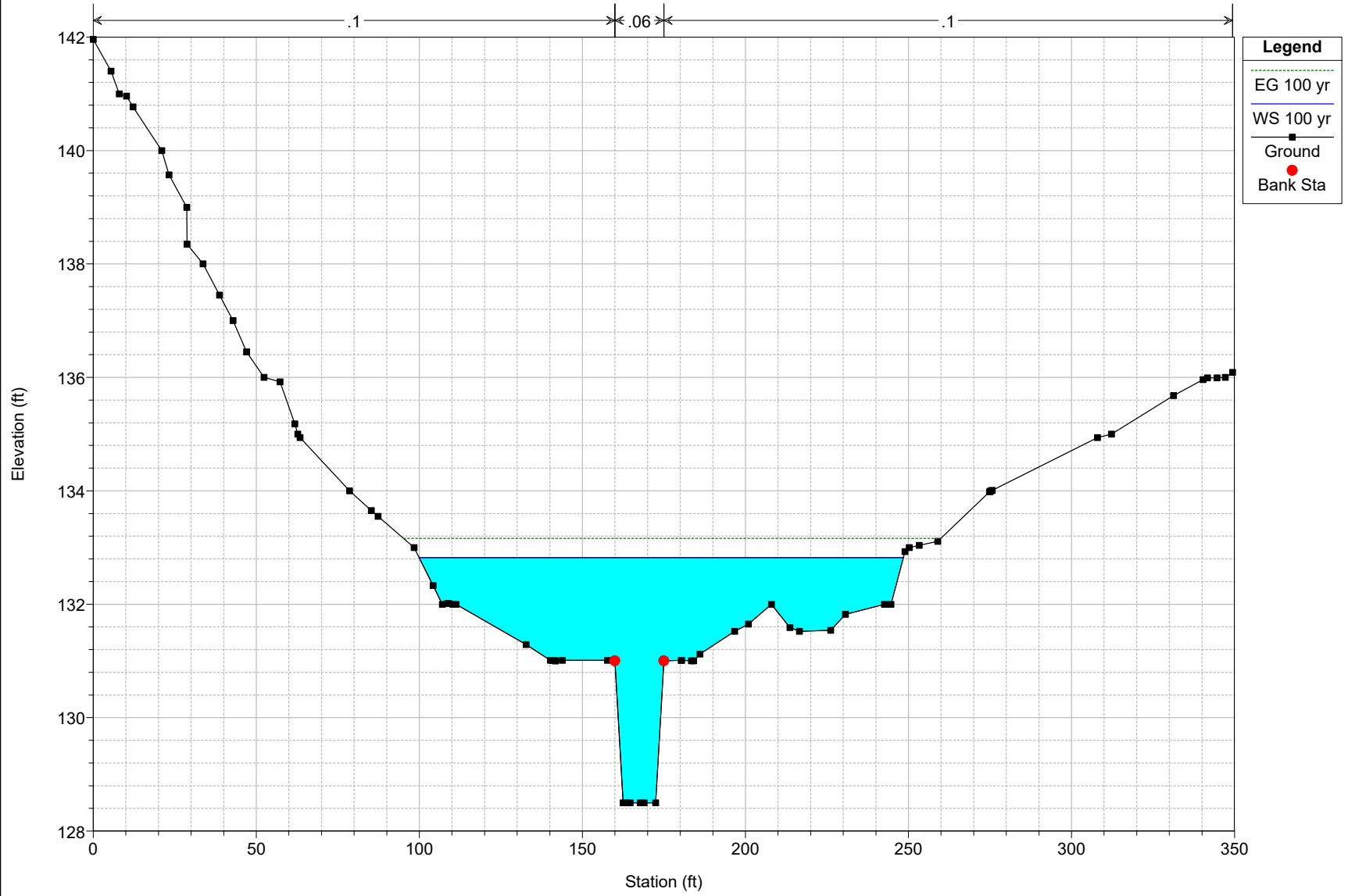
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

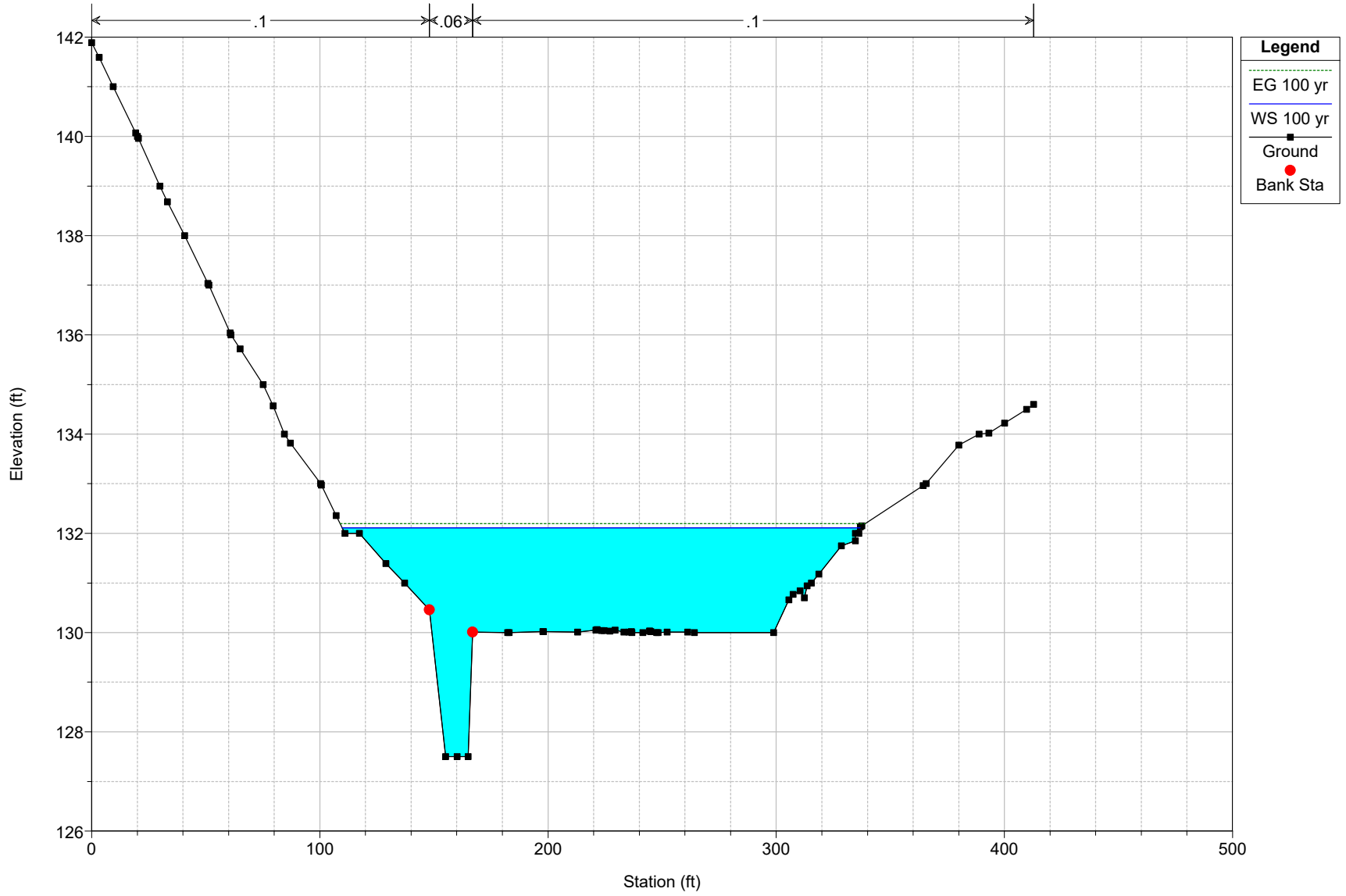
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

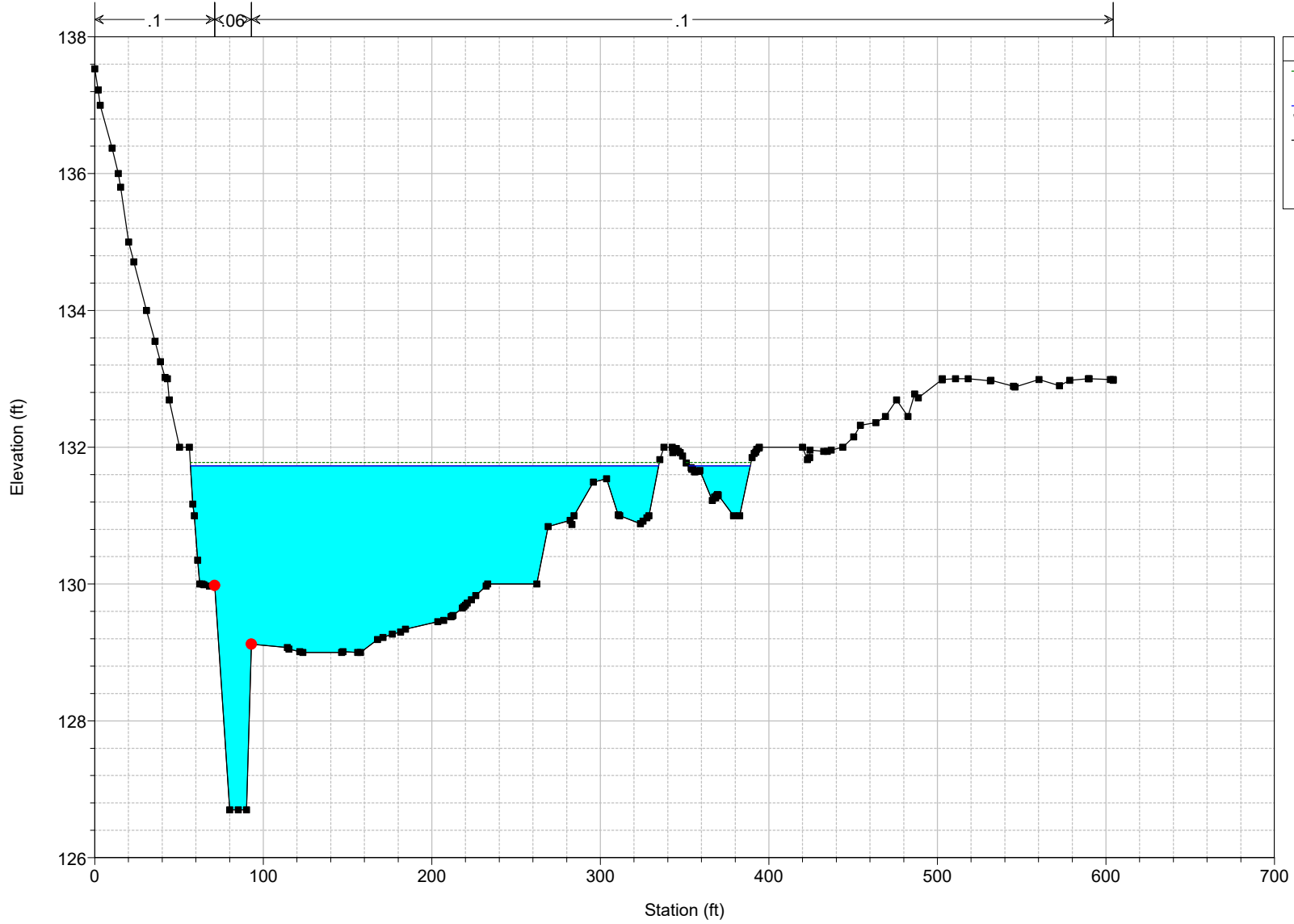
RS = 2413.06



Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 2246.04



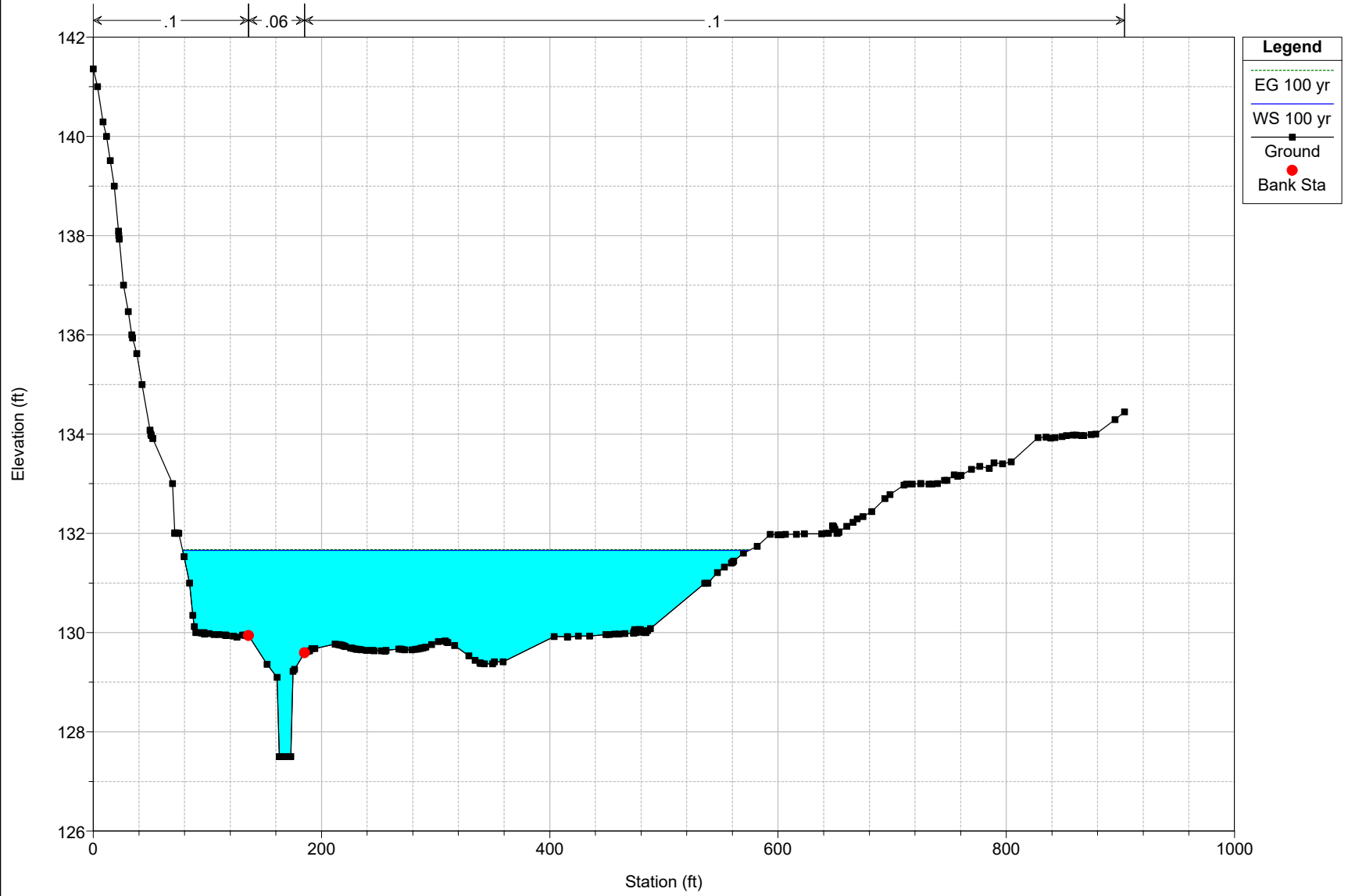
Legend

- EG 100 yr
- WS 100 yr
- Ground
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

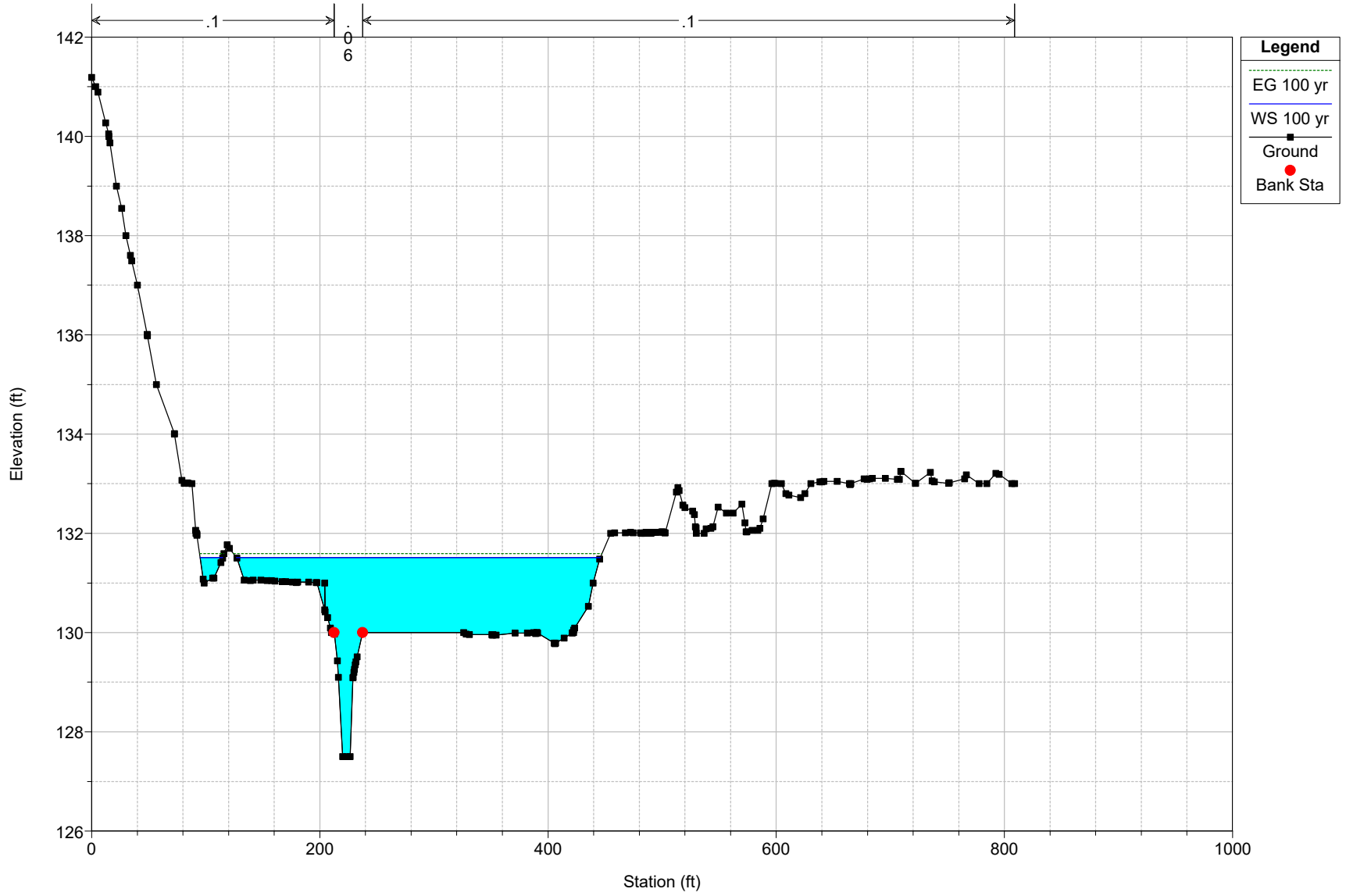
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

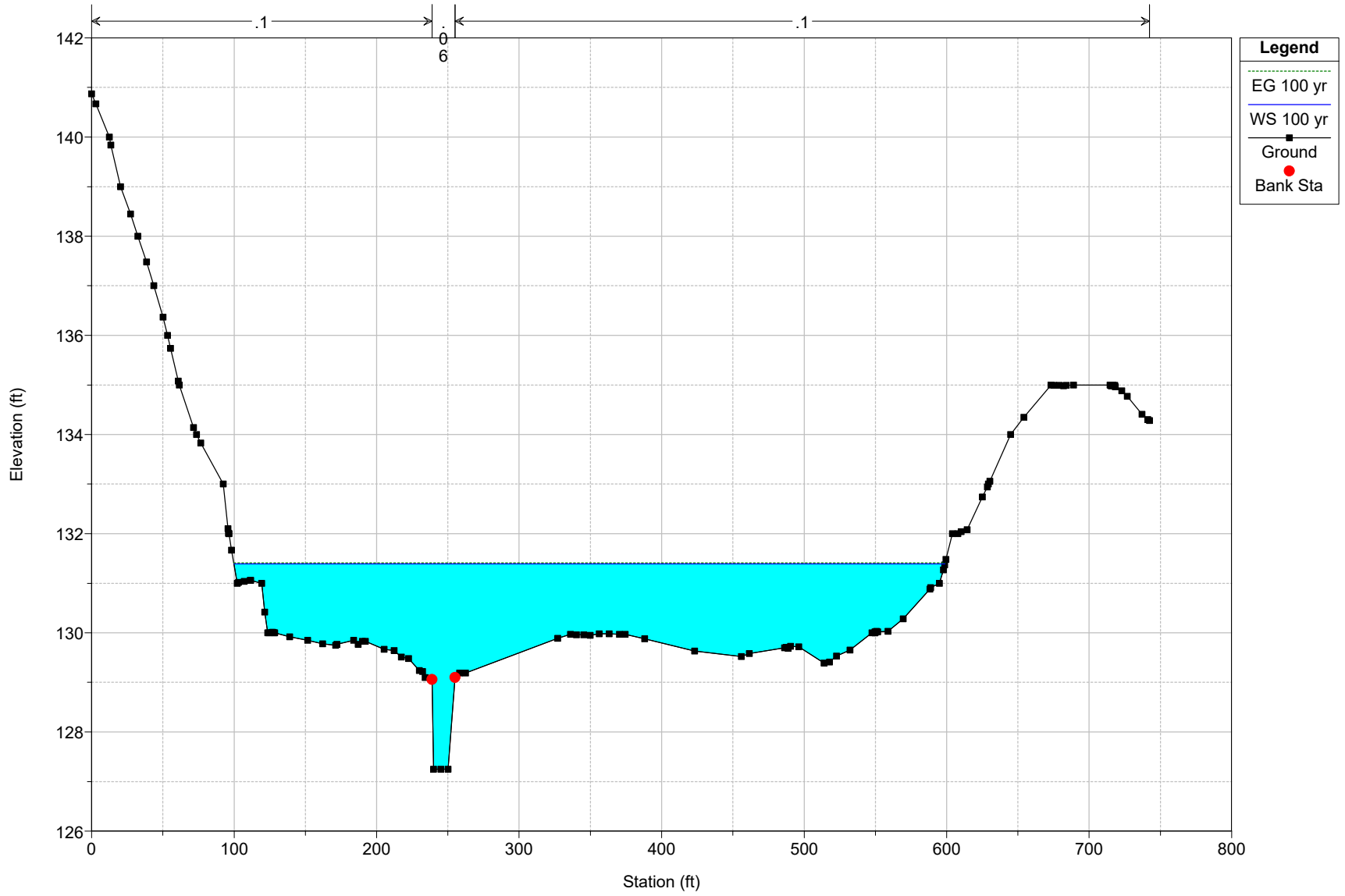
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

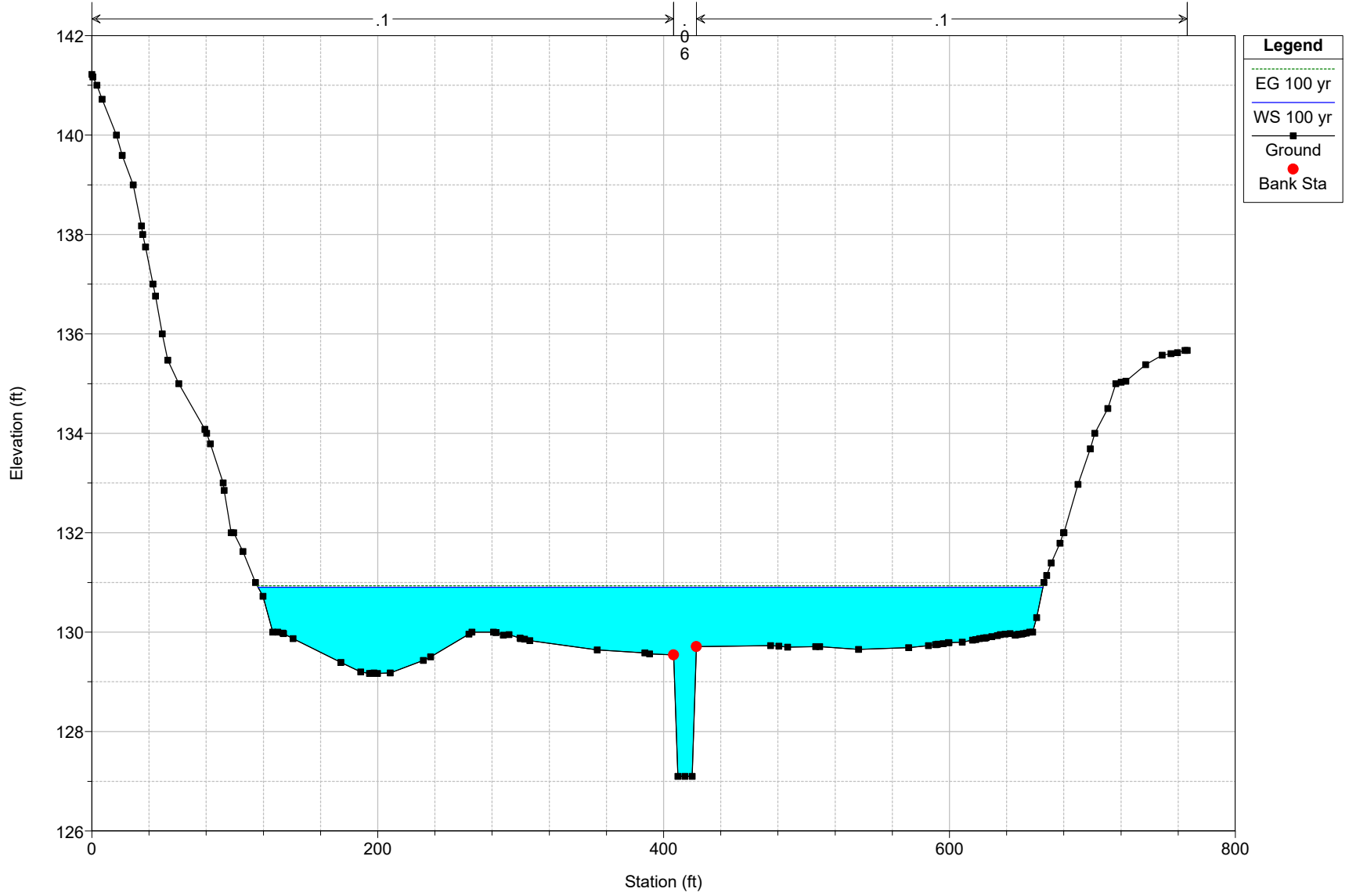
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

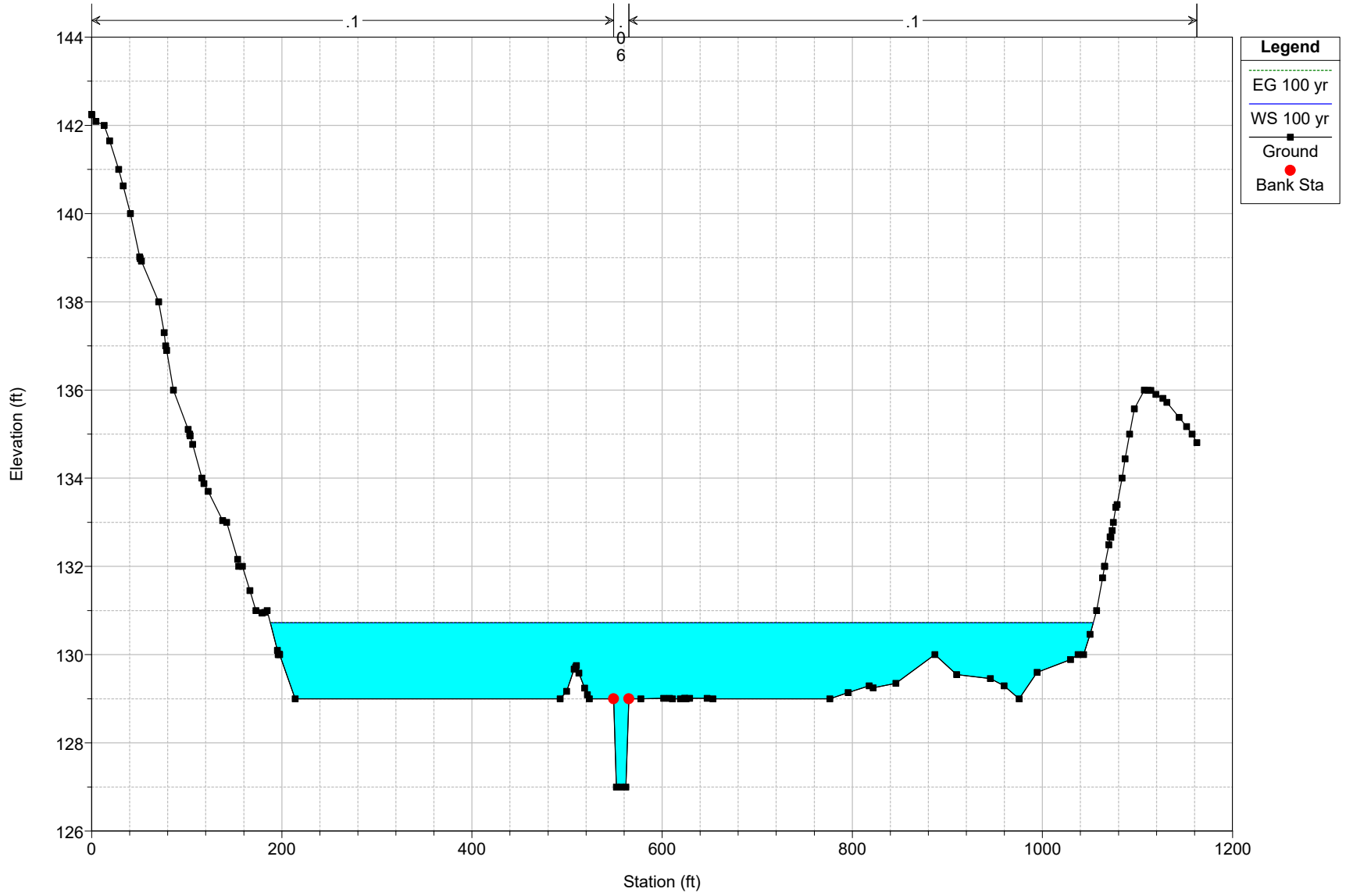
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

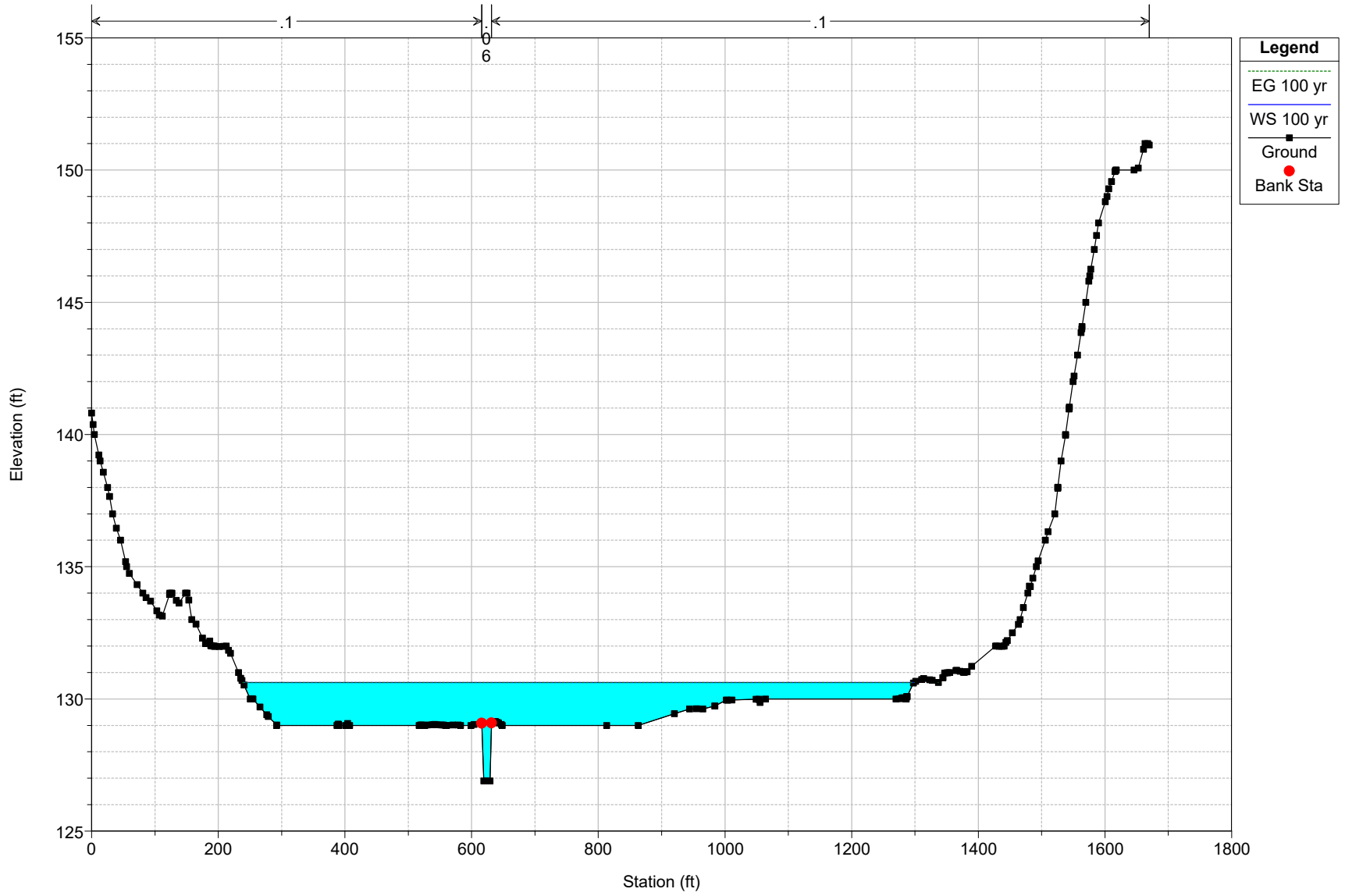
RS = 1600.28



Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

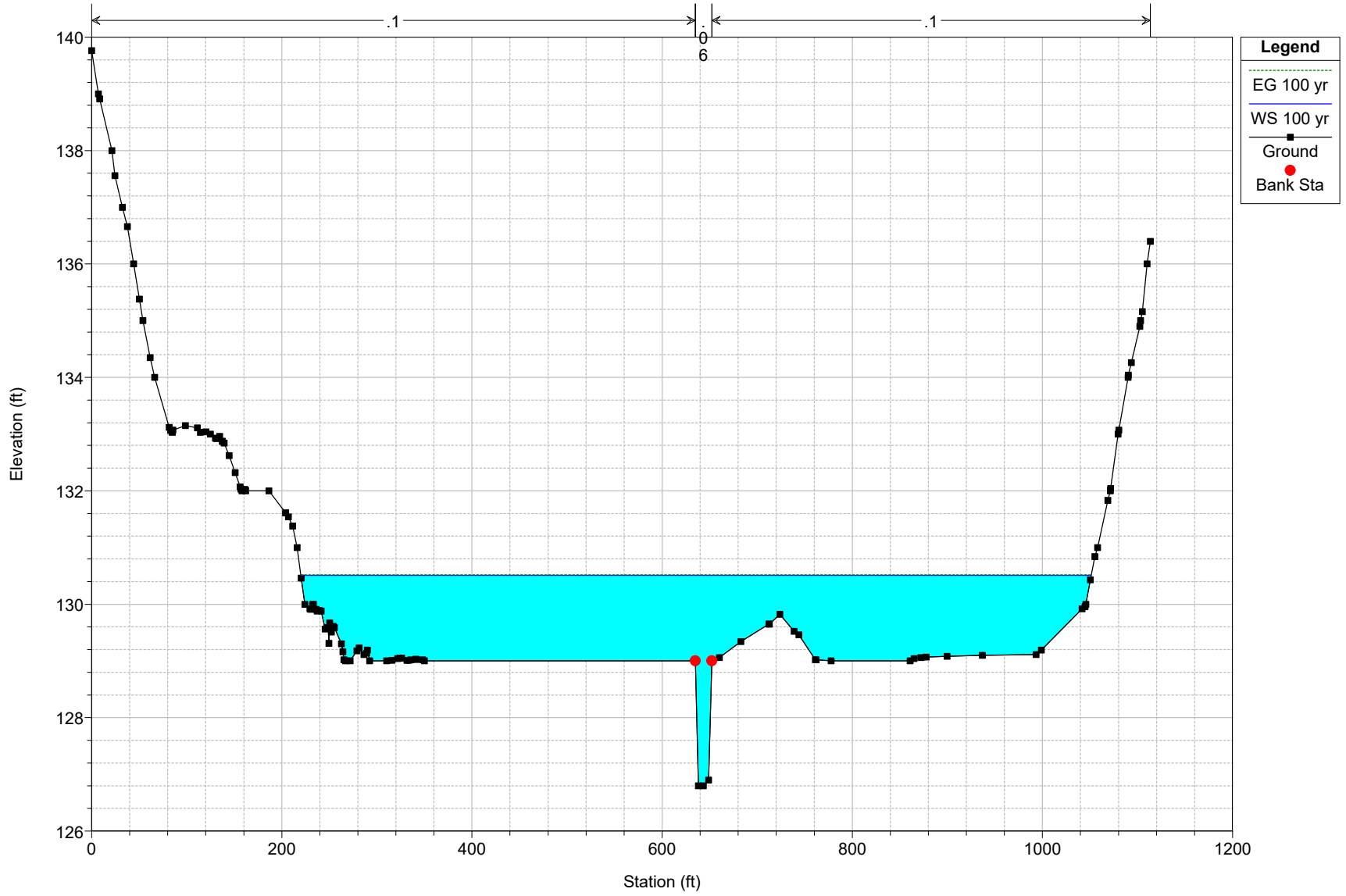
RS = 1501.43



Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

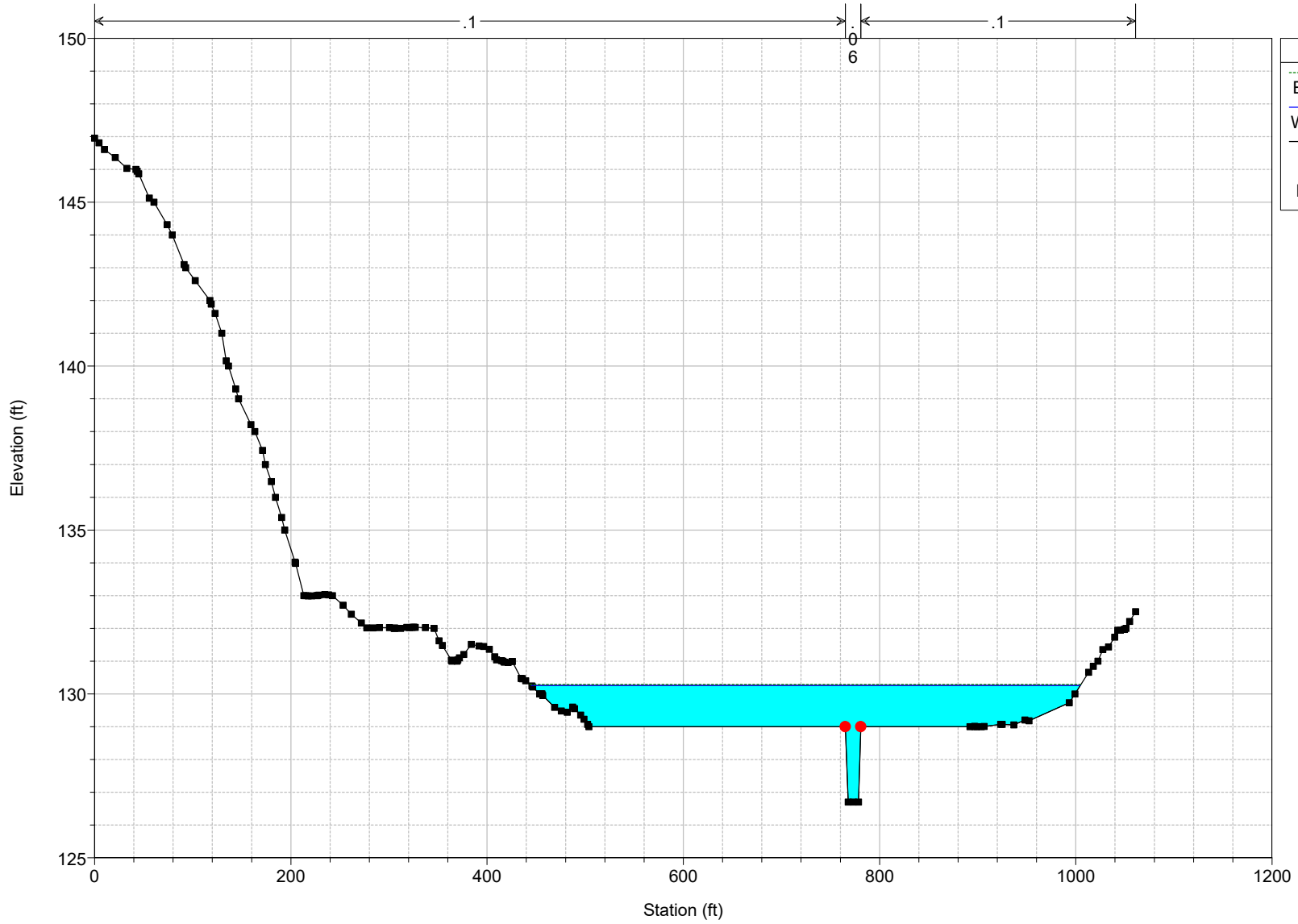
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 1201.38



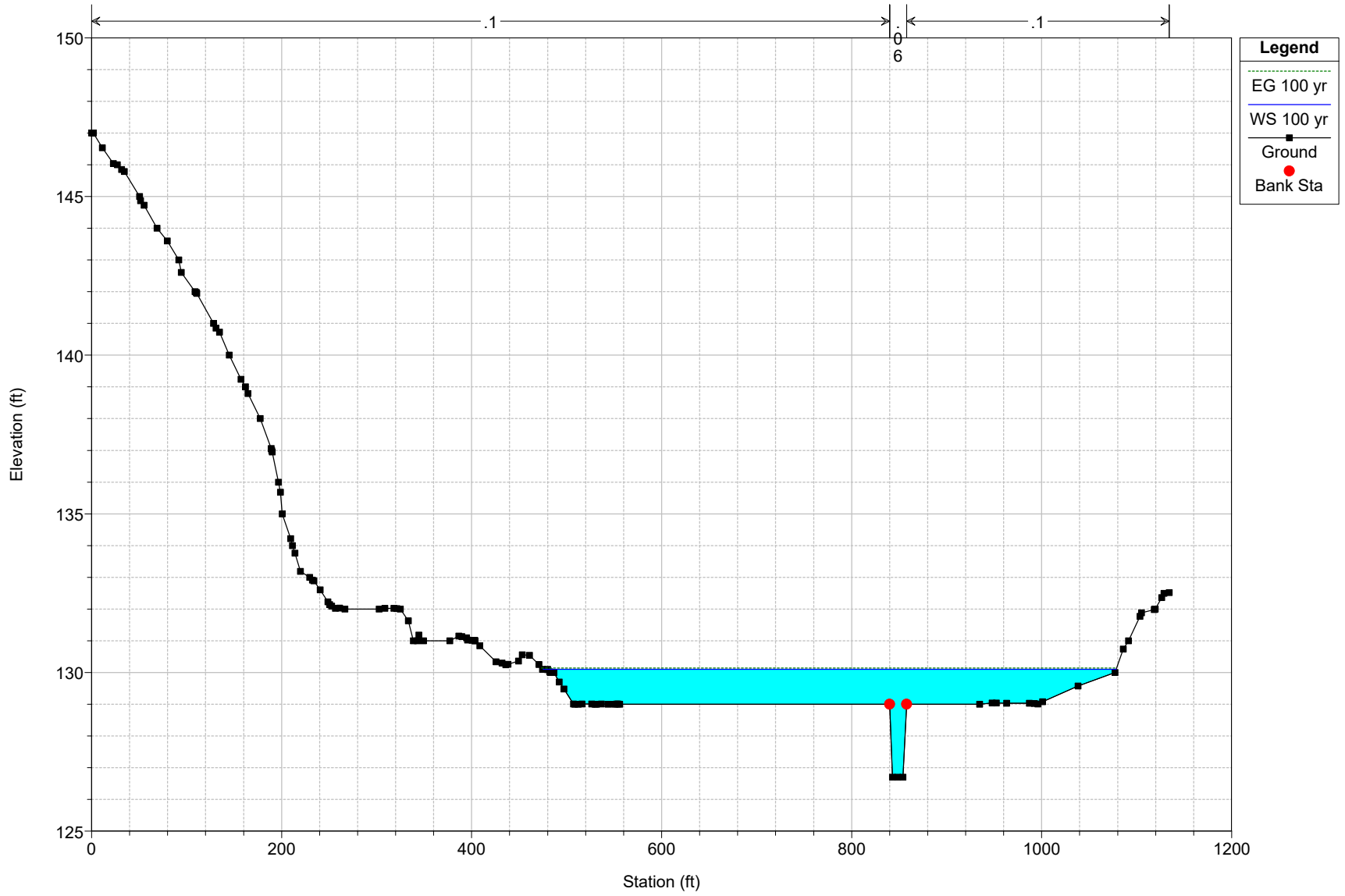
Legend

- EG 100 yr
- WS 100 yr
- Ground
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

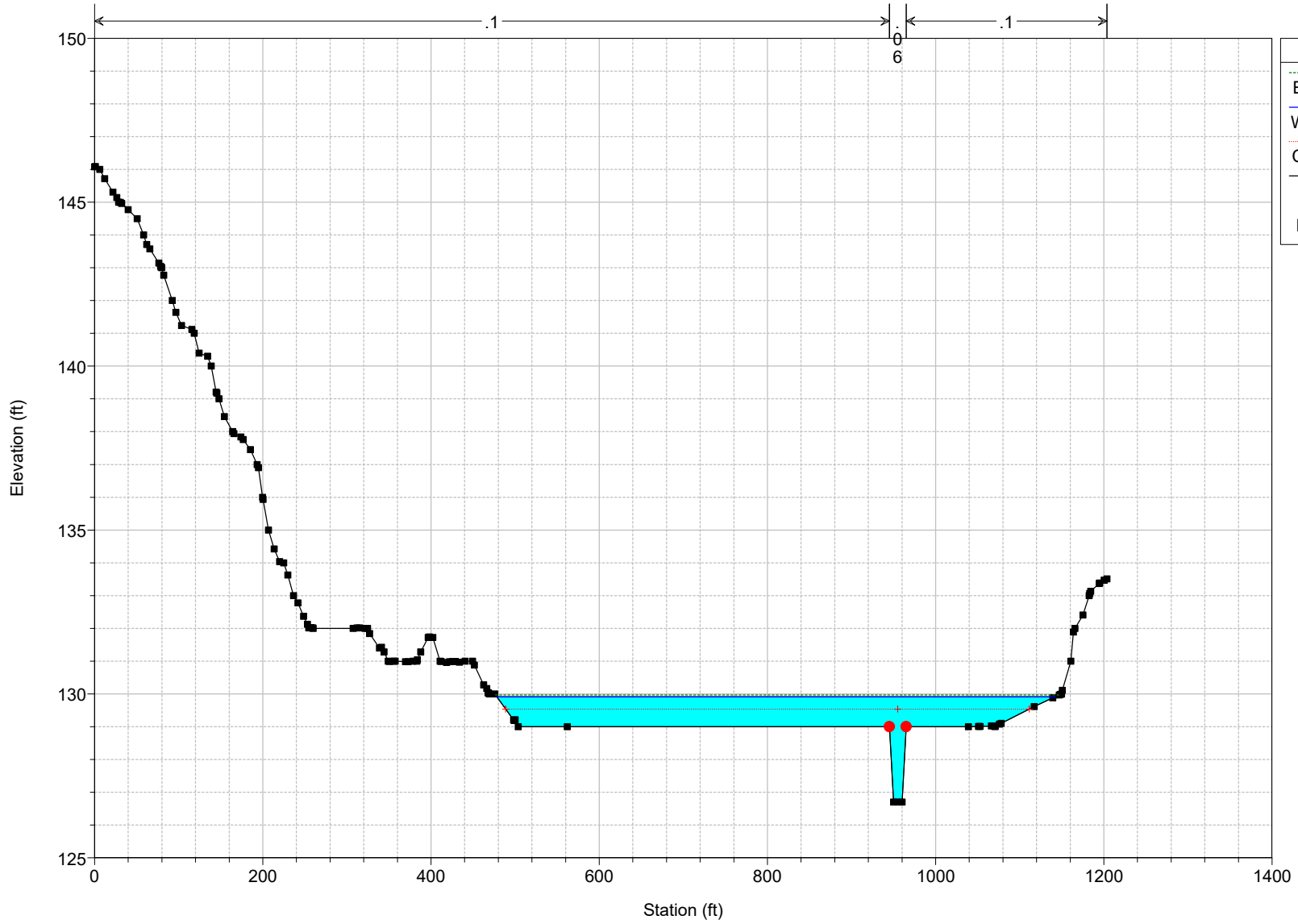
RS = 1099.53



Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 1013.78

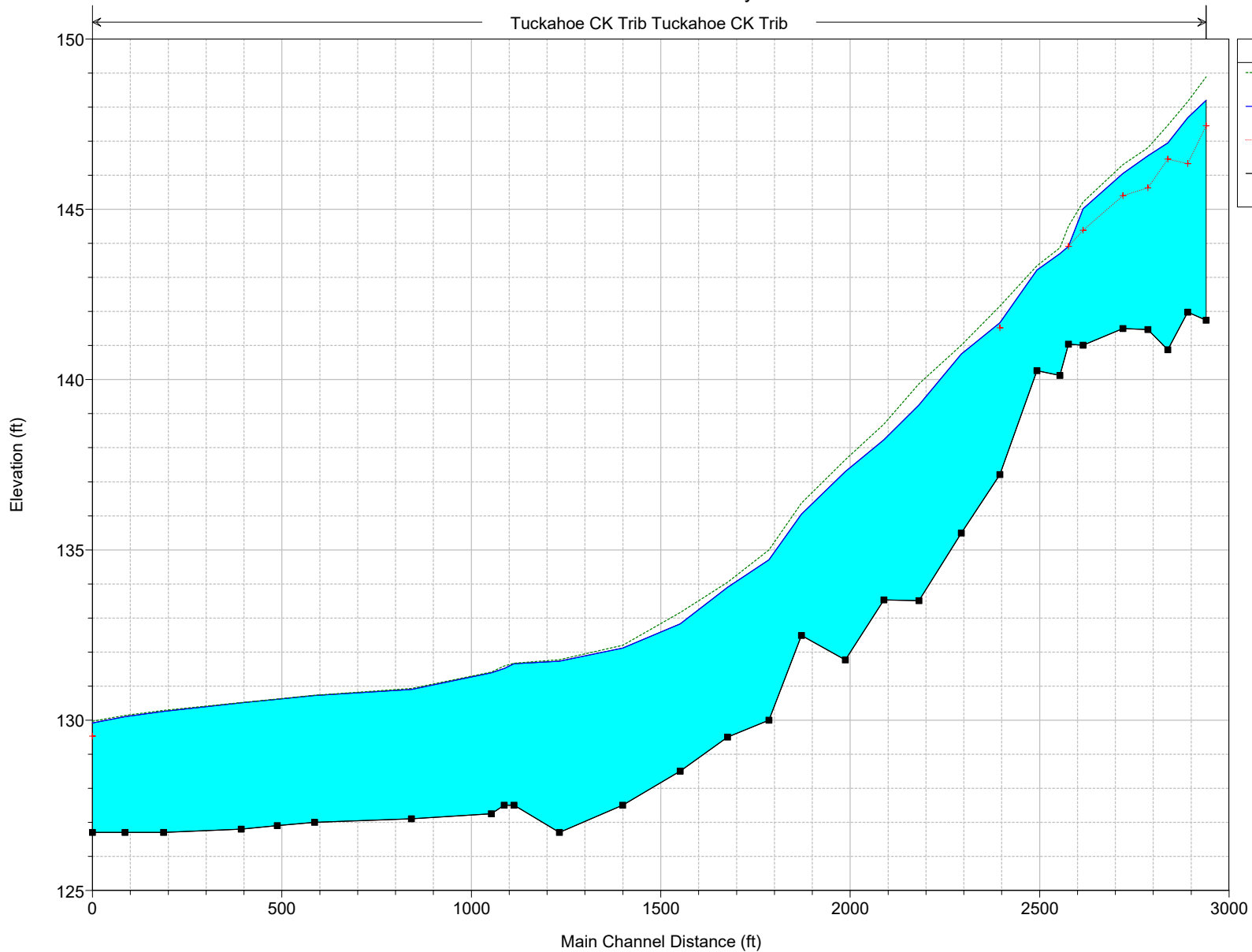


Legend

- EG 100 yr
- WS 100 yr
- Crit 100 yr
- Ground
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 9/2/2020

Tuckahoe CK Trib Tuckahoe CK Trib



Legend	
EG 100 yr	(Dashed green line)
WS 100 yr	(Solid blue line)
Crit 100 yr	(Dashed red line with square markers)
Ground	(Solid black line with square markers)

HEC-RAS Plan: Trib 3 Pr Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib

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
Tuckahoe CK Trib	3952.9	100 yr	478.00	141.74	147.44	147.44	148.67	0.034336	9.36	63.40	52.19	0.80
Tuckahoe CK Trib	3952.9	500 yr	586.00	141.74	147.85	147.85	149.19	0.034495	9.97	74.85	64.16	0.82
Tuckahoe CK Trib	3952.9	50 yr	428.00	141.74	147.22	147.22	148.40	0.034731	9.08	57.37	50.76	0.80
Tuckahoe CK Trib	3952.9	25 yr	377.00	141.74	146.98	146.98	148.11	0.035359	8.79	50.75	38.34	0.80
Tuckahoe CK Trib	3952.9	10 yr	311.00	141.74	146.29	146.29	147.60	0.048158	9.25	35.71	17.54	0.92
Tuckahoe CK Trib	3952.9	2 yr	194.00	141.74	145.23	145.23	146.40	0.060504	8.70	22.30	9.47	1.00
Tuckahoe CK Trib	3909		Culvert									
Tuckahoe CK Trib	3852.34	100 yr	478.00	140.88	146.90	146.39	147.58	0.019310	7.34	87.40	65.56	0.61
Tuckahoe CK Trib	3852.34	500 yr	586.00	140.88	147.19	146.74	148.01	0.021860	8.14	97.67	72.18	0.66
Tuckahoe CK Trib	3852.34	50 yr	428.00	140.88	146.75	146.20	147.37	0.018086	6.95	82.13	62.11	0.59
Tuckahoe CK Trib	3852.34	25 yr	377.00	140.88	146.58	145.99	147.14	0.016821	6.52	76.30	58.42	0.56
Tuckahoe CK Trib	3852.34	10 yr	311.00	140.88	146.33	145.60	146.81	0.015156	5.95	67.86	53.52	0.53
Tuckahoe CK Trib	3852.34	2 yr	194.00	140.88	145.77	144.09	146.10	0.011058	4.73	49.84	40.32	0.44
Tuckahoe CK Trib	3799.63	100 yr	478.00	141.47	146.57	145.66	146.82	0.008147	4.79	151.23	90.78	0.42
Tuckahoe CK Trib	3799.63	500 yr	586.00	141.47	146.86	145.89	147.14	0.008868	5.23	169.07	94.90	0.44
Tuckahoe CK Trib	3799.63	50 yr	428.00	141.47	146.43	145.53	146.65	0.007764	4.57	142.14	88.78	0.41
Tuckahoe CK Trib	3799.63	25 yr	377.00	141.47	146.26	145.33	146.47	0.007335	4.36	132.04	84.94	0.39
Tuckahoe CK Trib	3799.63	10 yr	311.00	141.47	146.02	145.09	146.21	0.006839	4.07	116.92	77.20	0.38
Tuckahoe CK Trib	3799.63	2 yr	194.00	141.47	145.48	143.97	145.63	0.005821	3.47	83.81	62.49	0.34
Tuckahoe CK Trib	3733.79	100 yr	478.00	141.50	146.05	145.39	146.31	0.009184	5.38	161.87	100.73	0.47
Tuckahoe CK Trib	3733.79	500 yr	586.00	141.50	146.32	145.61	146.61	0.009594	5.74	185.02	105.74	0.48
Tuckahoe CK Trib	3733.79	50 yr	428.00	141.50	145.91	145.27	146.16	0.008973	5.20	150.24	98.16	0.46
Tuckahoe CK Trib	3733.79	25 yr	377.00	141.50	145.75	145.14	146.00	0.008811	5.02	137.16	95.26	0.45
Tuckahoe CK Trib	3733.79	10 yr	311.00	141.50	145.52	144.91	145.75	0.008532	4.73	118.29	87.93	0.44
Tuckahoe CK Trib	3733.79	2 yr	194.00	141.50	145.01	144.31	145.21	0.007873	4.11	80.14	71.59	0.41
Tuckahoe CK Trib	3628.75	100 yr	478.00	141.01	145.01	144.38	145.22	0.011058	5.44	184.27	112.45	0.51
Tuckahoe CK Trib	3628.75	500 yr	586.00	141.01	145.23	144.57	145.45	0.011791	5.84	208.71	115.45	0.53
Tuckahoe CK Trib	3628.75	50 yr	428.00	141.01	144.89	144.29	145.08	0.010977	5.30	170.37	110.72	0.50
Tuckahoe CK Trib	3628.75	25 yr	377.00	141.01	144.75	144.18	144.94	0.010782	5.11	155.32	107.09	0.49
Tuckahoe CK Trib	3628.75	10 yr	311.00	141.01	144.54	144.04	144.72	0.010657	4.86	133.37	100.06	0.48
Tuckahoe CK Trib	3628.75	2 yr	194.00	141.01	144.11	143.70	144.26	0.009923	4.25	92.95	86.65	0.46
Tuckahoe CK Trib	3590.08	100 yr	478.00	141.04	143.91	143.91	144.51	0.039440	8.48	110.89	93.06	0.94
Tuckahoe CK Trib	3590.08	500 yr	586.00	141.04	144.17	144.17	144.75	0.035398	8.59	137.08	103.18	0.91

HEC-RAS Plan: Trib 3 Pr Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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
Tuckahoe CK Trib	3590.08	50 yr	428.00	141.04	143.80	143.80	144.38	0.039578	8.25	100.76	88.06	0.94
Tuckahoe CK Trib	3590.08	25 yr	377.00	141.04	143.68	143.68	144.24	0.039365	7.96	90.85	83.62	0.93
Tuckahoe CK Trib	3590.08	10 yr	311.00	141.04	143.55	143.55	144.04	0.036122	7.34	80.41	79.47	0.88
Tuckahoe CK Trib	3590.08	2 yr	194.00	141.04	143.23	143.23	143.64	0.032651	6.27	56.61	69.86	0.81
Tuckahoe CK Trib	3567.08	100 yr	478.00	140.12	143.70		143.87	0.008299	3.52	164.13	98.86	0.40
Tuckahoe CK Trib	3567.08	500 yr	586.00	140.12	143.93		144.13	0.008852	3.84	188.01	107.01	0.42
Tuckahoe CK Trib	3567.08	50 yr	428.00	140.12	143.58		143.74	0.008054	3.36	152.34	94.69	0.39
Tuckahoe CK Trib	3567.08	25 yr	377.00	140.12	143.45		143.59	0.007767	3.19	140.06	90.14	0.38
Tuckahoe CK Trib	3567.08	10 yr	311.00	140.12	143.25		143.38	0.007428	2.95	123.08	85.05	0.37
Tuckahoe CK Trib	3567.08	2 yr	194.00	140.12	142.82		142.91	0.006799	2.46	88.47	75.70	0.35
Tuckahoe CK Trib	3506.4	100 yr	478.00	140.26	143.21		143.34	0.008869	3.15	191.07	123.74	0.38
Tuckahoe CK Trib	3506.4	500 yr	586.00	140.26	143.41		143.56	0.009590	3.44	216.16	128.45	0.40
Tuckahoe CK Trib	3506.4	50 yr	428.00	140.26	143.10		143.22	0.008657	3.02	177.42	121.09	0.37
Tuckahoe CK Trib	3506.4	25 yr	377.00	140.26	142.98		143.09	0.008392	2.88	163.09	118.25	0.37
Tuckahoe CK Trib	3506.4	10 yr	311.00	140.26	142.79		142.89	0.008317	2.71	141.27	113.79	0.37
Tuckahoe CK Trib	3506.4	2 yr	194.00	140.26	142.33		142.42	0.009667	2.52	91.38	102.23	0.40
Tuckahoe CK Trib	3409.13	100 yr	478.00	137.21	141.67	141.52	142.16	0.018486	7.06	137.19	116.19	0.66
Tuckahoe CK Trib	3409.13	500 yr	586.00	137.21	142.01		142.43	0.015541	6.88	180.36	131.10	0.61
Tuckahoe CK Trib	3409.13	50 yr	428.00	137.21	141.50	141.41	142.02	0.019796	7.07	118.26	105.81	0.67
Tuckahoe CK Trib	3409.13	25 yr	377.00	137.21	141.31	141.27	141.86	0.021066	7.03	100.09	94.97	0.69
Tuckahoe CK Trib	3409.13	10 yr	311.00	137.21	141.07	141.05	141.64	0.022205	6.86	78.72	81.03	0.70
Tuckahoe CK Trib	3409.13	2 yr	194.00	137.21	140.62	140.44	141.09	0.020056	5.85	47.93	55.38	0.65
Tuckahoe CK Trib	3306.96	100 yr	478.00	135.49	140.75		141.01	0.007053	4.73	167.56	92.00	0.42
Tuckahoe CK Trib	3306.96	500 yr	586.00	135.49	141.15		141.41	0.006671	4.91	205.89	102.16	0.42
Tuckahoe CK Trib	3306.96	50 yr	428.00	135.49	140.54		140.80	0.007374	4.66	148.66	86.65	0.43
Tuckahoe CK Trib	3306.96	25 yr	377.00	135.49	140.31		140.56	0.007780	4.59	129.17	80.76	0.43
Tuckahoe CK Trib	3306.96	10 yr	311.00	135.49	139.97		140.23	0.008590	4.50	102.98	72.11	0.45
Tuckahoe CK Trib	3306.96	2 yr	194.00	135.49	139.15		139.44	0.012625	4.45	52.76	49.55	0.52
Tuckahoe CK Trib	3195.49	100 yr	478.00	133.51	139.25		139.88	0.014682	6.80	99.62	54.82	0.55
Tuckahoe CK Trib	3195.49	500 yr	586.00	133.51	139.64		140.31	0.014908	7.22	122.36	62.11	0.56
Tuckahoe CK Trib	3195.49	50 yr	428.00	133.51	139.05		139.65	0.014507	6.57	88.96	51.08	0.54
Tuckahoe CK Trib	3195.49	25 yr	377.00	133.51	138.83		139.39	0.014253	6.29	78.01	46.91	0.54
Tuckahoe CK Trib	3195.49	10 yr	311.00	133.51	138.50		139.01	0.013771	5.87	63.69	40.56	0.52
Tuckahoe CK Trib	3195.49	2 yr	194.00	133.51	137.74		138.09	0.011609	4.74	41.21	16.46	0.46

HEC-RAS Plan: Trib 3 Pr Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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
Tuckahoe CK Trib	3102.46	100 yr	478.00	133.53	138.24		138.69	0.010149	5.71	111.87	60.76	0.51
Tuckahoe CK Trib	3102.46	500 yr	586.00	133.53	138.59		139.10	0.010396	6.13	134.86	67.41	0.52
Tuckahoe CK Trib	3102.46	50 yr	428.00	133.53	138.05		138.48	0.010021	5.49	100.88	57.31	0.50
Tuckahoe CK Trib	3102.46	25 yr	377.00	133.53	137.84		138.24	0.009861	5.24	89.50	53.50	0.49
Tuckahoe CK Trib	3102.46	10 yr	311.00	133.53	137.55		137.90	0.009589	4.87	74.46	47.30	0.48
Tuckahoe CK Trib	3102.46	2 yr	194.00	133.53	136.89		137.13	0.008624	3.96	49.59	24.83	0.44
Tuckahoe CK Trib	3000.61	100 yr	478.00	131.77	137.30		137.65	0.009558	5.43	140.42	72.52	0.44
Tuckahoe CK Trib	3000.61	500 yr	586.00	131.77	137.61		138.00	0.010375	5.90	163.64	78.98	0.46
Tuckahoe CK Trib	3000.61	50 yr	428.00	131.77	137.15		137.47	0.009094	5.18	129.37	69.24	0.43
Tuckahoe CK Trib	3000.61	25 yr	377.00	131.77	136.98		137.27	0.008486	4.88	118.29	65.79	0.41
Tuckahoe CK Trib	3000.61	10 yr	311.00	131.77	136.75		137.00	0.007550	4.44	103.60	60.93	0.38
Tuckahoe CK Trib	3000.61	2 yr	194.00	131.77	136.25		136.41	0.005461	3.47	75.46	50.75	0.32
Tuckahoe CK Trib	2885.24	100 yr	684.00	132.49	136.05		136.37	0.014381	6.24	211.67	128.22	0.62
Tuckahoe CK Trib	2885.24	500 yr	852.00	132.49	136.36		136.70	0.013921	6.53	252.65	134.82	0.62
Tuckahoe CK Trib	2885.24	50 yr	607.00	132.49	135.89		136.21	0.014669	6.09	191.88	124.92	0.62
Tuckahoe CK Trib	2885.24	25 yr	530.00	132.49	135.73		136.04	0.014945	5.93	171.67	121.44	0.62
Tuckahoe CK Trib	2885.24	10 yr	430.00	132.49	135.49		135.80	0.015633	5.72	143.16	116.36	0.62
Tuckahoe CK Trib	2885.24	2 yr	259.00	132.49	134.98	134.85	135.30	0.018231	5.35	86.88	103.33	0.65
Tuckahoe CK Trib	2799.51	100 yr	684.00	130.00	134.71		135.00	0.011712	6.02	241.54	154.61	0.53
Tuckahoe CK Trib	2799.51	500 yr	852.00	130.00	135.03		135.33	0.011642	6.32	294.54	174.03	0.53
Tuckahoe CK Trib	2799.51	50 yr	607.00	130.00	134.56		134.84	0.011596	5.84	218.95	147.98	0.52
Tuckahoe CK Trib	2799.51	25 yr	530.00	130.00	134.40		134.67	0.011467	5.65	195.69	141.28	0.52
Tuckahoe CK Trib	2799.51	10 yr	430.00	130.00	134.16		134.43	0.011336	5.38	163.68	132.31	0.51
Tuckahoe CK Trib	2799.51	2 yr	259.00	130.00	133.66		133.93	0.011277	4.84	101.90	117.27	0.49
Tuckahoe CK Trib	2690.12	100 yr	684.00	129.50	133.90		134.05	0.006494	4.58	323.89	195.42	0.41
Tuckahoe CK Trib	2690.12	500 yr	852.00	129.50	134.21		134.38	0.006637	4.87	391.98	230.68	0.42
Tuckahoe CK Trib	2690.12	50 yr	607.00	129.50	133.76		133.91	0.006350	4.42	297.38	190.00	0.40
Tuckahoe CK Trib	2690.12	25 yr	530.00	129.50	133.62		133.76	0.006154	4.24	270.34	184.64	0.39
Tuckahoe CK Trib	2690.12	10 yr	430.00	129.50	133.42		133.55	0.005738	3.95	234.85	177.36	0.37
Tuckahoe CK Trib	2690.12	2 yr	259.00	129.50	132.93		133.05	0.005549	3.51	152.91	151.68	0.36
Tuckahoe CK Trib	2564.96	100 yr	684.00	128.50	132.82		133.16	0.011923	6.15	228.37	148.55	0.55
Tuckahoe CK Trib	2564.96	500 yr	852.00	128.50	133.14		133.49	0.011871	6.47	277.43	164.05	0.55
Tuckahoe CK Trib	2564.96	50 yr	607.00	128.50	132.66		133.01	0.012316	6.08	204.48	146.40	0.55

HEC-RAS Plan: Trib 3 Pr Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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)	
Tuckahoe CK Trib	2564.96	25 yr	530.00	128.50	132.49		132.85	0.012820	6.01	179.18	144.10	0.56
Tuckahoe CK Trib	2564.96	10 yr	430.00	128.50	132.22	132.14	132.62	0.014156	6.00	141.35	140.58	0.58
Tuckahoe CK Trib	2564.96	2 yr	259.00	128.50	131.68	131.35	132.07	0.014629	5.41	74.48	96.50	0.57
Tuckahoe CK Trib	2413.06	100 yr	684.00	127.50	132.11		132.20	0.003425	3.40	416.61	227.03	0.30
Tuckahoe CK Trib	2413.06	500 yr	852.00	127.50	132.39		132.48	0.003709	3.70	480.08	238.49	0.32
Tuckahoe CK Trib	2413.06	50 yr	607.00	127.50	131.97		132.05	0.003285	3.25	385.64	216.82	0.29
Tuckahoe CK Trib	2413.06	25 yr	530.00	127.50	131.81		131.88	0.003238	3.13	349.90	211.16	0.29
Tuckahoe CK Trib	2413.06	10 yr	430.00	127.50	131.59		131.65	0.003035	2.90	304.12	200.51	0.28
Tuckahoe CK Trib	2413.06	2 yr	259.00	127.50	131.12		131.17	0.002673	2.47	213.94	182.75	0.25
Tuckahoe CK Trib	2246.04	100 yr	684.00	126.70	131.73		131.78	0.001800	2.62	572.65	314.26	0.23
Tuckahoe CK Trib	2246.04	500 yr	852.00	126.70	131.96		132.02	0.002015	2.87	648.06	347.04	0.24
Tuckahoe CK Trib	2246.04	50 yr	607.00	126.70	131.61		131.65	0.001688	2.49	536.25	304.78	0.22
Tuckahoe CK Trib	2246.04	25 yr	530.00	126.70	131.48		131.52	0.001442	2.25	498.06	291.61	0.20
Tuckahoe CK Trib	2246.04	10 yr	430.00	126.70	131.30		131.33	0.001251	2.03	444.58	277.18	0.18
Tuckahoe CK Trib	2246.04	2 yr	259.00	126.70	130.91		130.93	0.000836	1.55	345.51	224.47	0.15
Tuckahoe CK Trib	2126.75	100 yr	684.00	127.50	131.66		131.67	0.001020	1.50	867.31	496.32	0.16
Tuckahoe CK Trib	2126.75	500 yr	852.00	127.50	131.89		131.90	0.001103	1.65	983.14	512.64	0.17
Tuckahoe CK Trib	2126.75	50 yr	607.00	127.50	131.54		131.56	0.000973	1.42	810.92	487.21	0.16
Tuckahoe CK Trib	2126.75	25 yr	530.00	127.50	131.42		131.43	0.000927	1.34	751.47	479.67	0.15
Tuckahoe CK Trib	2126.75	10 yr	430.00	127.50	131.24		131.25	0.000869	1.24	664.54	466.12	0.15
Tuckahoe CK Trib	2126.75	2 yr	259.00	127.50	130.86		130.86	0.000758	1.02	491.51	443.69	0.13
Tuckahoe CK Trib	2100.19	100 yr	684.00	127.50	131.51		131.59	0.004942	3.36	430.07	338.73	0.35
Tuckahoe CK Trib	2100.19	500 yr	852.00	127.50	131.73		131.82	0.005020	3.56	506.52	354.64	0.36
Tuckahoe CK Trib	2100.19	50 yr	607.00	127.50	131.40		131.48	0.004909	3.26	392.98	332.97	0.35
Tuckahoe CK Trib	2100.19	25 yr	530.00	127.50	131.28		131.36	0.004877	3.15	353.86	326.76	0.35
Tuckahoe CK Trib	2100.19	10 yr	430.00	127.50	131.10		131.17	0.004943	3.03	295.89	317.33	0.35
Tuckahoe CK Trib	2100.19	2 yr	259.00	127.50	130.74		130.80	0.004641	2.63	203.93	236.27	0.33
Tuckahoe CK Trib	2066.3	100 yr	684.00	127.25	131.39		131.41	0.001361	2.11	813.83	498.88	0.19
Tuckahoe CK Trib	2066.3	500 yr	852.00	127.25	131.60		131.63	0.001444	2.25	921.36	502.05	0.20
Tuckahoe CK Trib	2066.3	50 yr	607.00	127.25	131.28		131.30	0.001317	2.03	760.44	497.32	0.19
Tuckahoe CK Trib	2066.3	25 yr	530.00	127.25	131.17		131.19	0.001268	1.95	703.53	495.41	0.18
Tuckahoe CK Trib	2066.3	10 yr	430.00	127.25	131.00		131.01	0.001171	1.82	620.15	475.34	0.17
Tuckahoe CK Trib	2066.3	2 yr	259.00	127.25	130.66		130.67	0.000986	1.55	460.67	460.61	0.16

HEC-RAS Plan: Trib 3 Pr Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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
Tuckahoe CK Trib	1855.43	100 yr	684.00	127.10	130.90		130.93	0.002639	2.64	687.09	549.07	0.25
Tuckahoe CK Trib	1855.43	500 yr	852.00	127.10	131.10		131.13	0.002638	2.74	795.66	554.39	0.26
Tuckahoe CK Trib	1855.43	50 yr	607.00	127.10	130.80		130.84	0.002647	2.59	633.18	546.52	0.25
Tuckahoe CK Trib	1855.43	25 yr	530.00	127.10	130.70		130.73	0.002667	2.54	575.68	543.98	0.25
Tuckahoe CK Trib	1855.43	10 yr	430.00	127.10	130.55		130.58	0.002721	2.49	494.46	541.48	0.25
Tuckahoe CK Trib	1855.43	2 yr	259.00	127.10	130.24		130.28	0.003025	2.43	325.80	536.10	0.26
Tuckahoe CK Trib	1600.28	100 yr	684.00	127.00	130.72		130.73	0.000591	1.28	1341.00	865.52	0.12
Tuckahoe CK Trib	1600.28	500 yr	852.00	127.00	130.91		130.92	0.000640	1.38	1502.95	870.09	0.13
Tuckahoe CK Trib	1600.28	50 yr	607.00	127.00	130.63		130.63	0.000566	1.23	1260.33	863.24	0.12
Tuckahoe CK Trib	1600.28	25 yr	530.00	127.00	130.53		130.53	0.000539	1.18	1174.21	860.80	0.12
Tuckahoe CK Trib	1600.28	10 yr	430.00	127.00	130.39		130.39	0.000500	1.10	1051.87	857.13	0.11
Tuckahoe CK Trib	1600.28	2 yr	259.00	127.00	130.09		130.10	0.000421	0.94	800.35	849.19	0.10
Tuckahoe CK Trib	1501.43	100 yr	684.00	126.90	130.62		130.62	0.000757	1.43	1333.10	1059.57	0.14
Tuckahoe CK Trib	1501.43	500 yr	852.00	126.90	130.80		130.80	0.000803	1.52	1527.35	1108.52	0.14
Tuckahoe CK Trib	1501.43	50 yr	607.00	126.90	130.53		130.53	0.000747	1.39	1238.16	1055.53	0.14
Tuckahoe CK Trib	1501.43	25 yr	530.00	126.90	130.43		130.44	0.000738	1.35	1136.88	1051.86	0.13
Tuckahoe CK Trib	1501.43	10 yr	430.00	126.90	130.29		130.30	0.000727	1.30	993.16	1046.63	0.13
Tuckahoe CK Trib	1501.43	2 yr	259.00	126.90	130.01		130.01	0.000717	1.21	696.48	1023.48	0.13
Tuckahoe CK Trib	1406.3	100 yr	684.00	126.80	130.51		130.52	0.000888	1.55	1156.38	831.31	0.15
Tuckahoe CK Trib	1406.3	500 yr	852.00	126.80	130.68		130.69	0.000959	1.67	1297.98	834.69	0.16
Tuckahoe CK Trib	1406.3	50 yr	607.00	126.80	130.42		130.43	0.000852	1.49	1085.22	829.61	0.15
Tuckahoe CK Trib	1406.3	25 yr	530.00	126.80	130.33		130.34	0.000814	1.43	1009.21	827.83	0.14
Tuckahoe CK Trib	1406.3	10 yr	430.00	126.80	130.20		130.21	0.000759	1.34	901.31	825.30	0.14
Tuckahoe CK Trib	1406.3	2 yr	259.00	126.80	129.93		129.94	0.000633	1.15	679.52	809.31	0.12
Tuckahoe CK Trib	1201.38	100 yr	684.00	126.70	130.26		130.29	0.003050	2.76	663.29	559.64	0.27
Tuckahoe CK Trib	1201.38	500 yr	852.00	126.70	130.41		130.44	0.003343	2.98	747.23	568.72	0.29
Tuckahoe CK Trib	1201.38	50 yr	607.00	126.70	130.18		130.21	0.002905	2.65	621.28	555.51	0.27
Tuckahoe CK Trib	1201.38	25 yr	530.00	126.70	130.10		130.13	0.002747	2.53	576.68	551.19	0.26
Tuckahoe CK Trib	1201.38	10 yr	430.00	126.70	129.99		130.01	0.002495	2.35	514.43	542.71	0.24
Tuckahoe CK Trib	1201.38	2 yr	259.00	126.70	129.75		129.78	0.001956	1.97	389.37	530.47	0.21
Tuckahoe CK Trib	1099.53	100 yr	684.00	126.70	130.10		130.14	0.003839	3.00	627.91	603.18	0.31
Tuckahoe CK Trib	1099.53	500 yr	852.00	126.70	130.24		130.29	0.004062	3.19	715.77	609.76	0.32
Tuckahoe CK Trib	1099.53	50 yr	607.00	126.70	130.03		130.07	0.003677	2.89	584.87	595.58	0.30
Tuckahoe CK Trib	1099.53	25 yr	530.00	126.70	129.95		129.99	0.003479	2.76	539.88	585.12	0.29

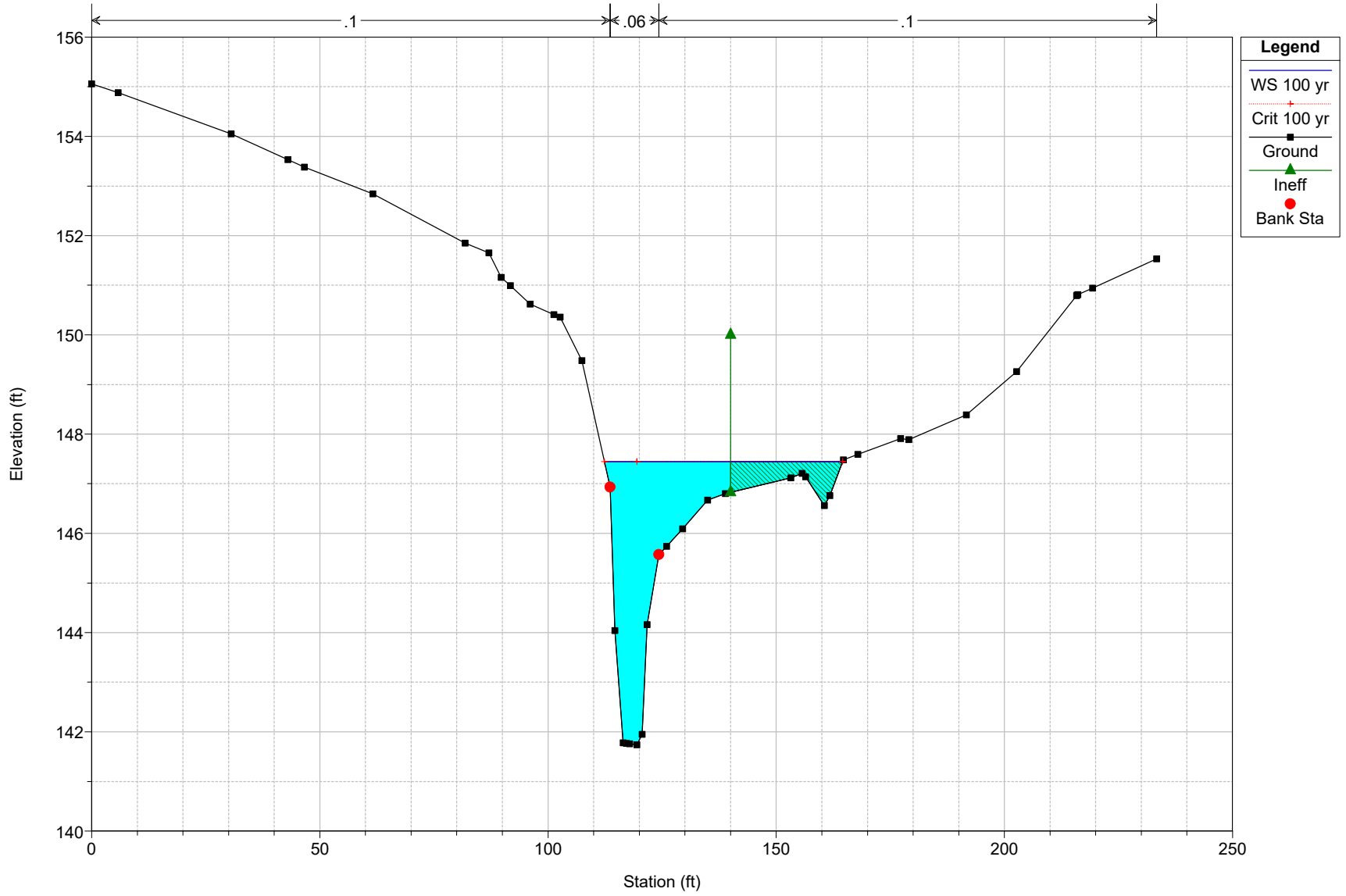
HEC-RAS Plan: Trib 3 Pr Cond River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib (Continued)

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)	
Tuckahoe CK Trib	1099.53	10 yr	430.00	126.70	129.84		129.88	0.003190	2.58	478.07	573.48	0.28
Tuckahoe CK Trib	1099.53	2 yr	259.00	126.70	129.63		129.66	0.002482	2.15	357.39	549.74	0.24
Tuckahoe CK Trib	1013.78	100 yr	684.00	126.70	129.92	129.53	129.97	0.005000	3.24	596.92	664.28	0.35
Tuckahoe CK Trib	1013.78	500 yr	852.00	126.70	130.07	129.61	130.12	0.005004	3.36	698.63	682.91	0.35
Tuckahoe CK Trib	1013.78	50 yr	607.00	126.70	129.84	129.50	129.89	0.005001	3.18	547.80	656.04	0.35
Tuckahoe CK Trib	1013.78	25 yr	530.00	126.70	129.76	129.46	129.81	0.005004	3.11	496.15	647.34	0.35
Tuckahoe CK Trib	1013.78	10 yr	430.00	126.70	129.65	129.40	129.70	0.005000	3.02	424.60	635.07	0.35
Tuckahoe CK Trib	1013.78	2 yr	259.00	126.70	129.42	129.25	129.48	0.005001	2.82	282.28	610.82	0.34

Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

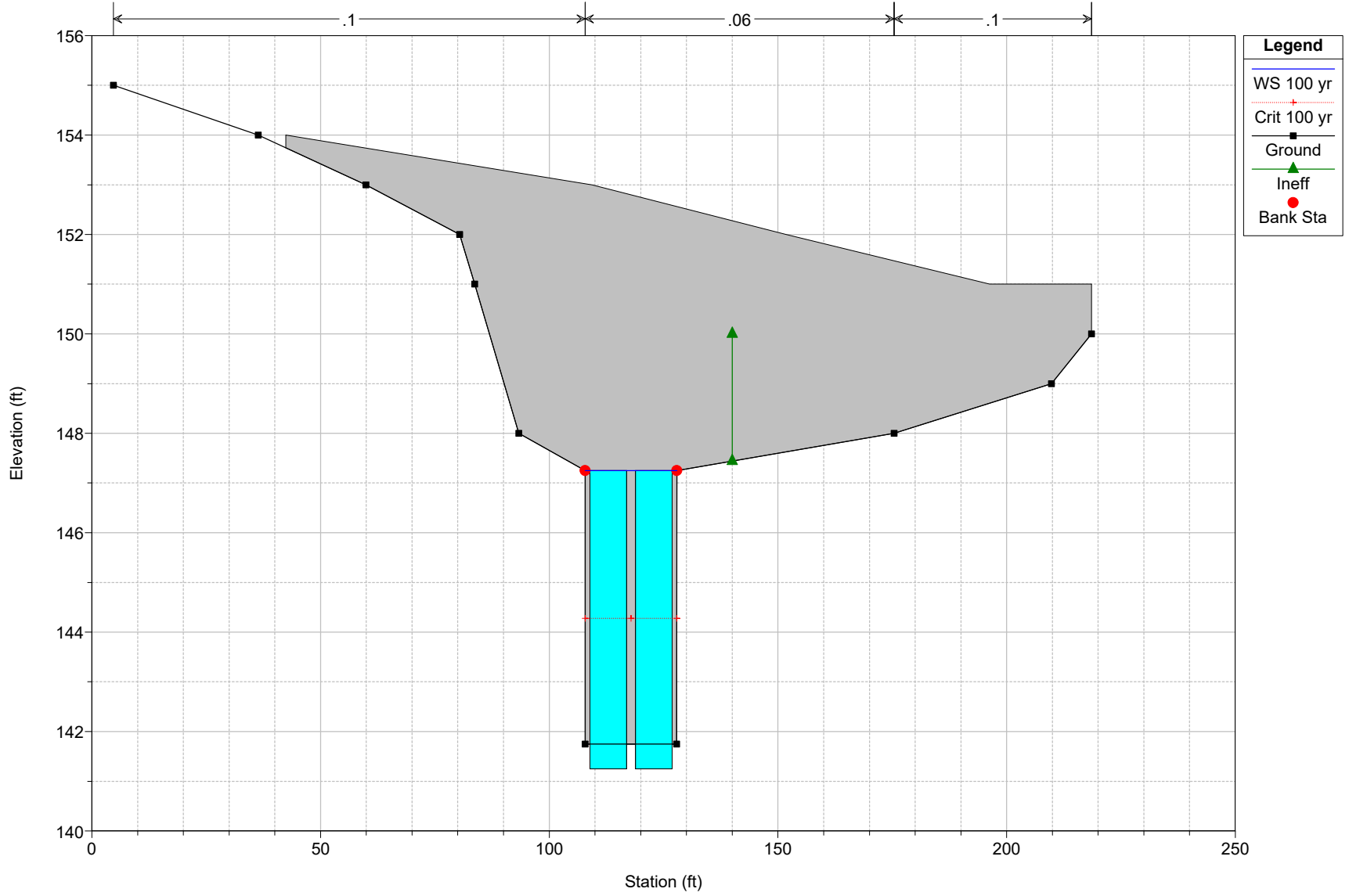
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

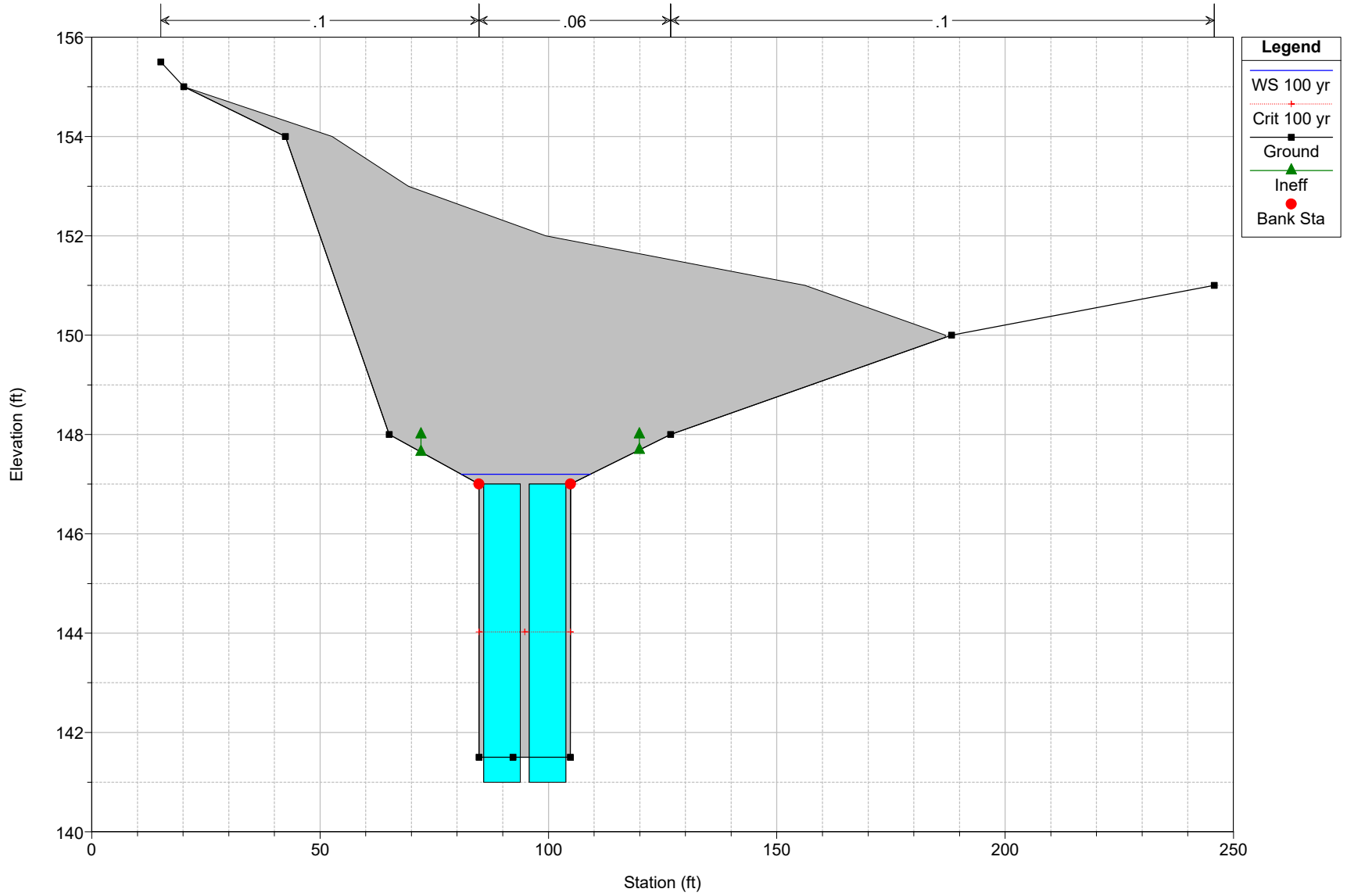
RS = 3909 Culv



Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

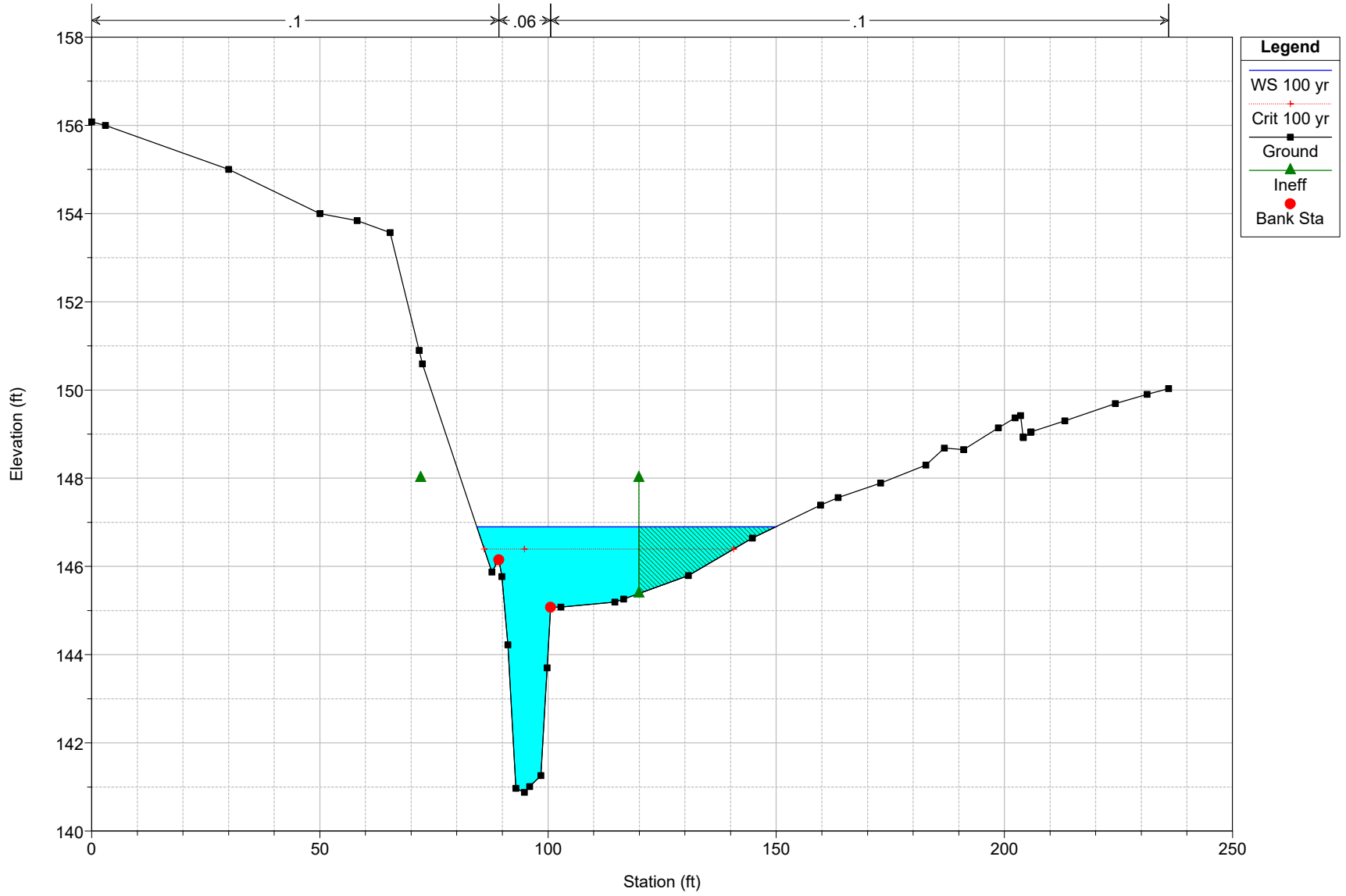
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

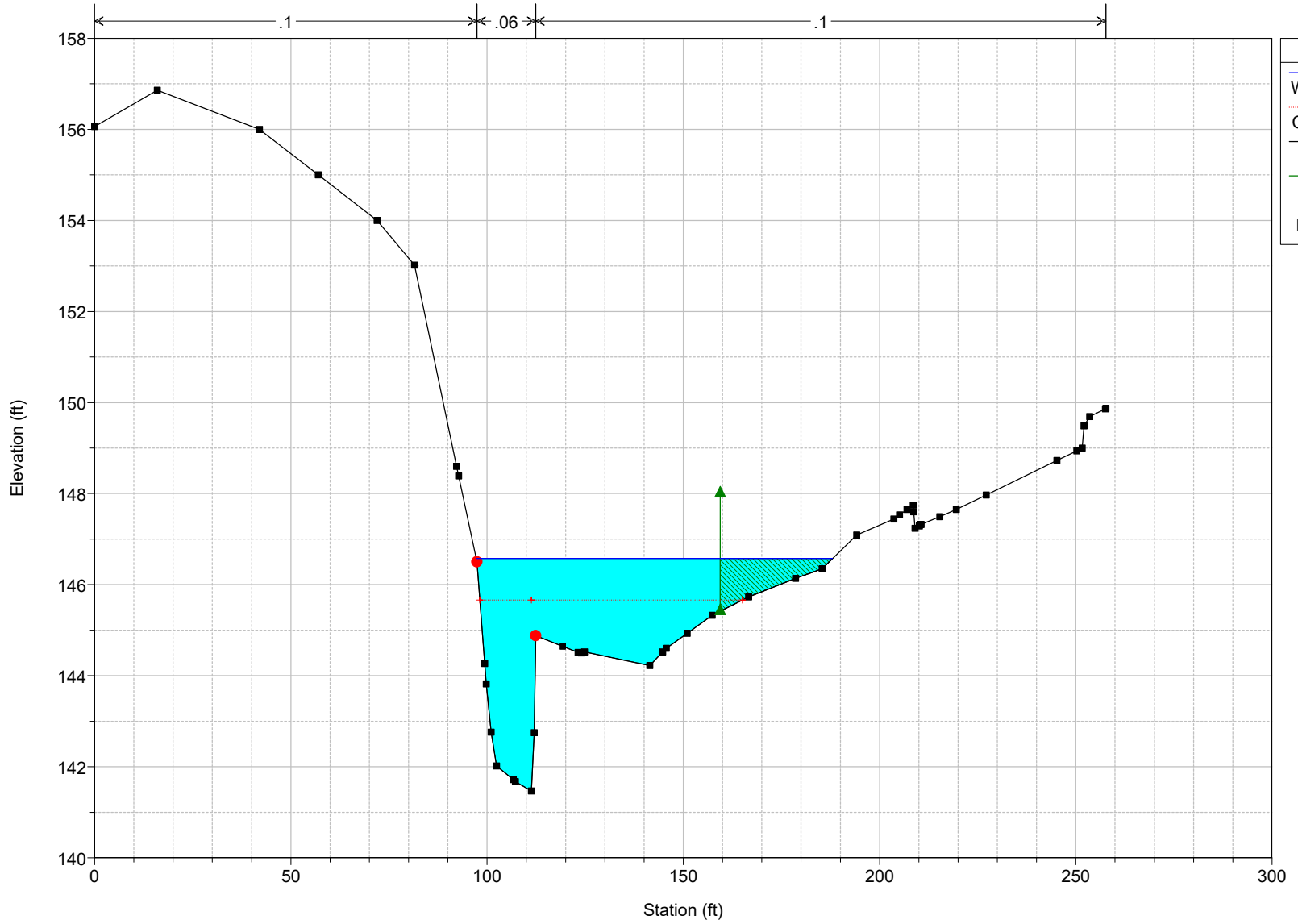
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

RS = 3799.63



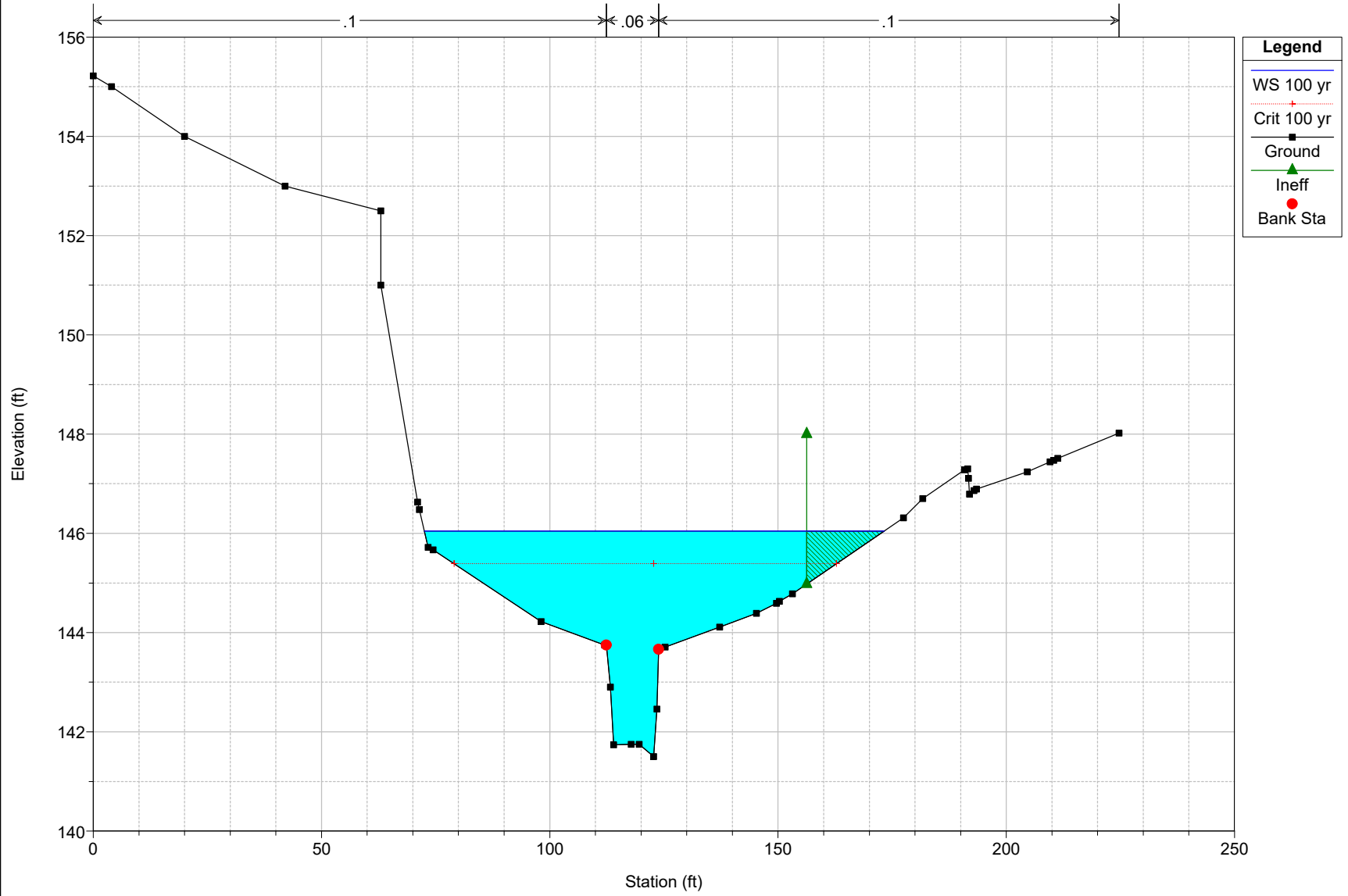
Legend

- WS 100 yr
- Crit 100 yr
- Ground
- Ineff
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

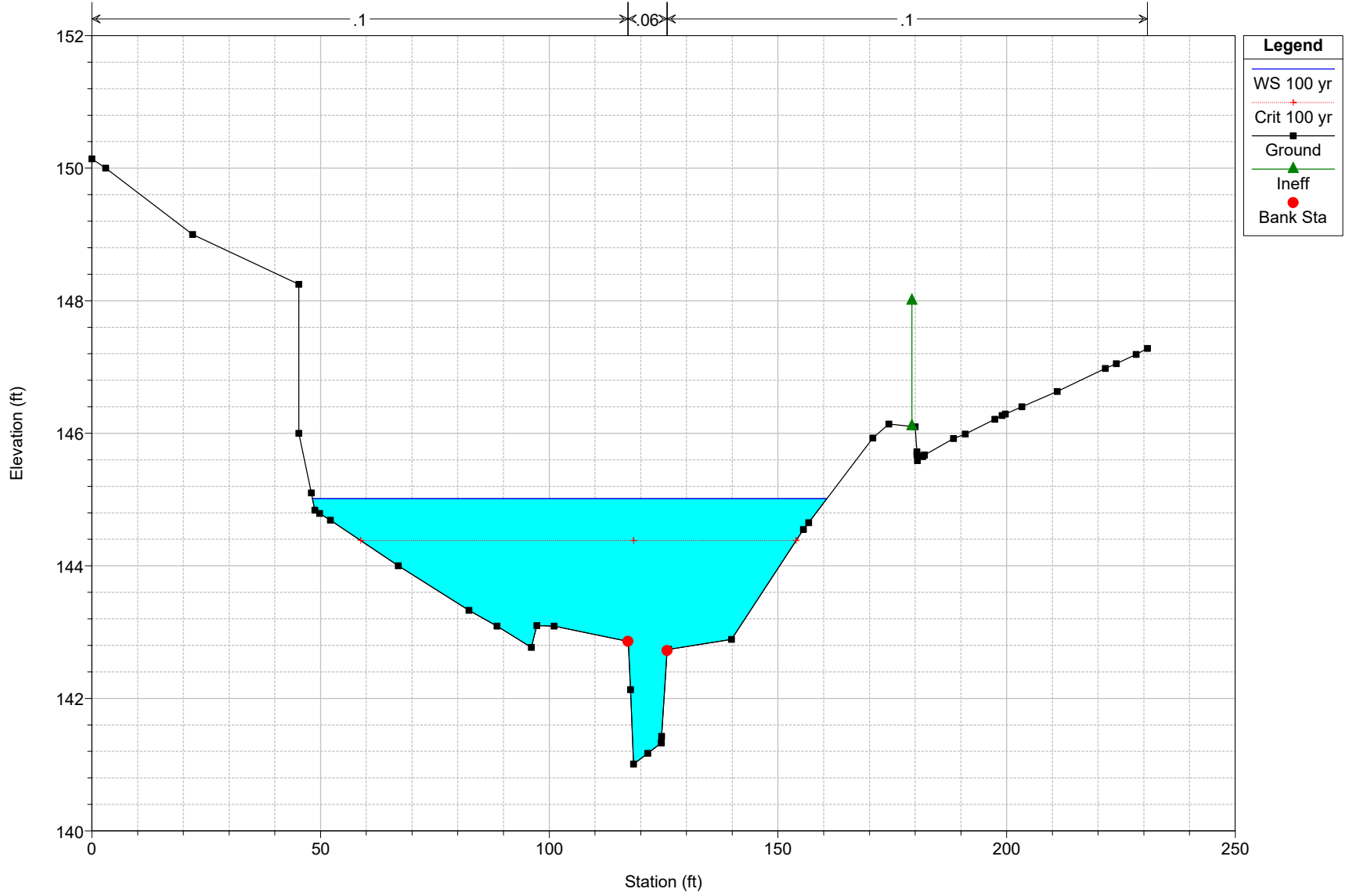
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

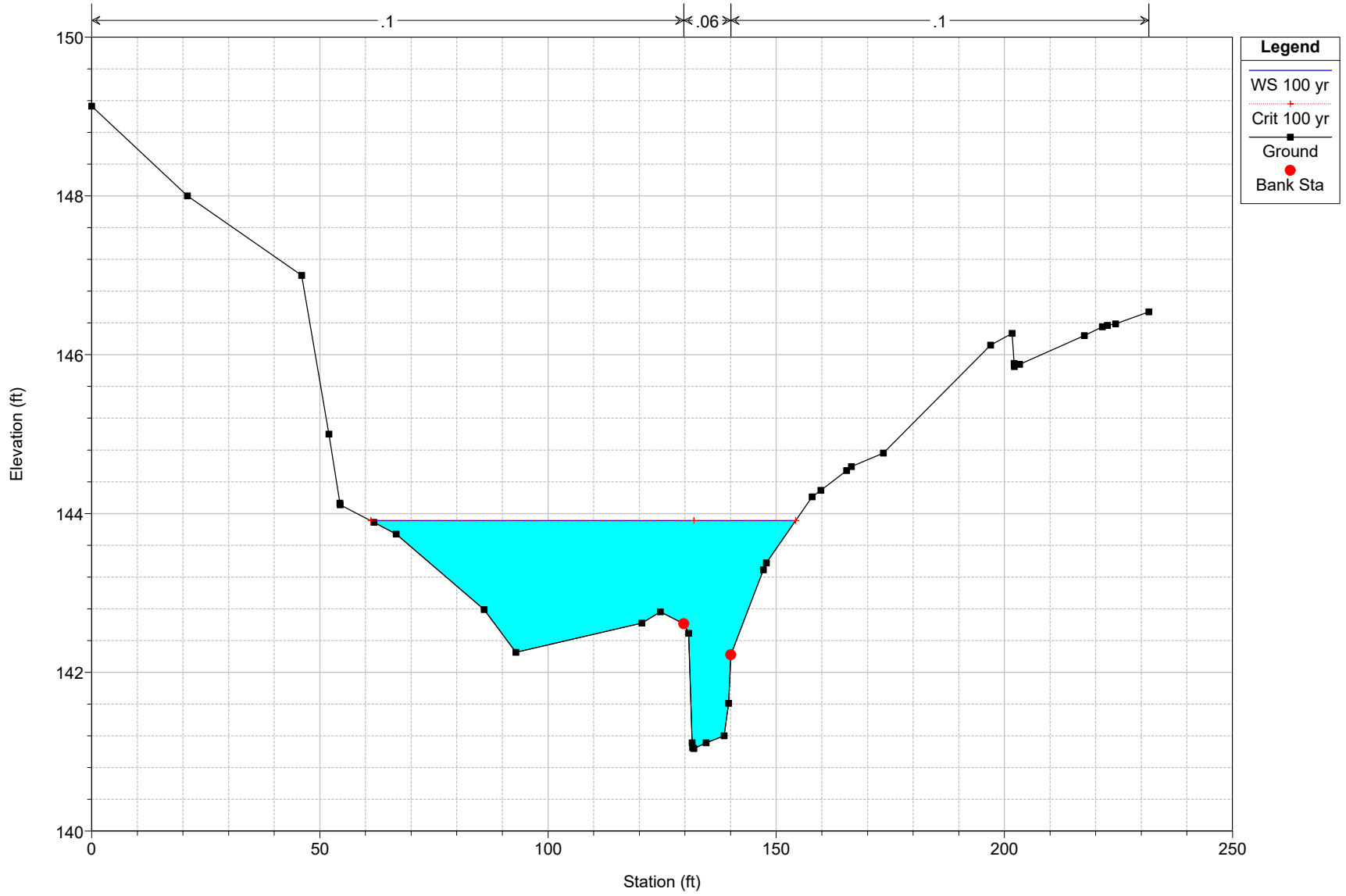
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

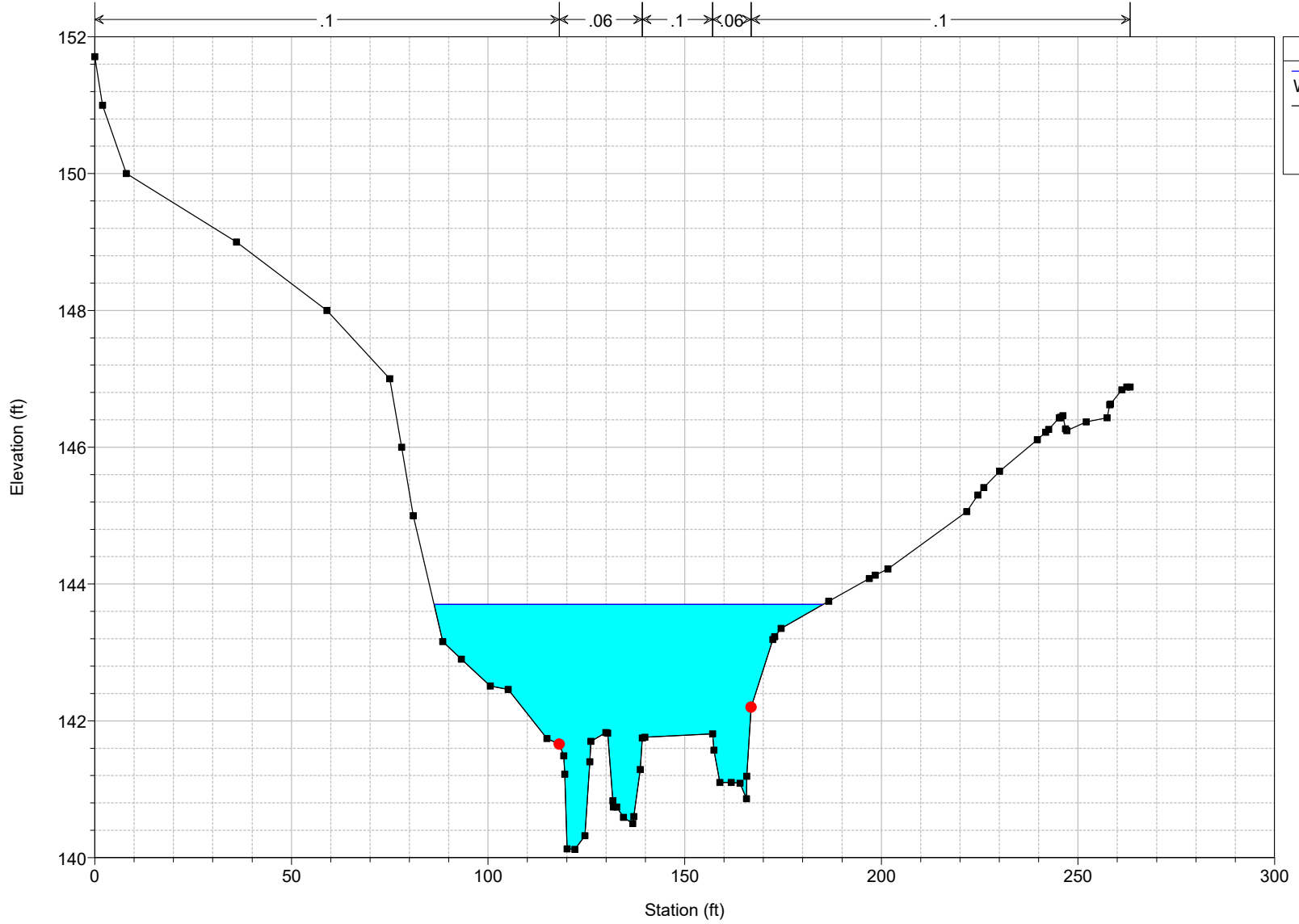
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

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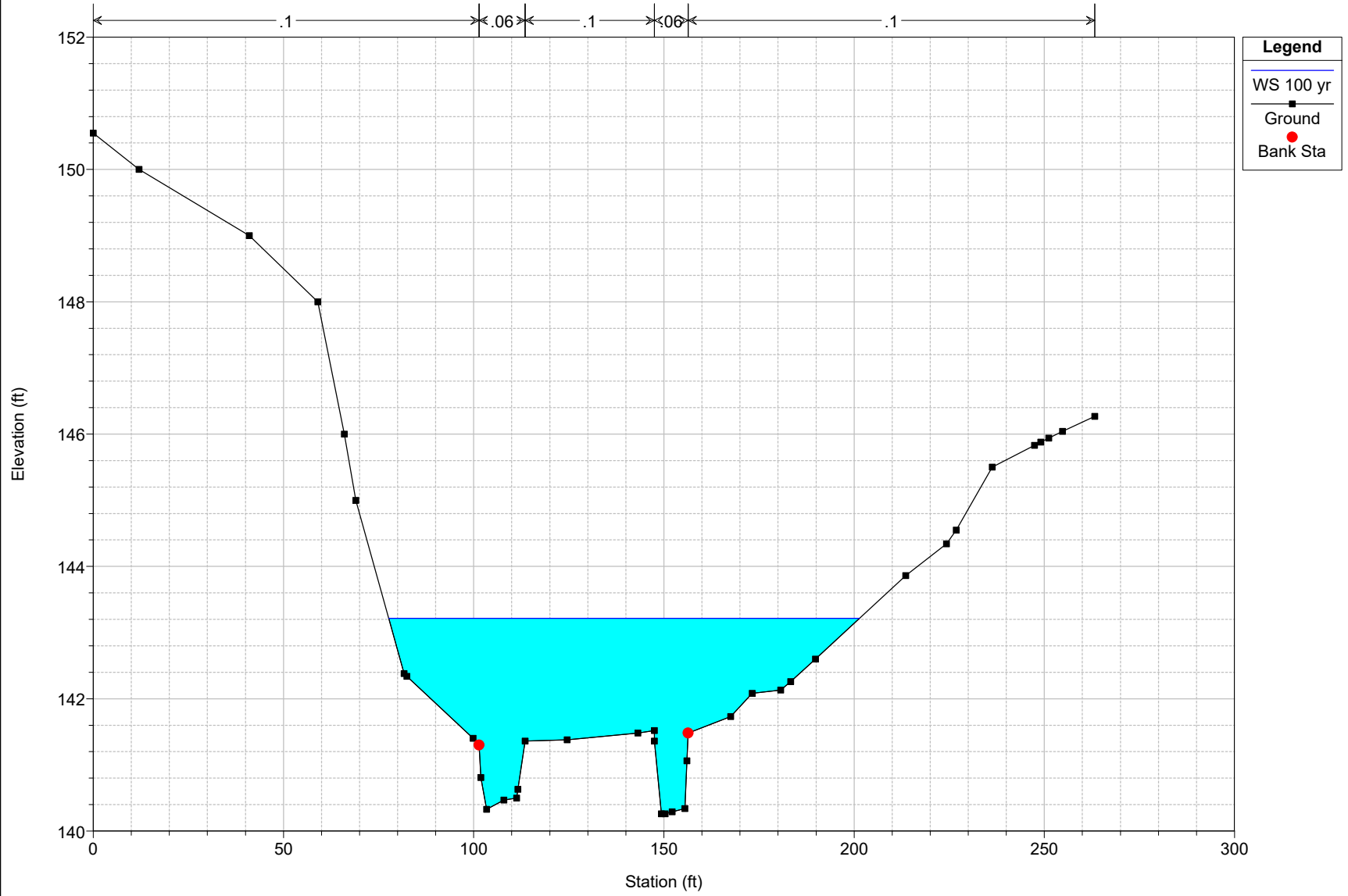
Legend

- WS 100 yr
- Ground
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

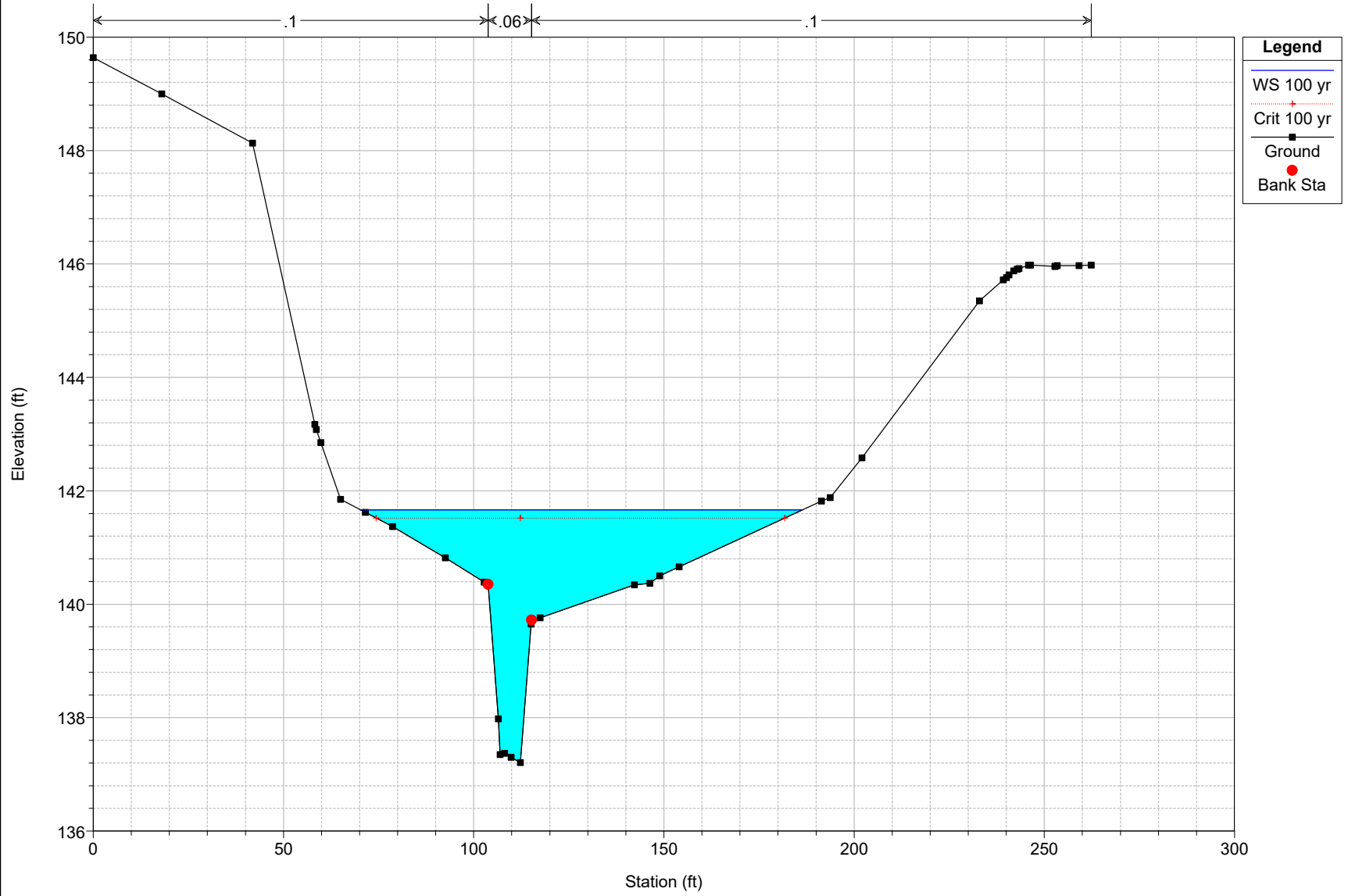
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

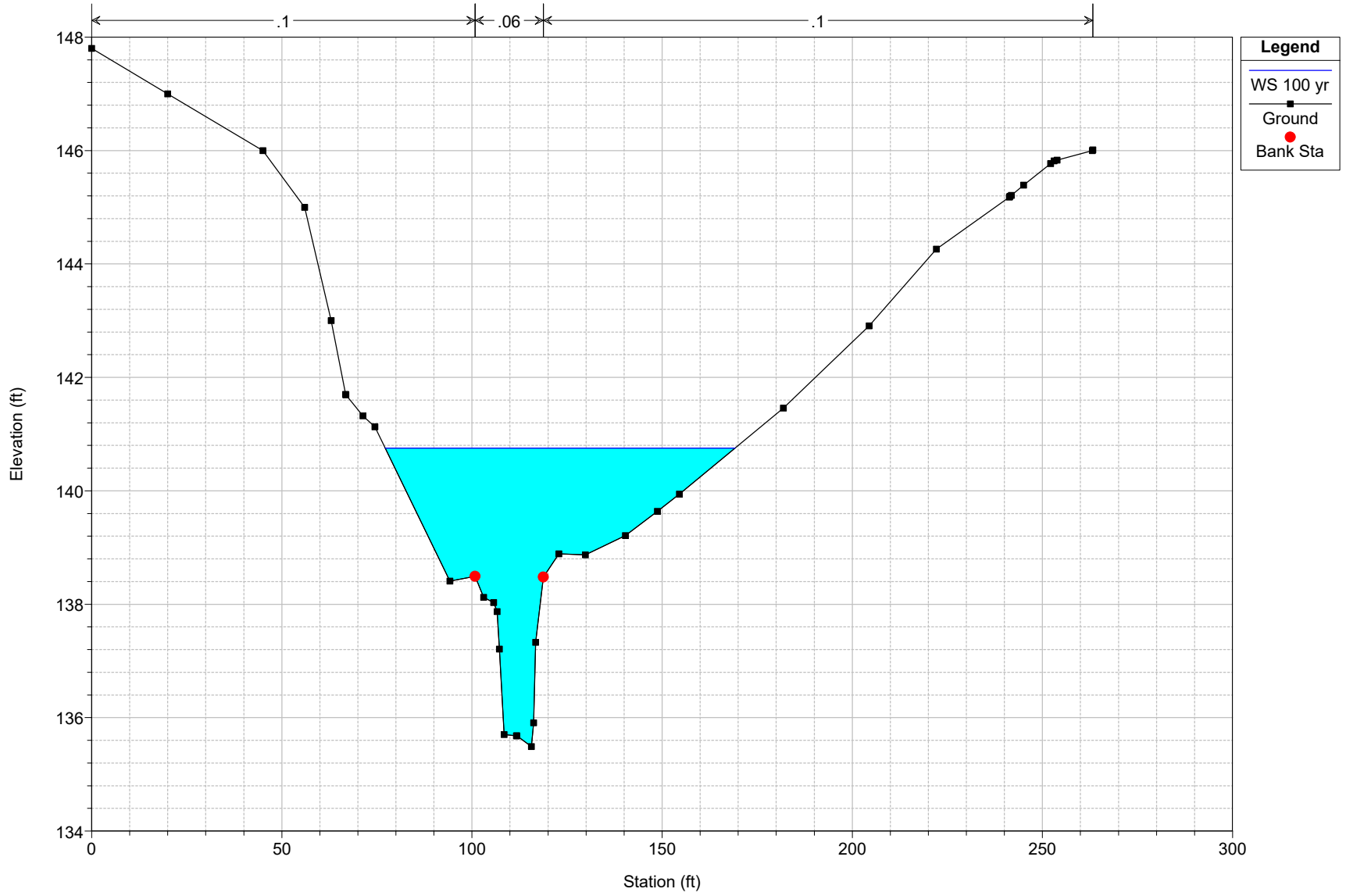
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

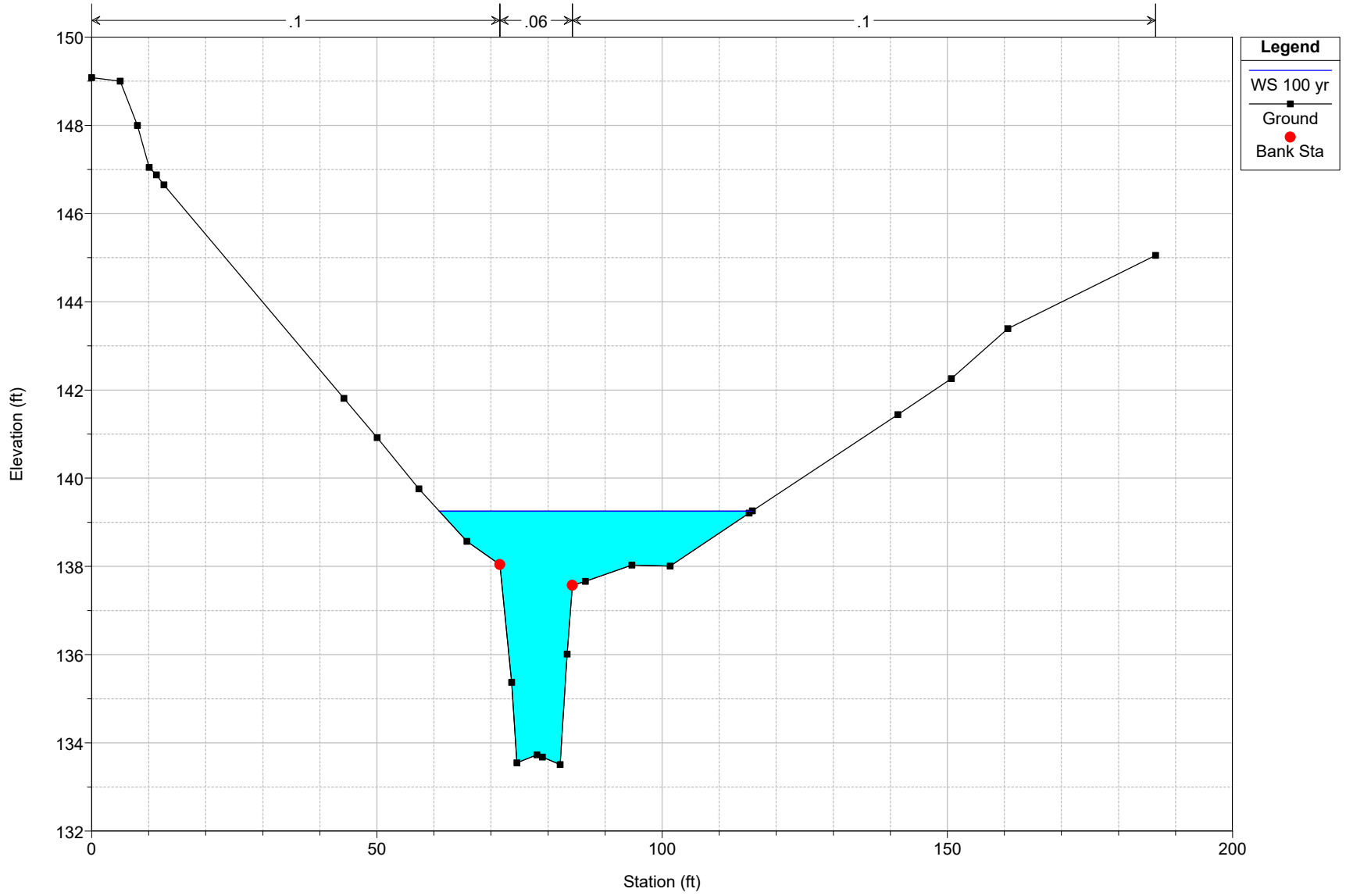
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

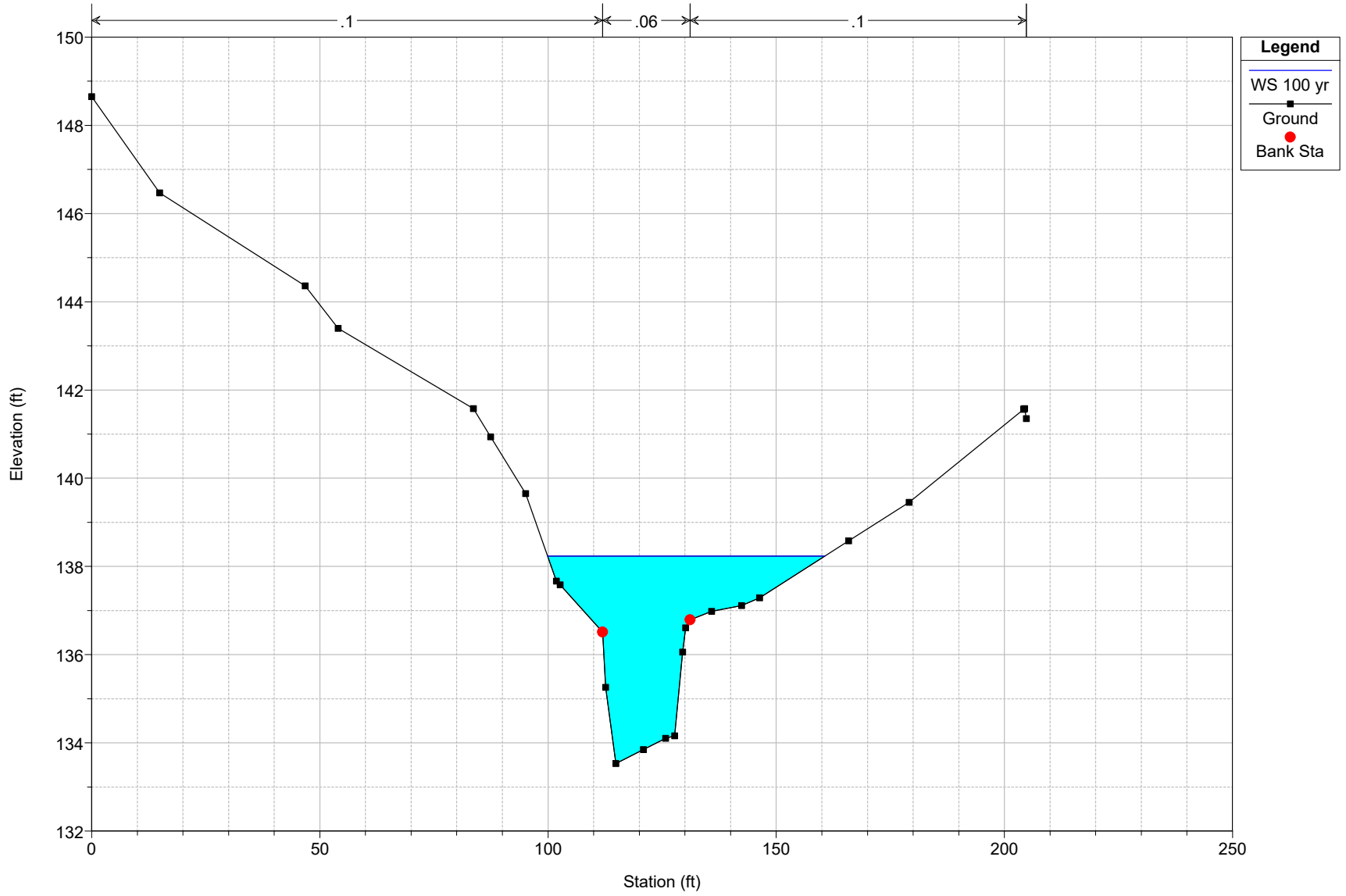
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

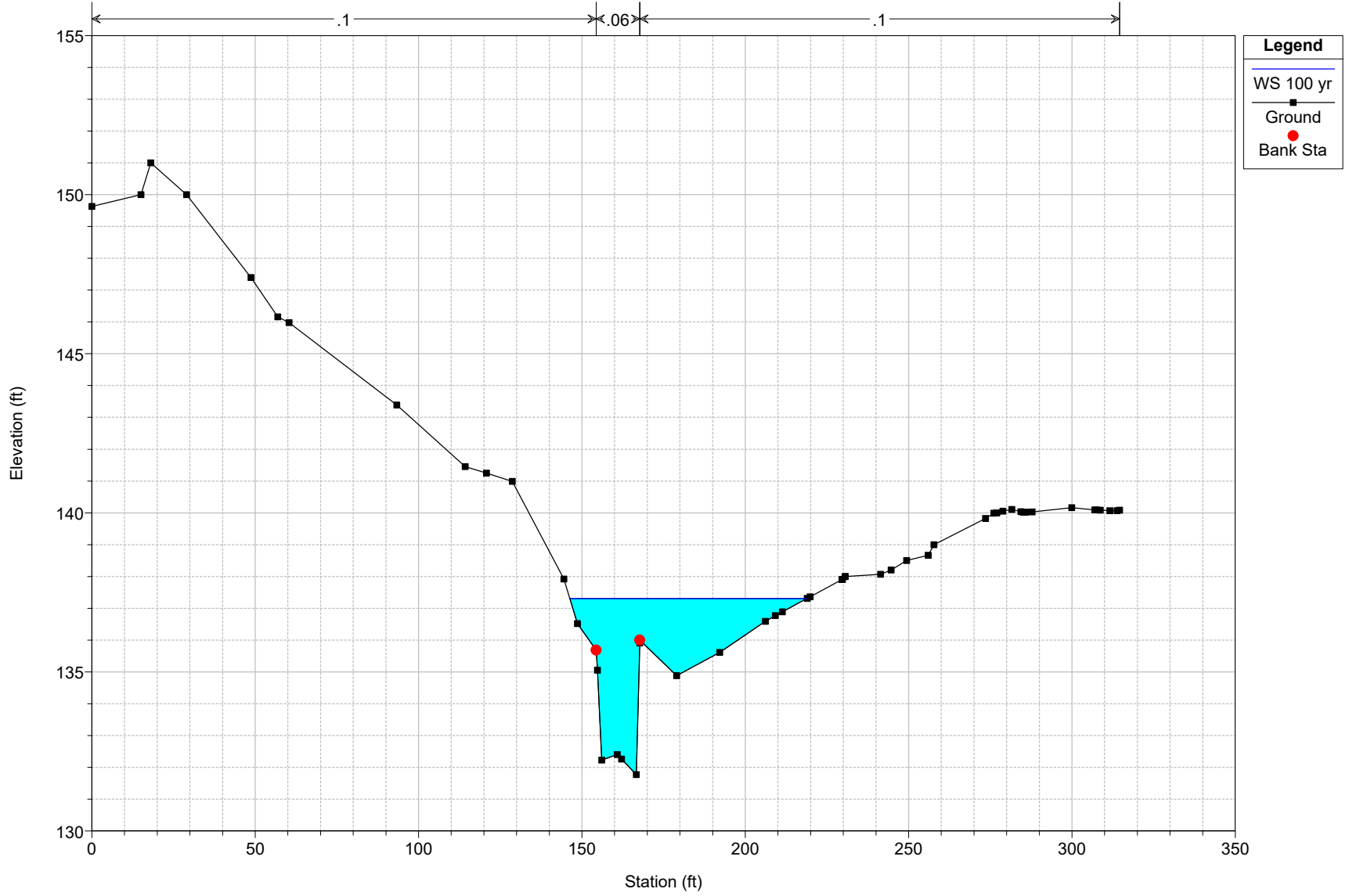
RS = 3102.46



Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

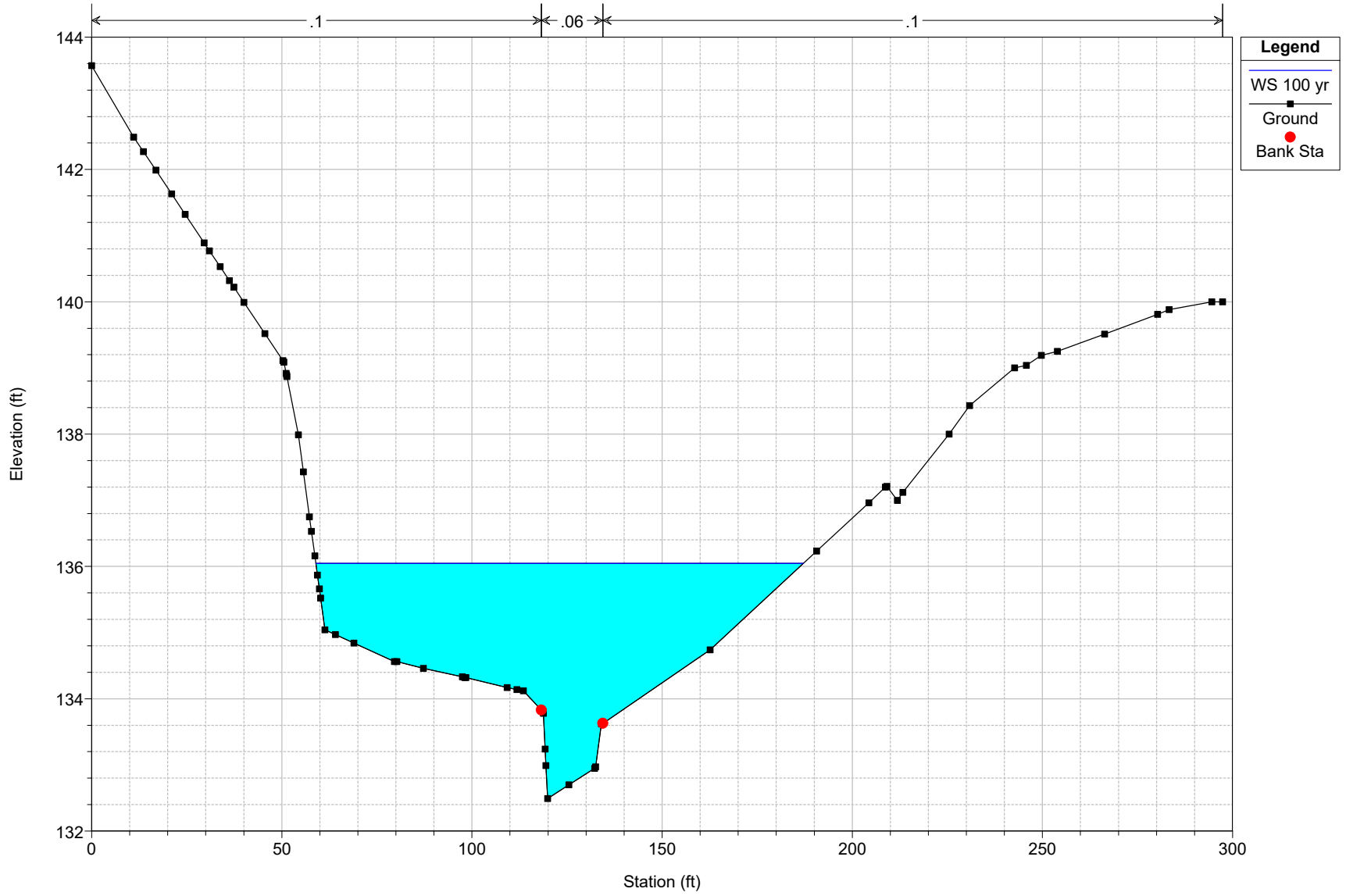
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

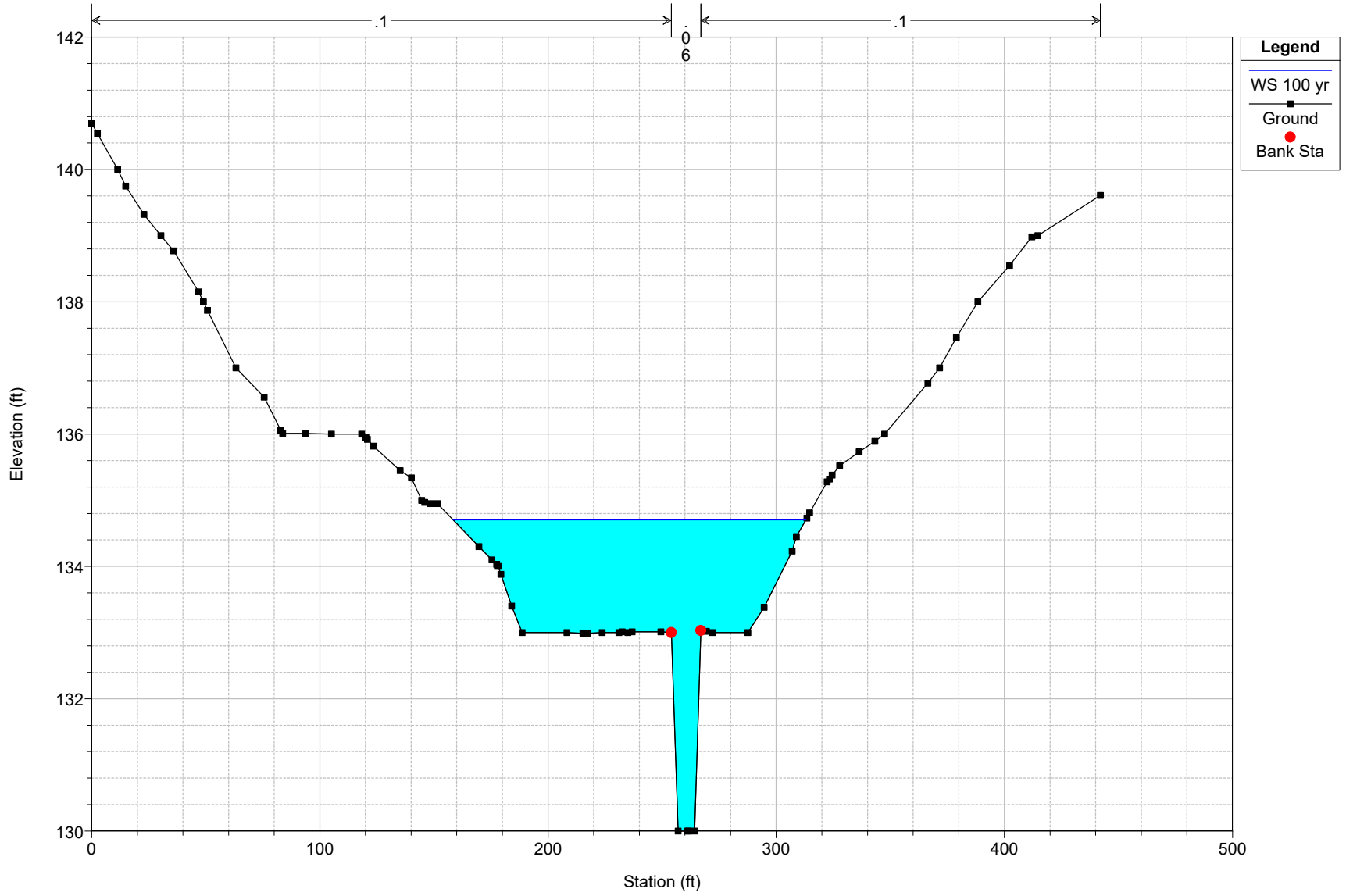
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

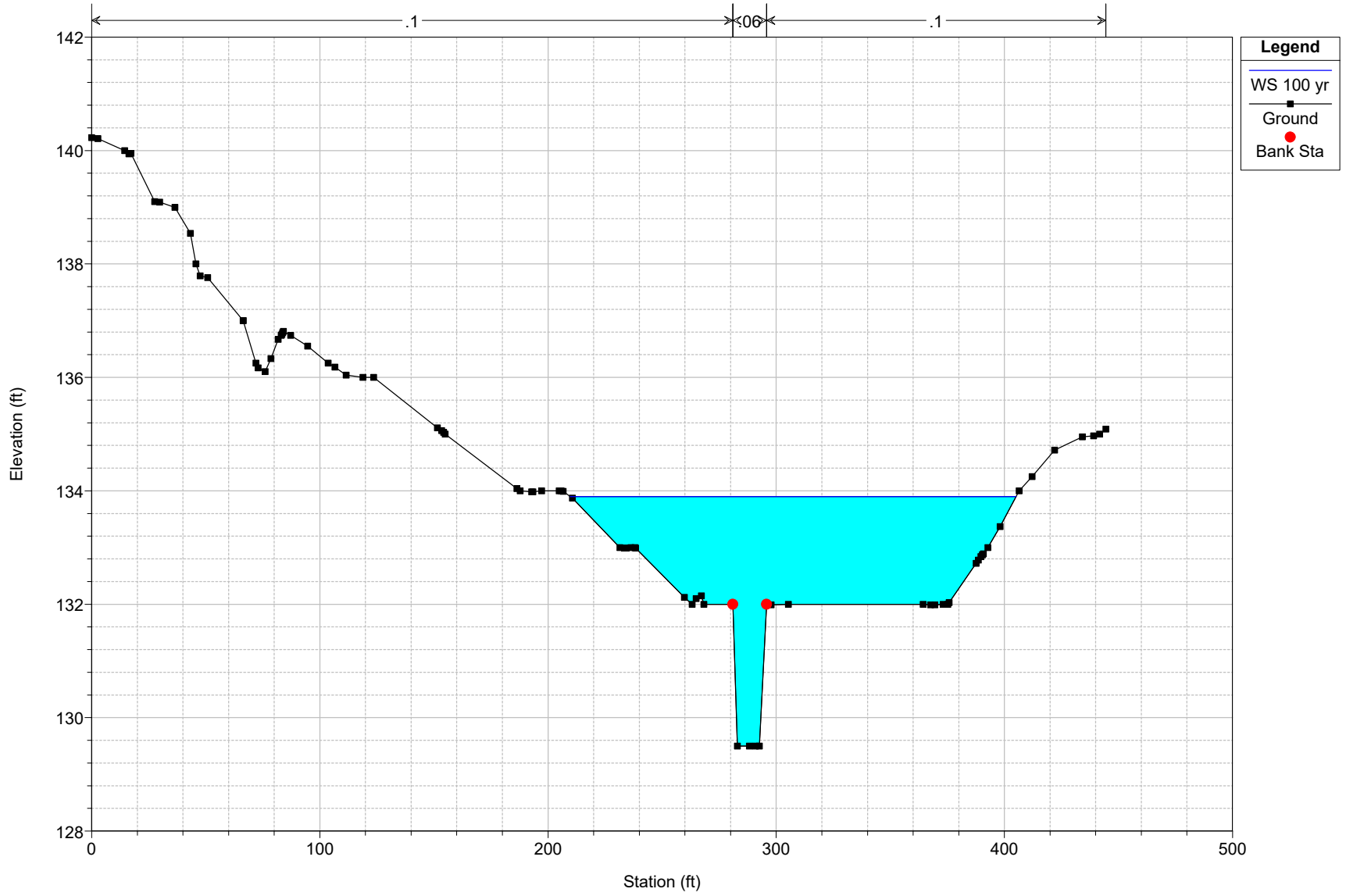
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

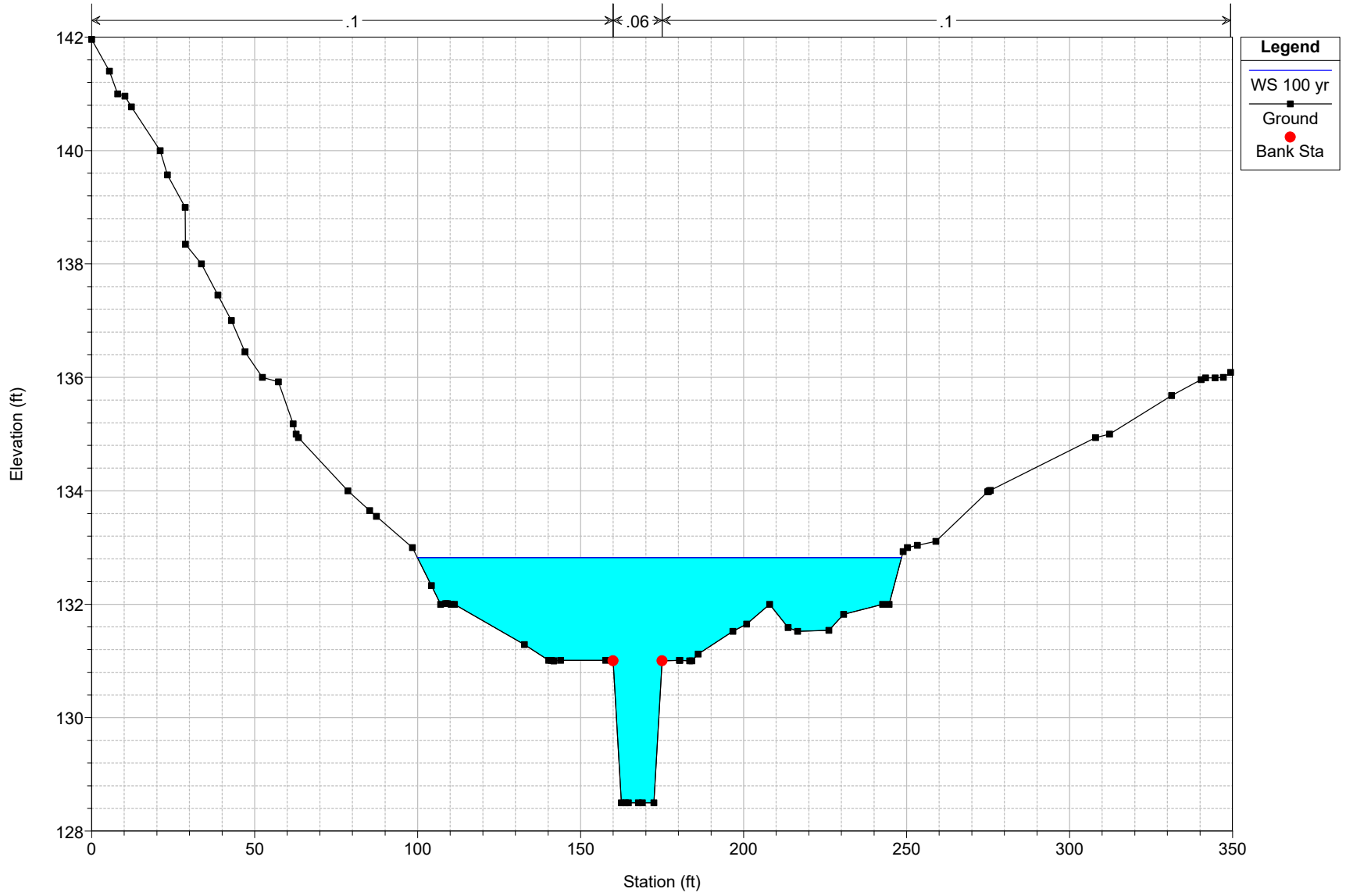
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

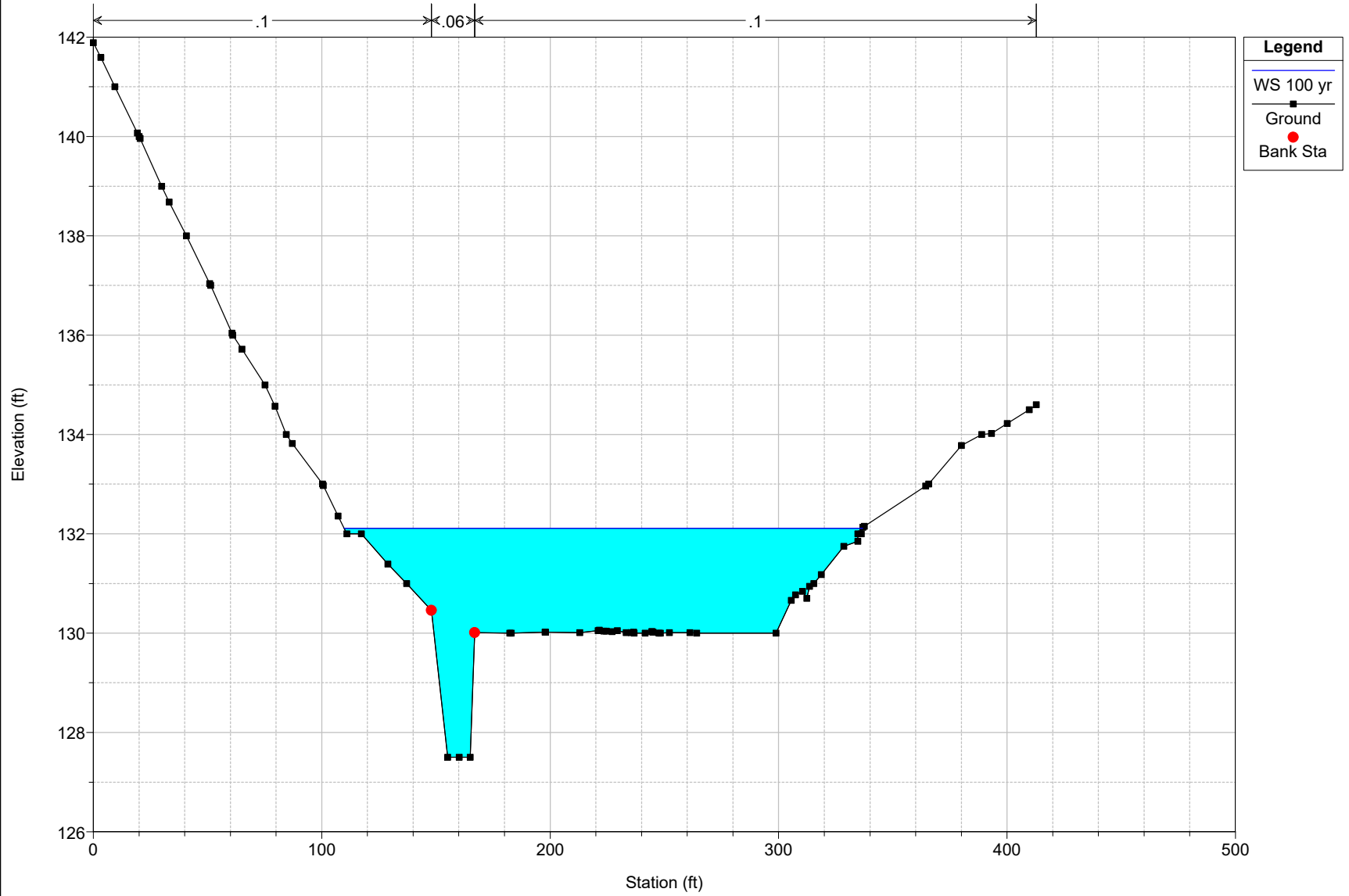
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

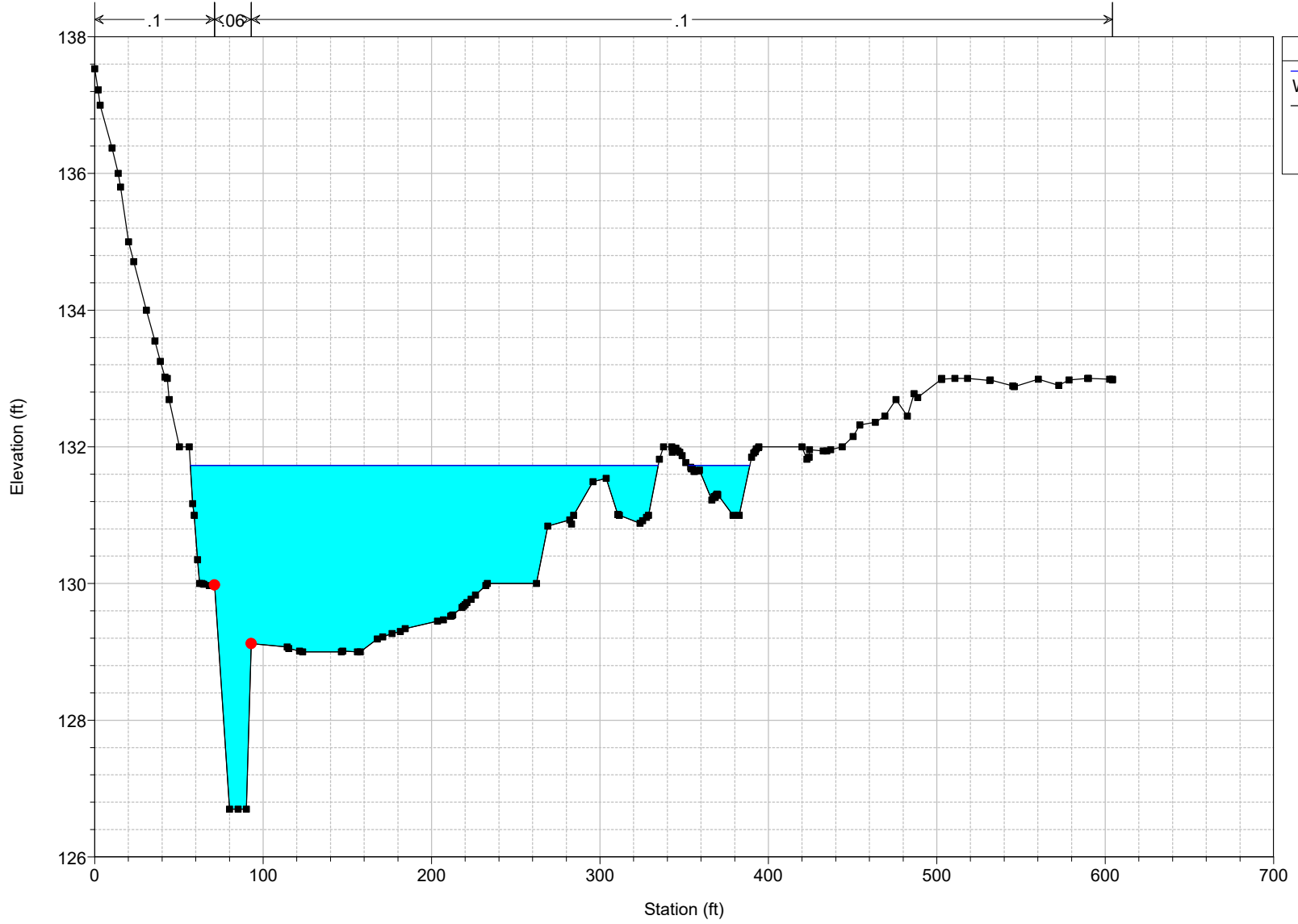
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

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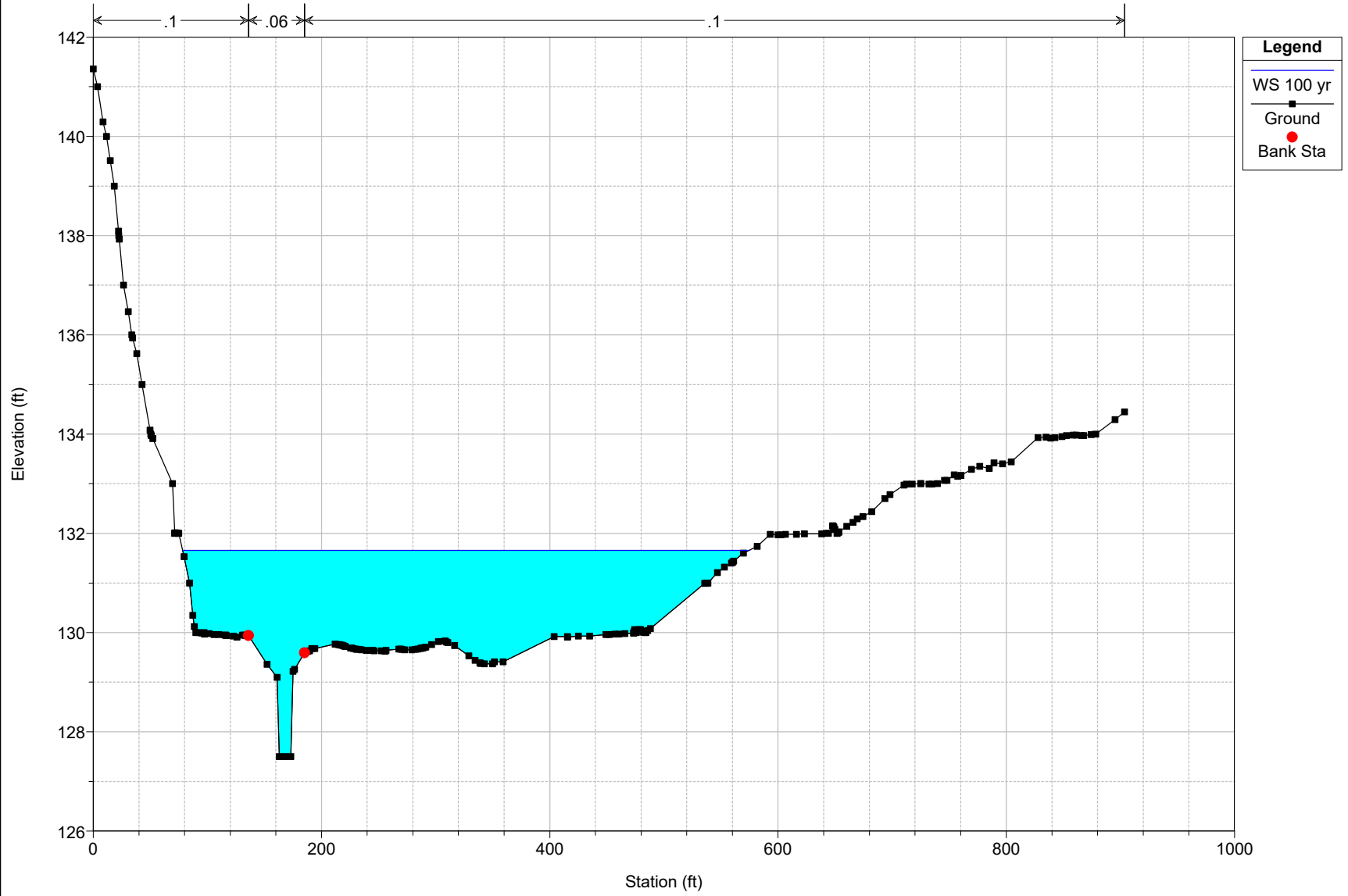
Legend

- WS 100 yr
- Ground
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

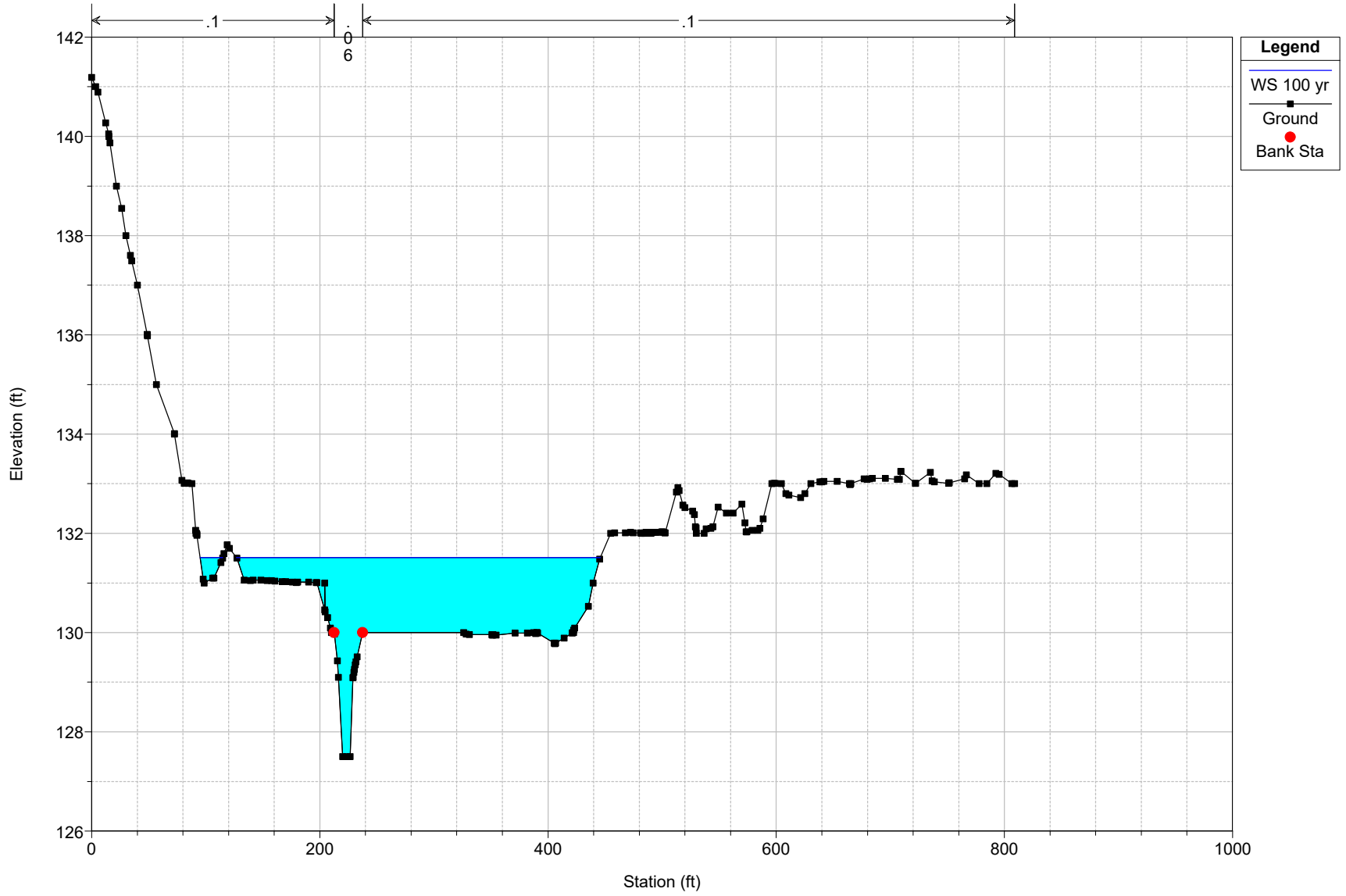
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

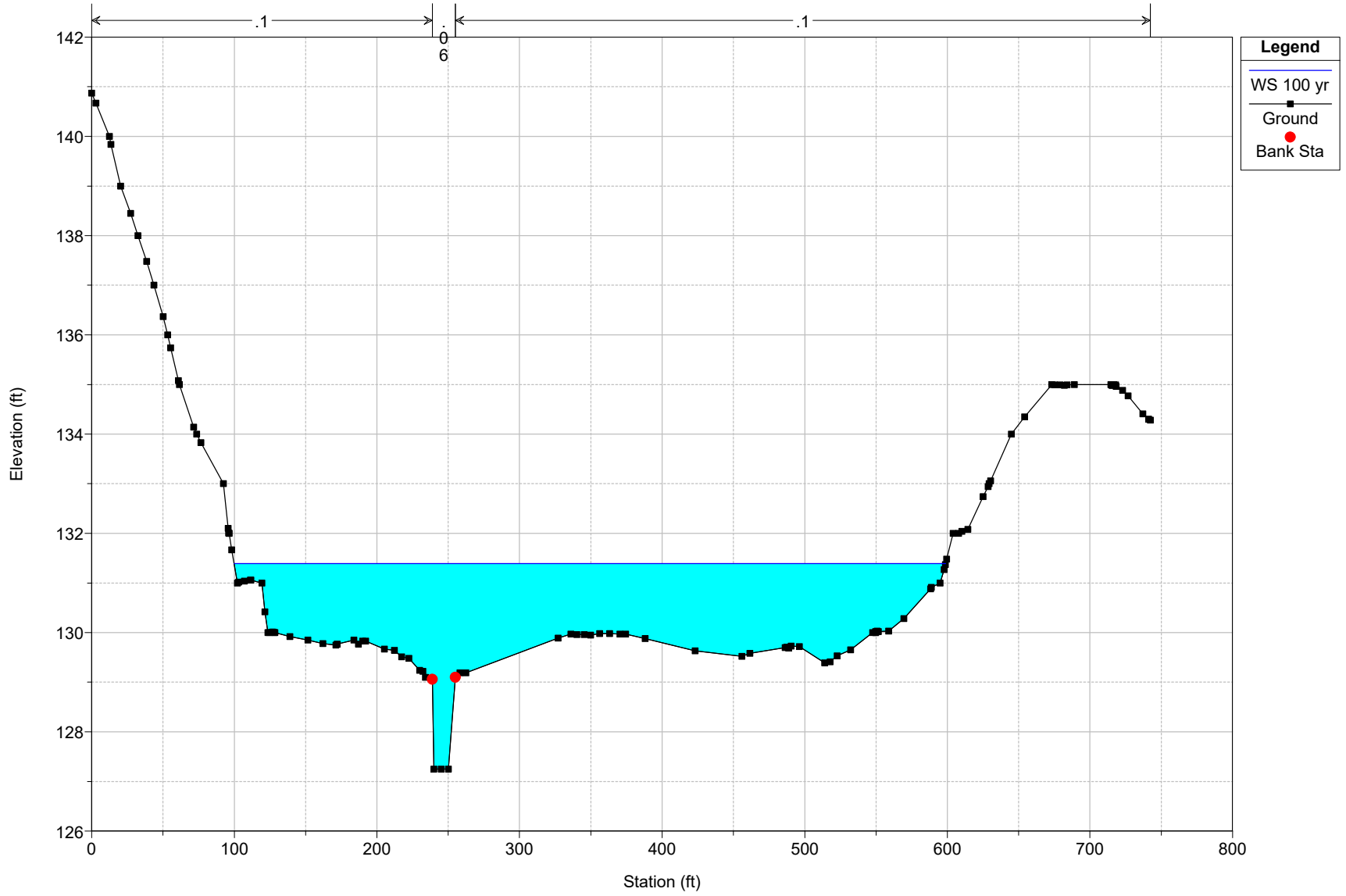
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

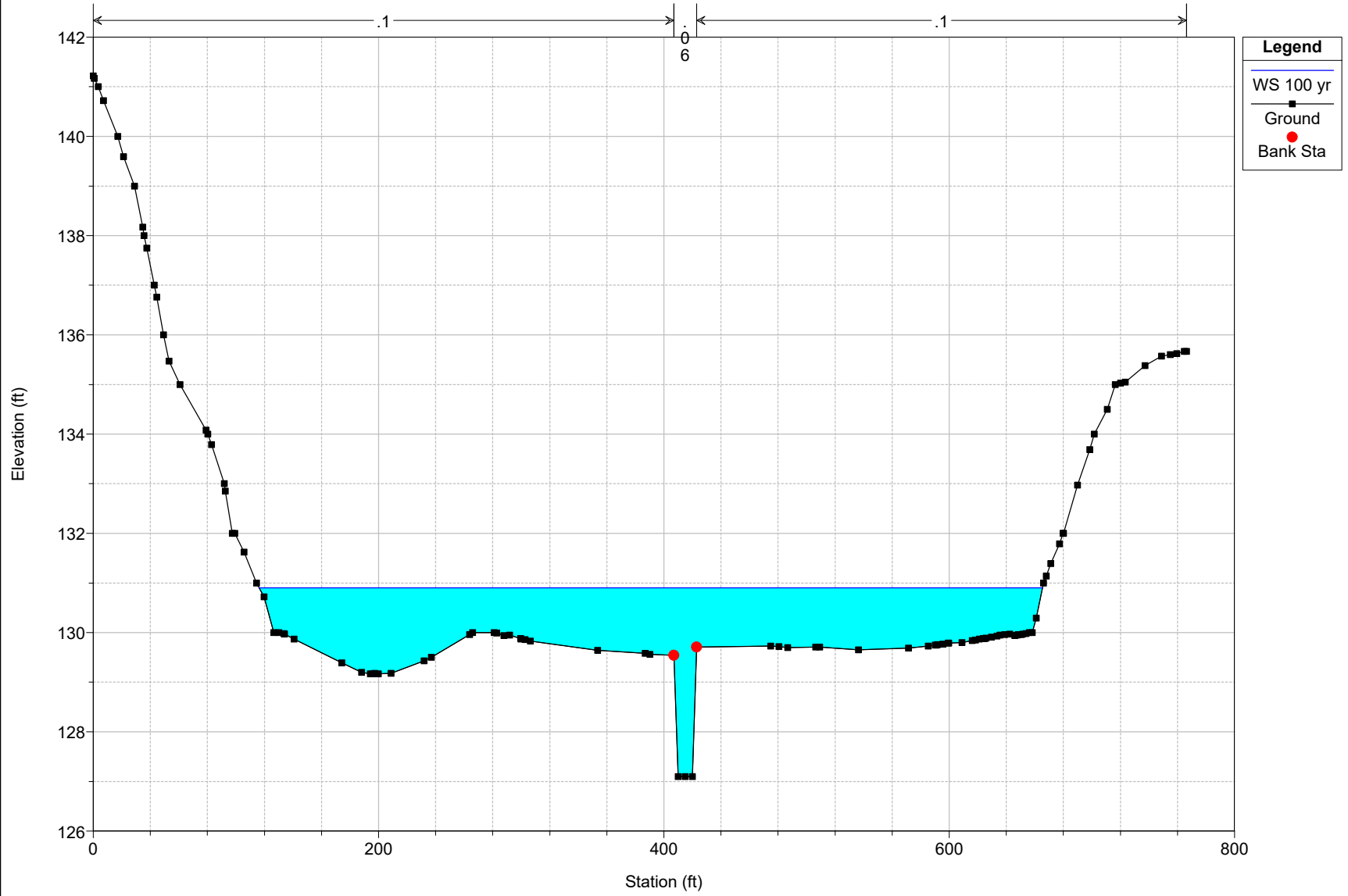
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

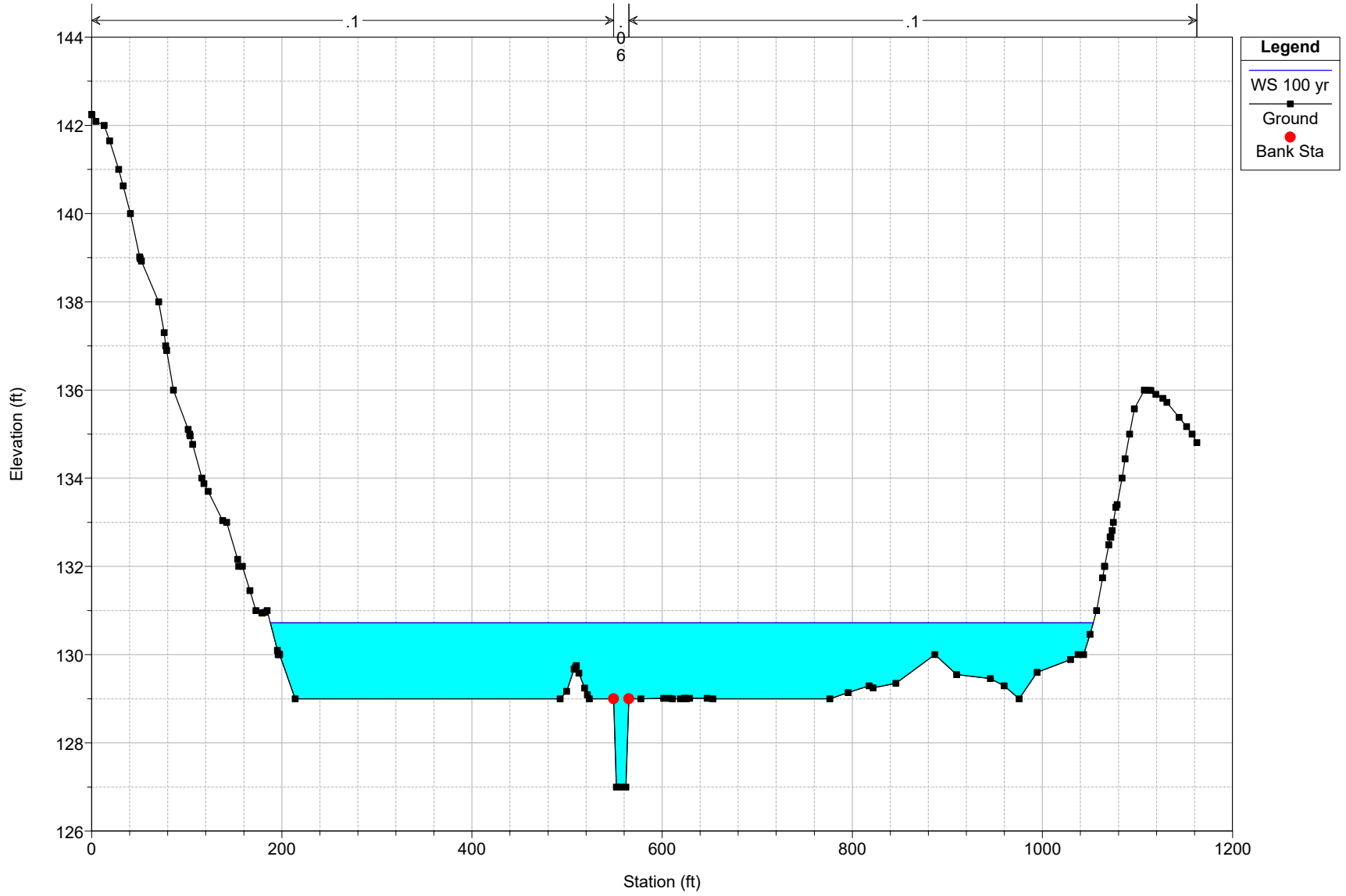
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

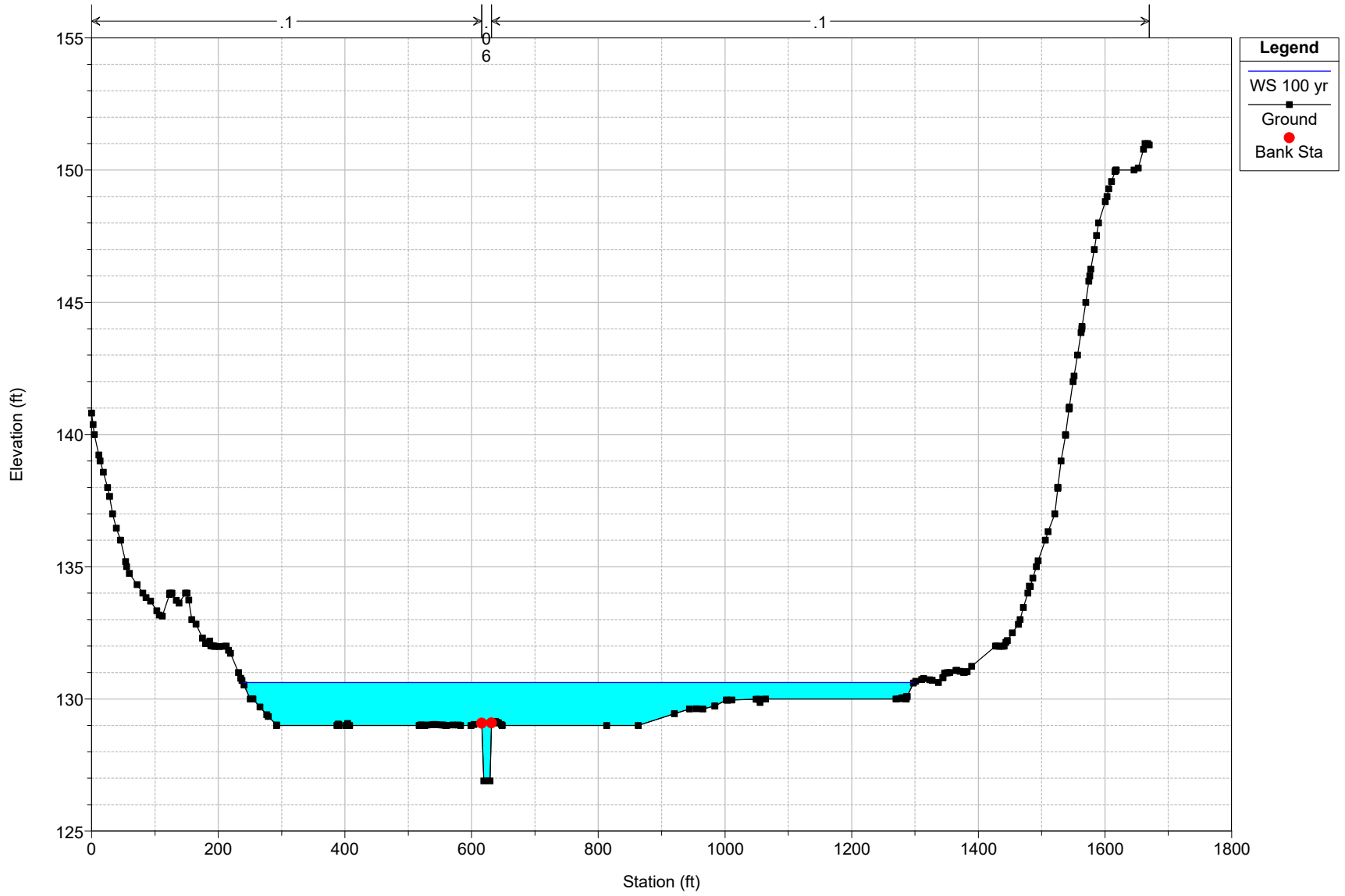
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

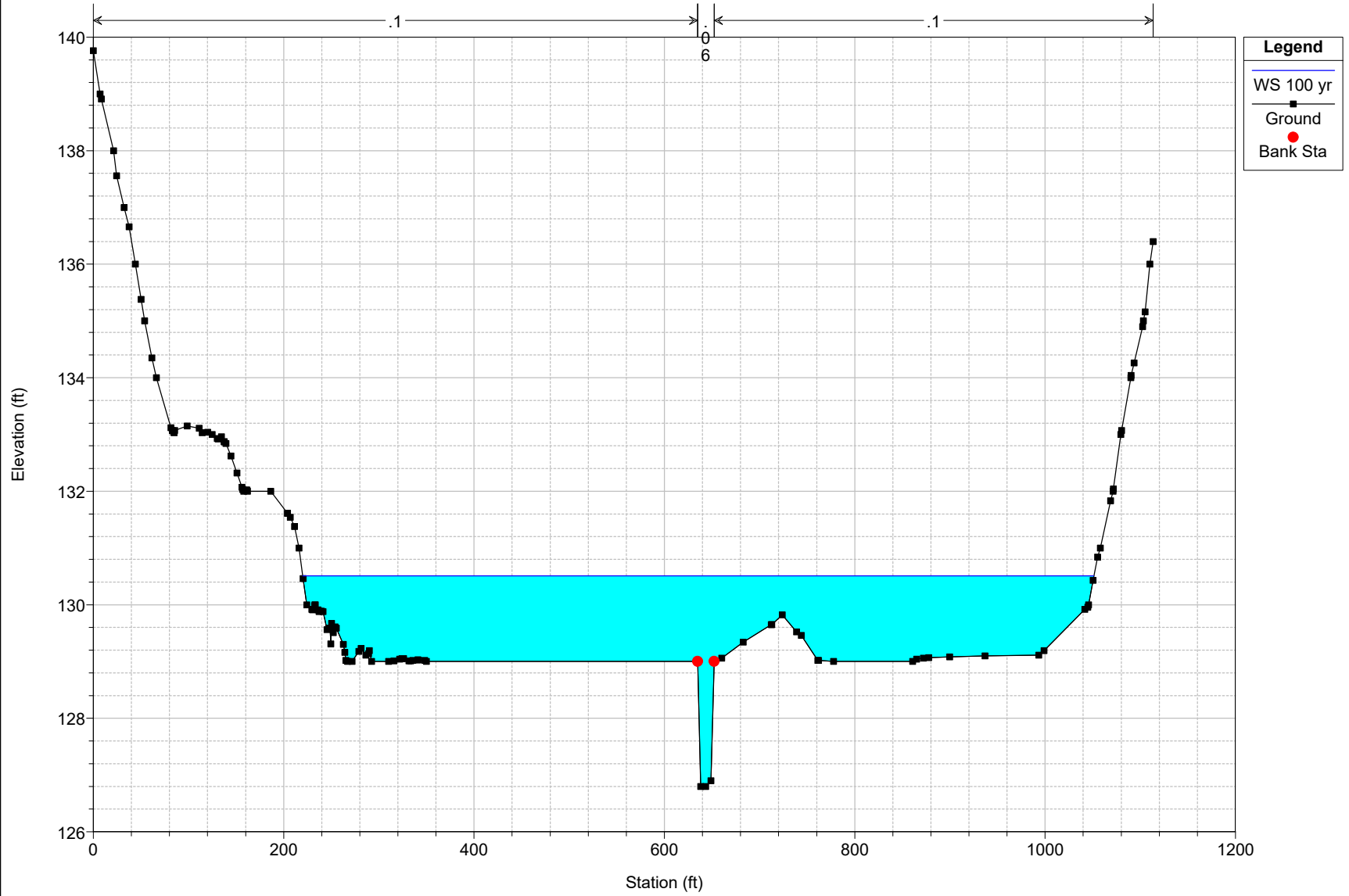
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

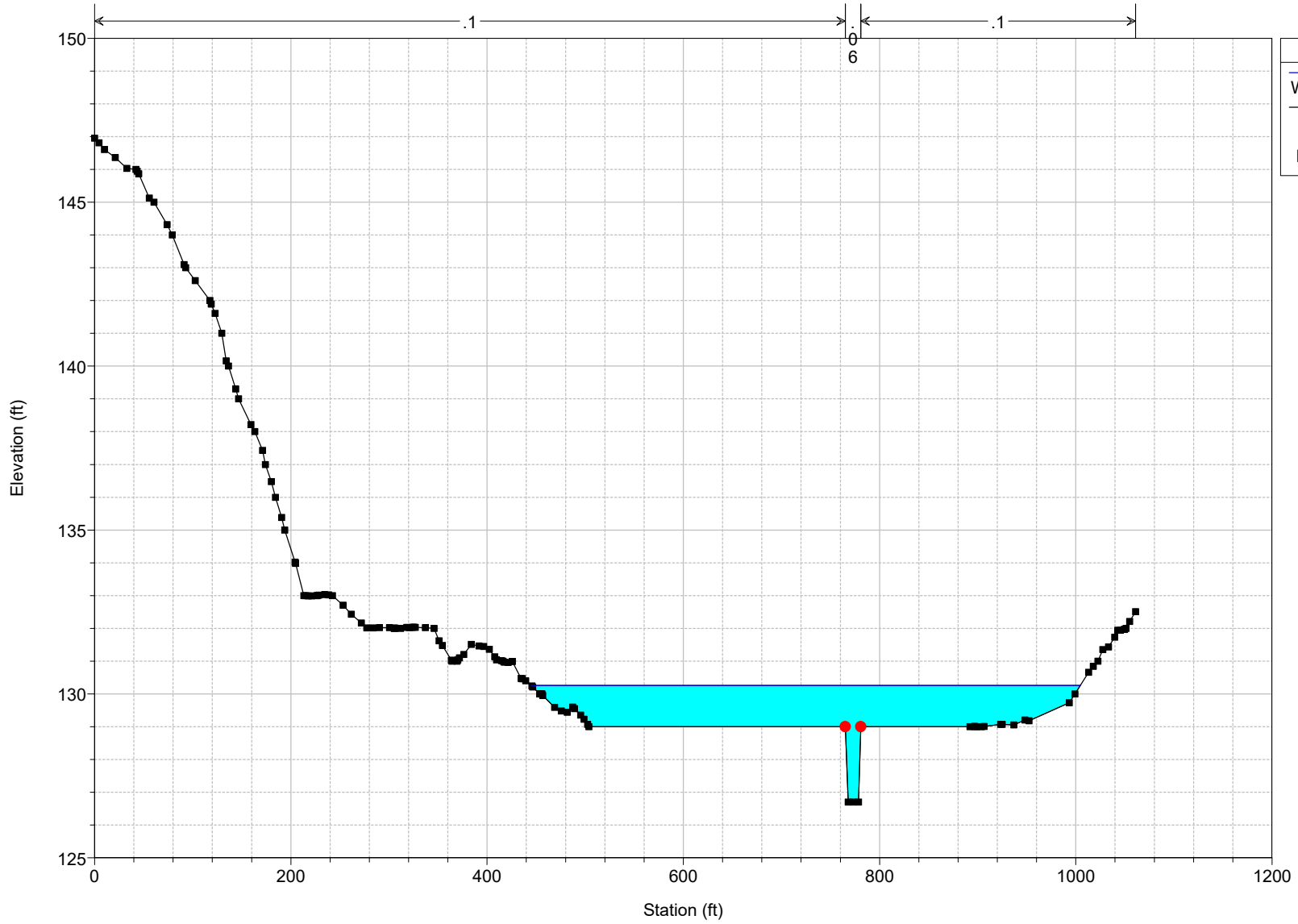
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

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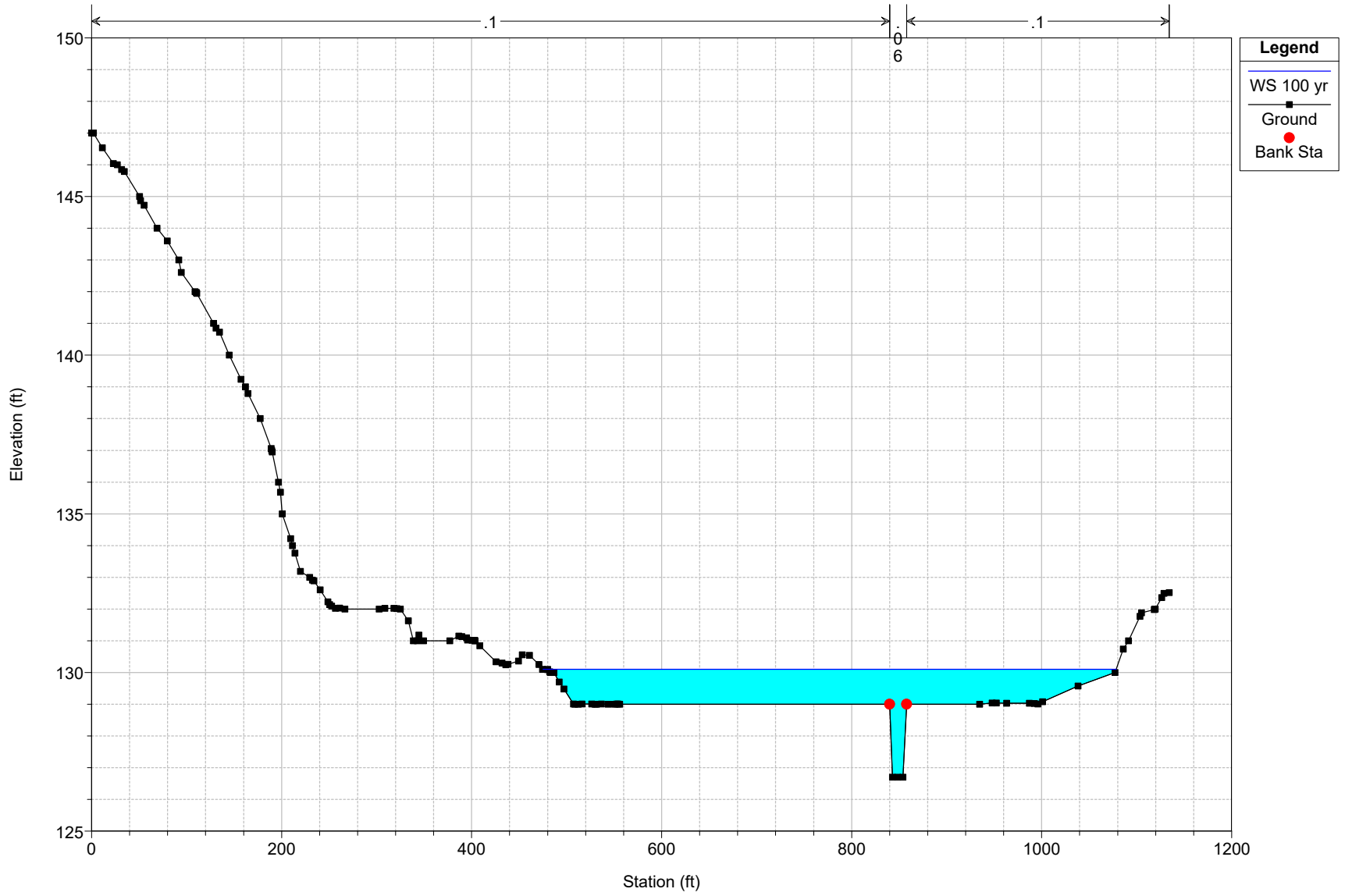
Legend

- WS 100 yr
- Ground
- Bank Sta

Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

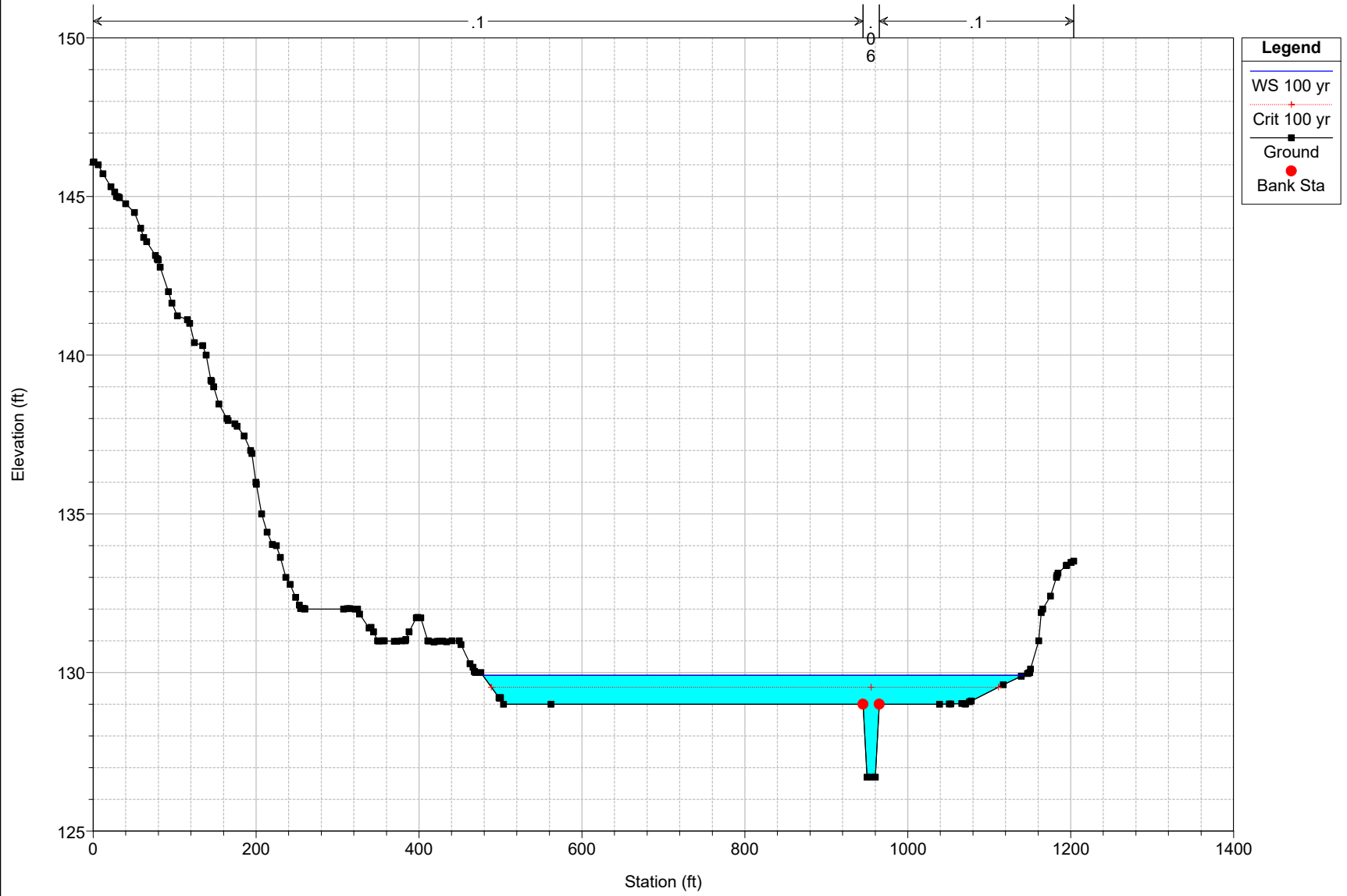
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Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

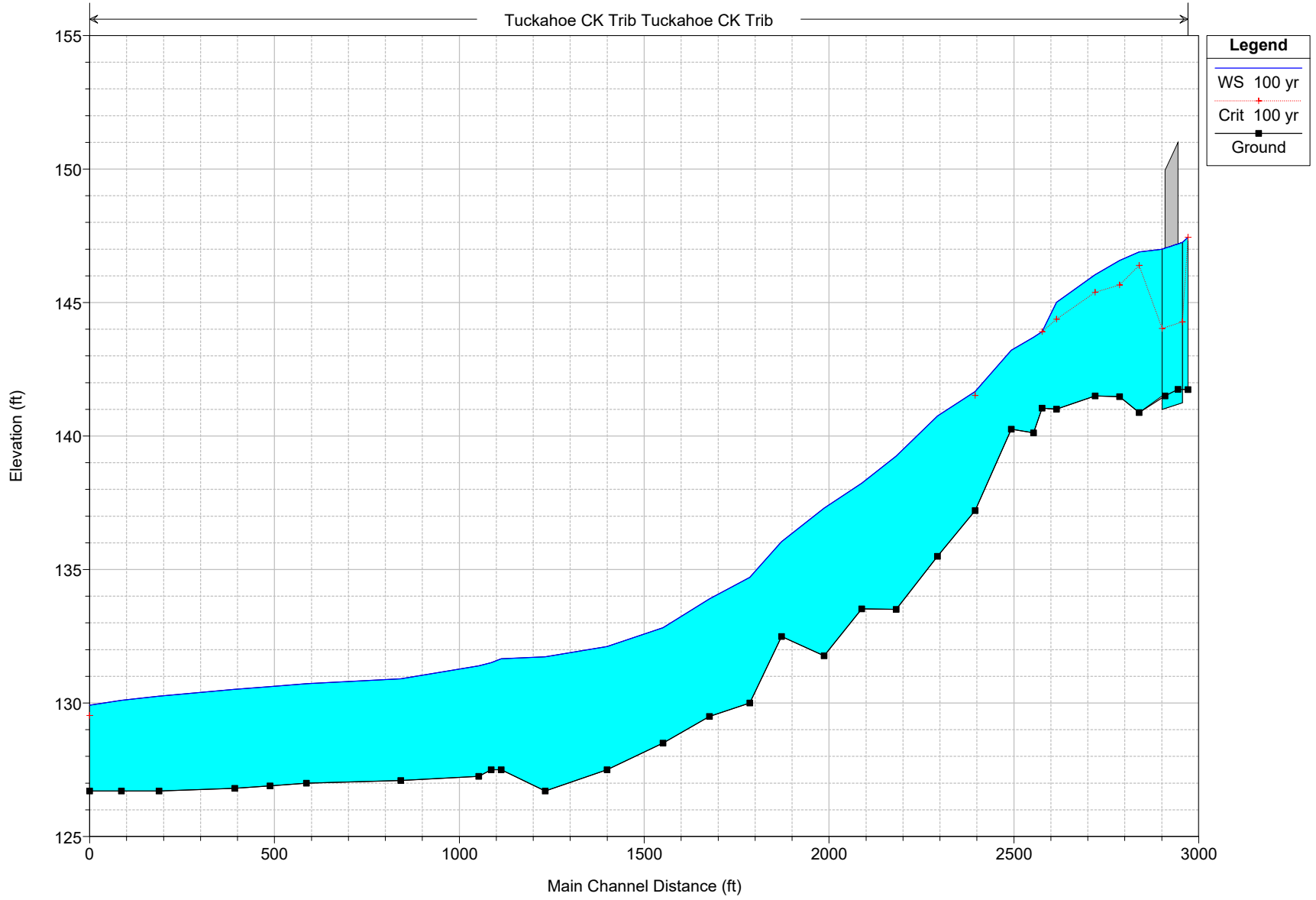
Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3

RS = 1013.78



Tuckahoe CK Trib 3 Plan: Tributary 3 Pr Cond 12/18/2020

Geom: Tributary 3 Pr Cond Flow: Tuckahoe CK Trib 3



HEC-RAS River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib Profile: 100 yr

Reach	River Sta	Profile	Plan	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
Tuckahoe CK Trib	3952.9	100 yr	Trib 3 Ex Cond	478.00	141.74	148.20	147.45	148.89	0.016608	7.26	85.52	76.28	0.57
Tuckahoe CK Trib	3952.9	100 yr	Trib 3 Pr Cond	478.00	141.74	147.44	147.44	148.67	0.034336	9.36	63.40	52.19	0.80
Tuckahoe CK Trib	3904.75	100 yr	Trib 3 Ex Cond	478.00	141.98	147.69	146.35	148.16	0.011408	5.93	108.93	58.63	0.48
Tuckahoe CK Trib	3852.34	100 yr	Trib 3 Ex Cond	478.00	140.88	146.95	146.48	147.47	0.015674	6.67	115.37	66.79	0.55
Tuckahoe CK Trib	3852.34	100 yr	Trib 3 Pr Cond	478.00	140.88	146.90	146.39	147.58	0.019310	7.34	87.40	65.56	0.61
Tuckahoe CK Trib	3799.63	100 yr	Trib 3 Ex Cond	478.00	141.47	146.57	145.63	146.80	0.007997	4.74	166.65	90.80	0.42
Tuckahoe CK Trib	3799.63	100 yr	Trib 3 Pr Cond	478.00	141.47	146.57	145.66	146.82	0.008147	4.79	151.23	90.78	0.42
Tuckahoe CK Trib	3733.79	100 yr	Trib 3 Ex Cond	478.00	141.50	146.05	145.40	146.31	0.009106	5.36	170.54	100.78	0.47
Tuckahoe CK Trib	3733.79	100 yr	Trib 3 Pr Cond	478.00	141.50	146.05	145.39	146.31	0.009184	5.38	161.87	100.73	0.47
Tuckahoe CK Trib	3628.75	100 yr	Trib 3 Ex Cond	478.00	141.01	145.01	144.38	145.22	0.011104	5.45	183.97	112.46	0.51
Tuckahoe CK Trib	3628.75	100 yr	Trib 3 Pr Cond	478.00	141.01	145.01	144.38	145.22	0.011058	5.44	184.27	112.45	0.51
Tuckahoe CK Trib	3590.08	100 yr	Trib 3 Ex Cond	478.00	141.04	143.91	143.91	144.51	0.039426	8.48	110.91	93.07	0.94
Tuckahoe CK Trib	3590.08	100 yr	Trib 3 Pr Cond	478.00	141.04	143.91	143.91	144.51	0.039440	8.48	110.89	93.06	0.94
Tuckahoe CK Trib	3567.08	100 yr	Trib 3 Ex Cond	478.00	140.12	143.70		143.87	0.008298	3.52	164.13	98.86	0.40
Tuckahoe CK Trib	3567.08	100 yr	Trib 3 Pr Cond	478.00	140.12	143.70		143.87	0.008299	3.52	164.13	98.86	0.40
Tuckahoe CK Trib	3506.4	100 yr	Trib 3 Ex Cond	478.00	140.26	143.21		143.34	0.008869	3.15	191.18	123.97	0.38
Tuckahoe CK Trib	3506.4	100 yr	Trib 3 Pr Cond	478.00	140.26	143.21		143.34	0.008869	3.15	191.07	123.74	0.38
Tuckahoe CK Trib	3409.13	100 yr	Trib 3 Ex Cond	478.00	137.21	141.67	141.52	142.16	0.018486	7.06	137.19	116.19	0.66
Tuckahoe CK Trib	3409.13	100 yr	Trib 3 Pr Cond	478.00	137.21	141.67	141.52	142.16	0.018486	7.06	137.19	116.19	0.66
Tuckahoe CK Trib	3306.96	100 yr	Trib 3 Ex Cond	478.00	135.49	140.75		141.01	0.007053	4.73	167.56	92.00	0.42
Tuckahoe CK Trib	3306.96	100 yr	Trib 3 Pr Cond	478.00	135.49	140.75		141.01	0.007053	4.73	167.56	92.00	0.42
Tuckahoe CK Trib	3195.49	100 yr	Trib 3 Ex Cond	478.00	133.51	139.25		139.88	0.014682	6.80	99.62	54.82	0.55
Tuckahoe CK Trib	3195.49	100 yr	Trib 3 Pr Cond	478.00	133.51	139.25		139.88	0.014682	6.80	99.62	54.82	0.55
Tuckahoe CK Trib	3102.46	100 yr	Trib 3 Ex Cond	478.00	133.53	138.24		138.69	0.010149	5.71	111.87	60.76	0.51
Tuckahoe CK Trib	3102.46	100 yr	Trib 3 Pr Cond	478.00	133.53	138.24		138.69	0.010149	5.71	111.87	60.76	0.51
Tuckahoe CK Trib	3000.61	100 yr	Trib 3 Ex Cond	478.00	131.77	137.30		137.65	0.009558	5.43	140.42	72.52	0.44
Tuckahoe CK Trib	3000.61	100 yr	Trib 3 Pr Cond	478.00	131.77	137.30		137.65	0.009558	5.43	140.42	72.52	0.44
Tuckahoe CK Trib	2885.24	100 yr	Trib 3 Ex Cond	684.00	132.49	136.05		136.37	0.014381	6.24	211.67	128.22	0.62
Tuckahoe CK Trib	2885.24	100 yr	Trib 3 Pr Cond	684.00	132.49	136.05		136.37	0.014381	6.24	211.67	128.22	0.62
Tuckahoe CK Trib	2799.51	100 yr	Trib 3 Ex Cond	684.00	130.00	134.71		135.00	0.011712	6.02	241.54	154.61	0.53
Tuckahoe CK Trib	2799.51	100 yr	Trib 3 Pr Cond	684.00	130.00	134.71		135.00	0.011712	6.02	241.54	154.61	0.53

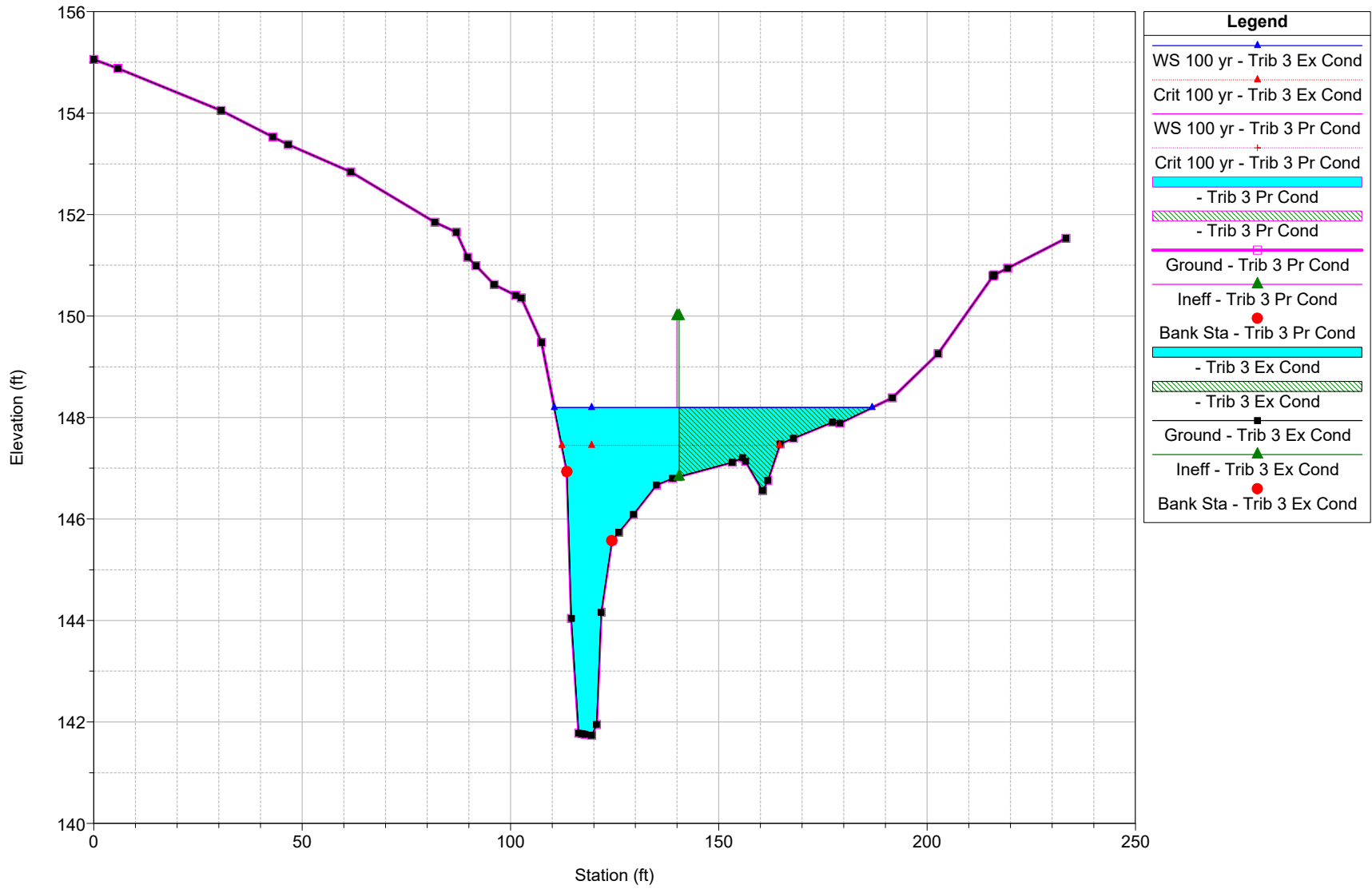
HEC-RAS River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib Profile: 100 yr (Continued)

Reach	River Sta	Profile	Plan	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
Tuckahoe CK Trib	2690.12	100 yr	Trib 3 Ex Cond	684.00	129.50	133.90		134.05	0.006494	4.58	323.89	195.42	0.41
Tuckahoe CK Trib	2690.12	100 yr	Trib 3 Pr Cond	684.00	129.50	133.90		134.05	0.006494	4.58	323.89	195.42	0.41
Tuckahoe CK Trib	2564.96	100 yr	Trib 3 Ex Cond	684.00	128.50	132.82		133.16	0.011923	6.15	228.37	148.55	0.55
Tuckahoe CK Trib	2564.96	100 yr	Trib 3 Pr Cond	684.00	128.50	132.82		133.16	0.011923	6.15	228.37	148.55	0.55
Tuckahoe CK Trib	2413.06	100 yr	Trib 3 Ex Cond	684.00	127.50	132.11		132.20	0.003425	3.40	416.61	227.03	0.30
Tuckahoe CK Trib	2413.06	100 yr	Trib 3 Pr Cond	684.00	127.50	132.11		132.20	0.003425	3.40	416.61	227.03	0.30
Tuckahoe CK Trib	2246.04	100 yr	Trib 3 Ex Cond	684.00	126.70	131.73		131.78	0.001800	2.62	572.65	314.26	0.23
Tuckahoe CK Trib	2246.04	100 yr	Trib 3 Pr Cond	684.00	126.70	131.73		131.78	0.001800	2.62	572.65	314.26	0.23
Tuckahoe CK Trib	2126.75	100 yr	Trib 3 Ex Cond	684.00	127.50	131.66		131.67	0.001020	1.50	867.31	496.32	0.16
Tuckahoe CK Trib	2126.75	100 yr	Trib 3 Pr Cond	684.00	127.50	131.66		131.67	0.001020	1.50	867.31	496.32	0.16
Tuckahoe CK Trib	2100.19	100 yr	Trib 3 Ex Cond	684.00	127.50	131.51		131.59	0.004942	3.36	430.07	338.73	0.35
Tuckahoe CK Trib	2100.19	100 yr	Trib 3 Pr Cond	684.00	127.50	131.51		131.59	0.004942	3.36	430.07	338.73	0.35
Tuckahoe CK Trib	2066.3	100 yr	Trib 3 Ex Cond	684.00	127.25	131.39		131.41	0.001361	2.11	813.83	498.88	0.19
Tuckahoe CK Trib	2066.3	100 yr	Trib 3 Pr Cond	684.00	127.25	131.39		131.41	0.001361	2.11	813.83	498.88	0.19
Tuckahoe CK Trib	1855.43	100 yr	Trib 3 Ex Cond	684.00	127.10	130.90		130.93	0.002639	2.64	687.09	549.07	0.25
Tuckahoe CK Trib	1855.43	100 yr	Trib 3 Pr Cond	684.00	127.10	130.90		130.93	0.002639	2.64	687.09	549.07	0.25
Tuckahoe CK Trib	1600.28	100 yr	Trib 3 Ex Cond	684.00	127.00	130.72		130.73	0.000591	1.28	1341.00	865.52	0.12
Tuckahoe CK Trib	1600.28	100 yr	Trib 3 Pr Cond	684.00	127.00	130.72		130.73	0.000591	1.28	1341.00	865.52	0.12
Tuckahoe CK Trib	1501.43	100 yr	Trib 3 Ex Cond	684.00	126.90	130.62		130.62	0.000757	1.43	1333.10	1059.57	0.14
Tuckahoe CK Trib	1501.43	100 yr	Trib 3 Pr Cond	684.00	126.90	130.62		130.62	0.000757	1.43	1333.10	1059.57	0.14
Tuckahoe CK Trib	1406.3	100 yr	Trib 3 Ex Cond	684.00	126.80	130.51		130.52	0.000888	1.55	1156.38	831.31	0.15
Tuckahoe CK Trib	1406.3	100 yr	Trib 3 Pr Cond	684.00	126.80	130.51		130.52	0.000888	1.55	1156.38	831.31	0.15
Tuckahoe CK Trib	1201.38	100 yr	Trib 3 Ex Cond	684.00	126.70	130.26		130.29	0.003050	2.76	663.29	559.64	0.27
Tuckahoe CK Trib	1201.38	100 yr	Trib 3 Pr Cond	684.00	126.70	130.26		130.29	0.003050	2.76	663.29	559.64	0.27
Tuckahoe CK Trib	1099.53	100 yr	Trib 3 Ex Cond	684.00	126.70	130.10		130.14	0.003839	3.00	627.91	603.18	0.31
Tuckahoe CK Trib	1099.53	100 yr	Trib 3 Pr Cond	684.00	126.70	130.10		130.14	0.003839	3.00	627.91	603.18	0.31
Tuckahoe CK Trib	1013.78	100 yr	Trib 3 Ex Cond	684.00	126.70	129.92	129.53	129.97	0.005000	3.24	596.92	664.28	0.35
Tuckahoe CK Trib	1013.78	100 yr	Trib 3 Pr Cond	684.00	126.70	129.92	129.53	129.97	0.005000	3.24	596.92	664.28	0.35

Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

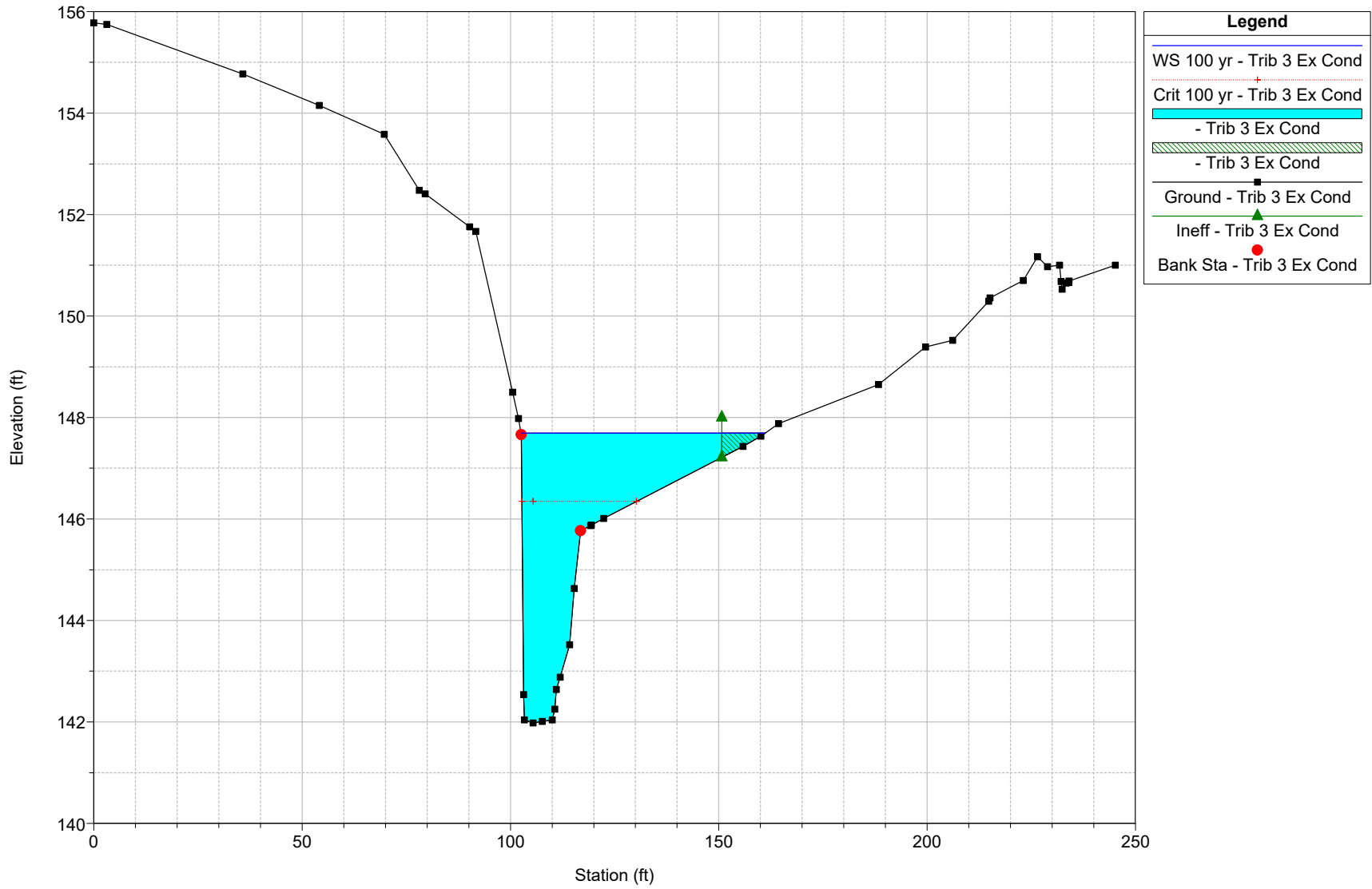
RS = 3952.9



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

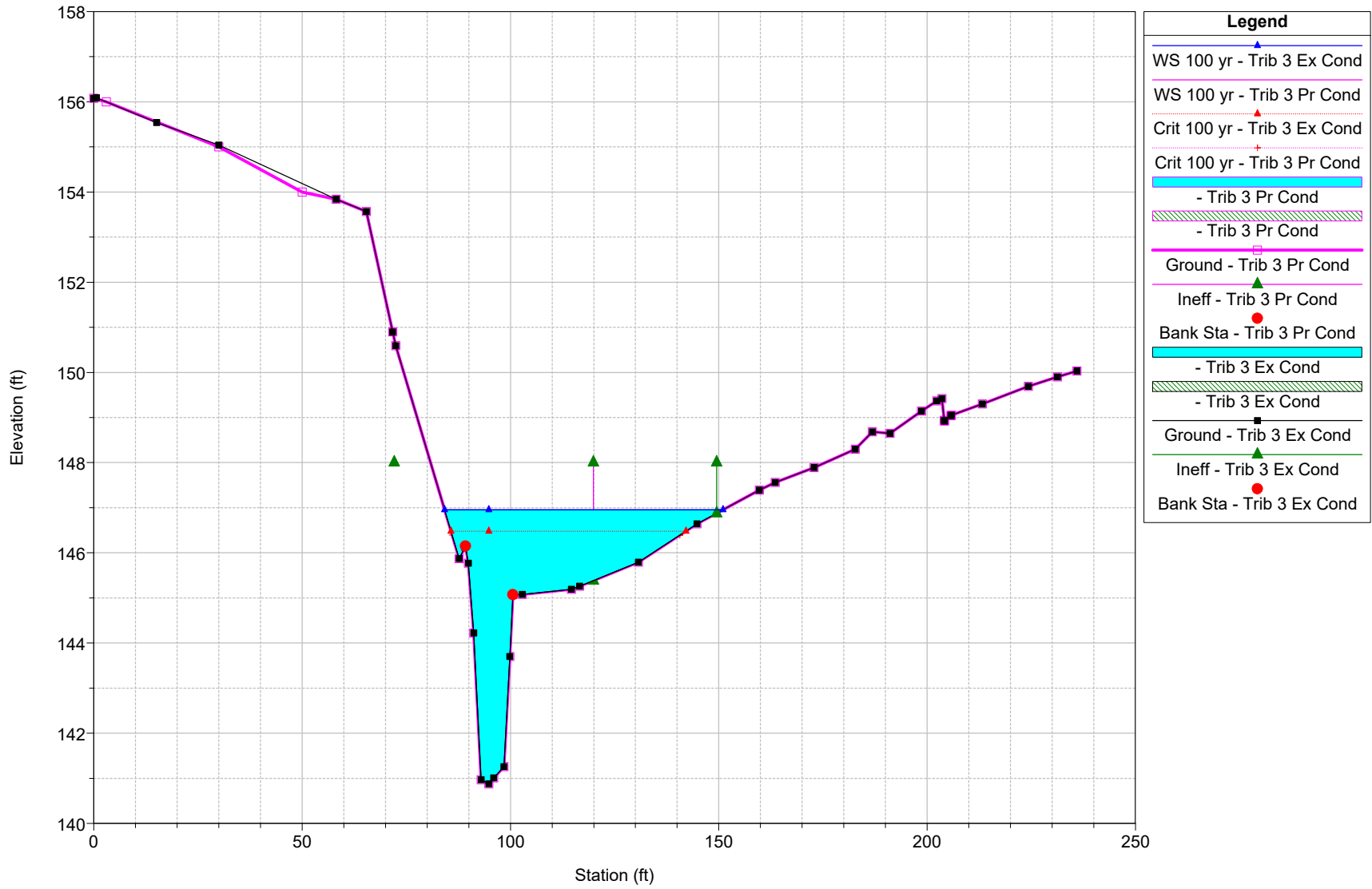
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

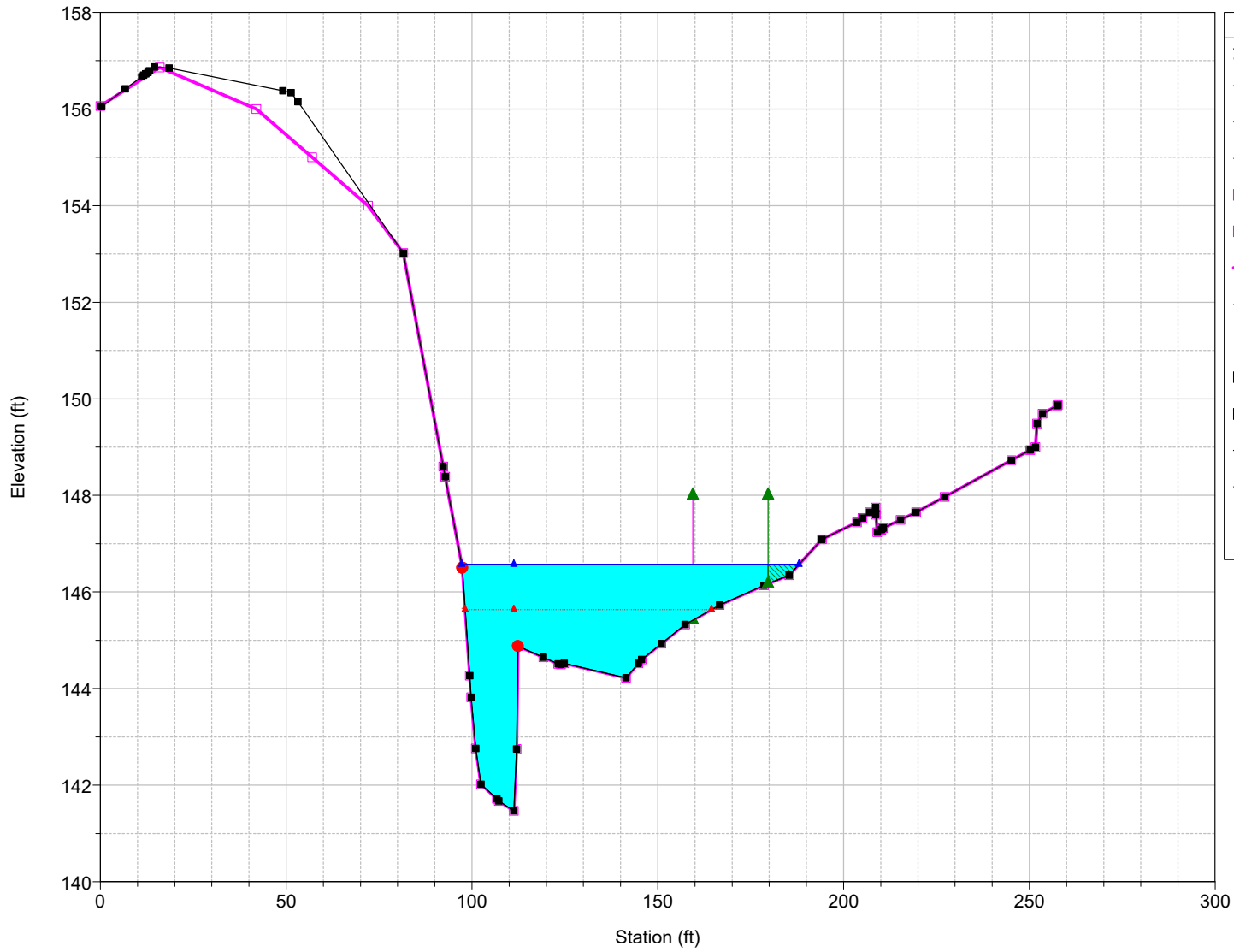
RS = 3852.34



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 3799.63

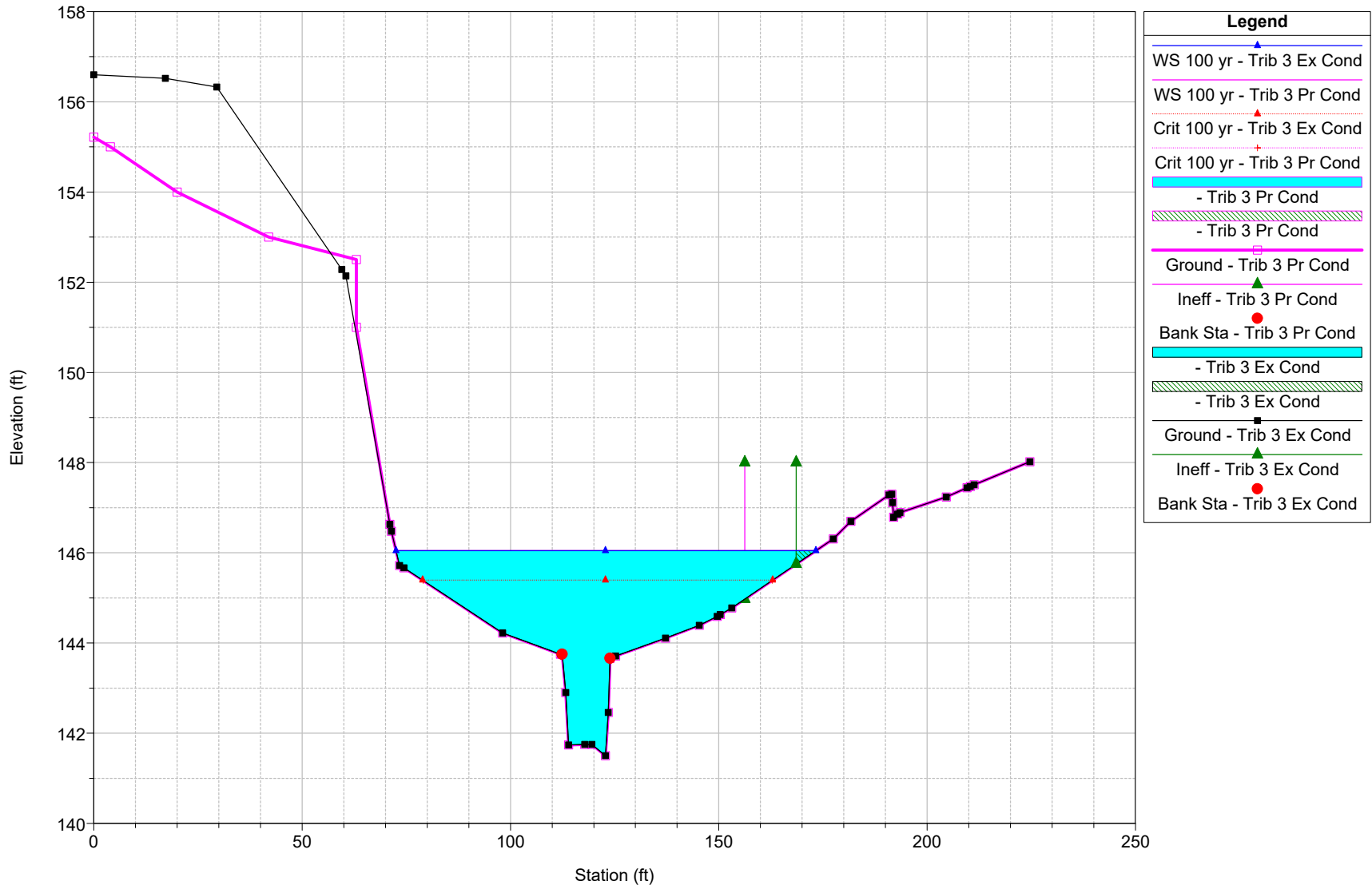


Legend	
WS 100 yr - Trib 3 Ex Cond	▲
WS 100 yr - Trib 3 Pr Cond	■
Crit 100 yr - Trib 3 Pr Cond	+
Crit 100 yr - Trib 3 Ex Cond	▲
- Trib 3 Pr Cond	■
- Trib 3 Pr Cond	▨
Ground - Trib 3 Pr Cond	□
Ineff - Trib 3 Pr Cond	▲
Bank Sta - Trib 3 Pr Cond	●
- Trib 3 Ex Cond	■
- Trib 3 Ex Cond	▨
Ground - Trib 3 Ex Cond	■
Ineff - Trib 3 Ex Cond	▲
Bank Sta - Trib 3 Ex Cond	●

Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

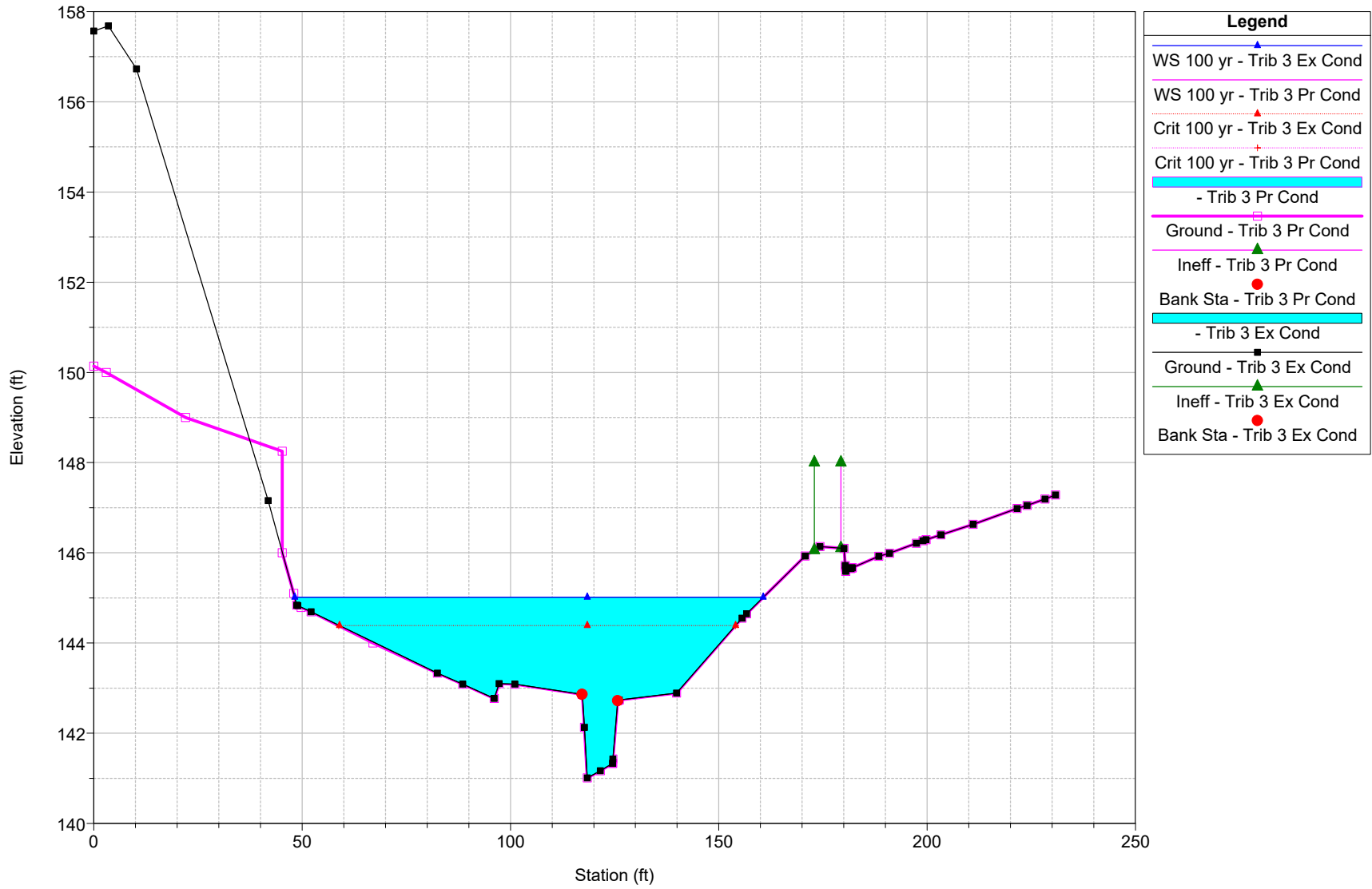
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

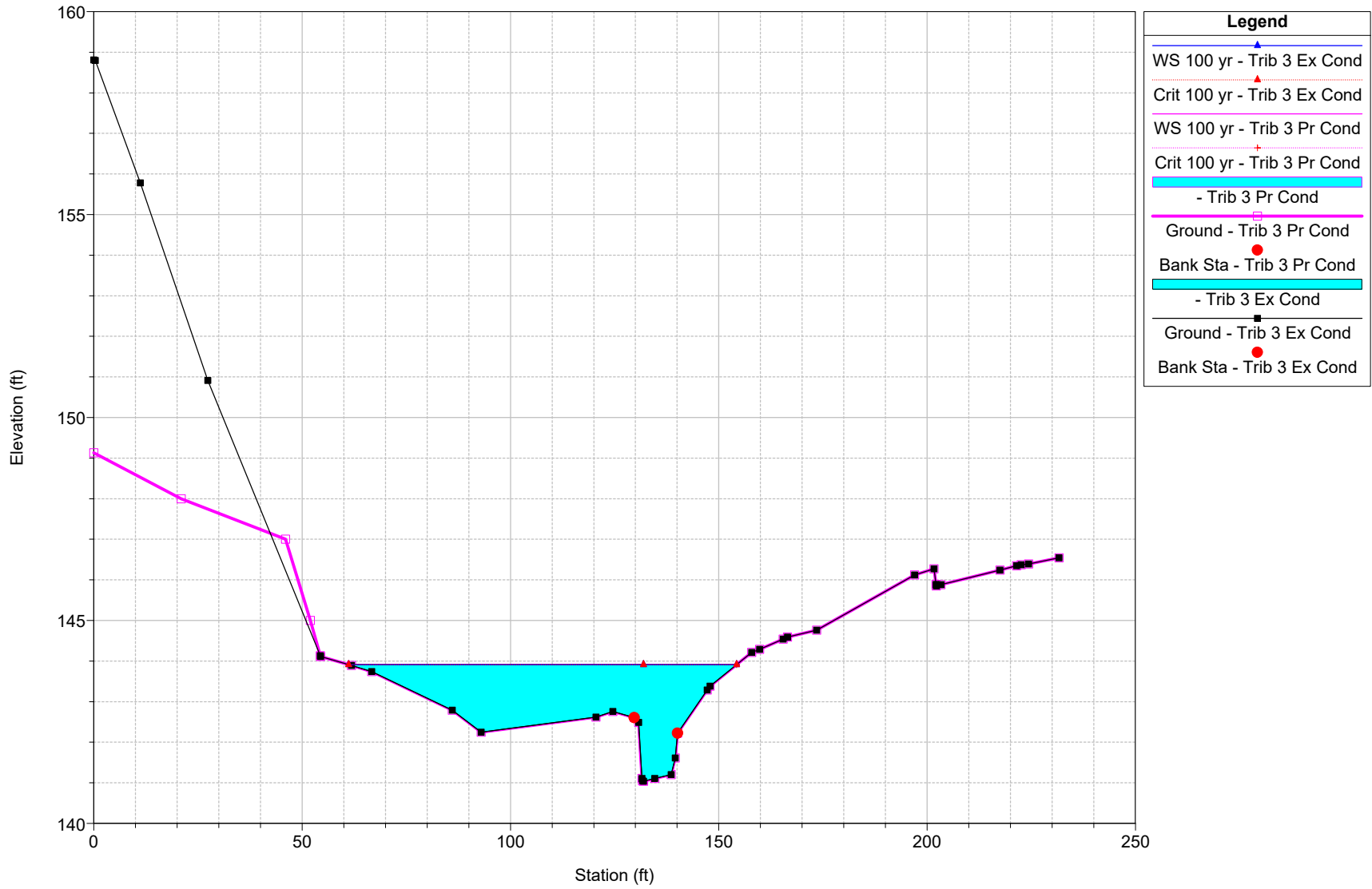
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

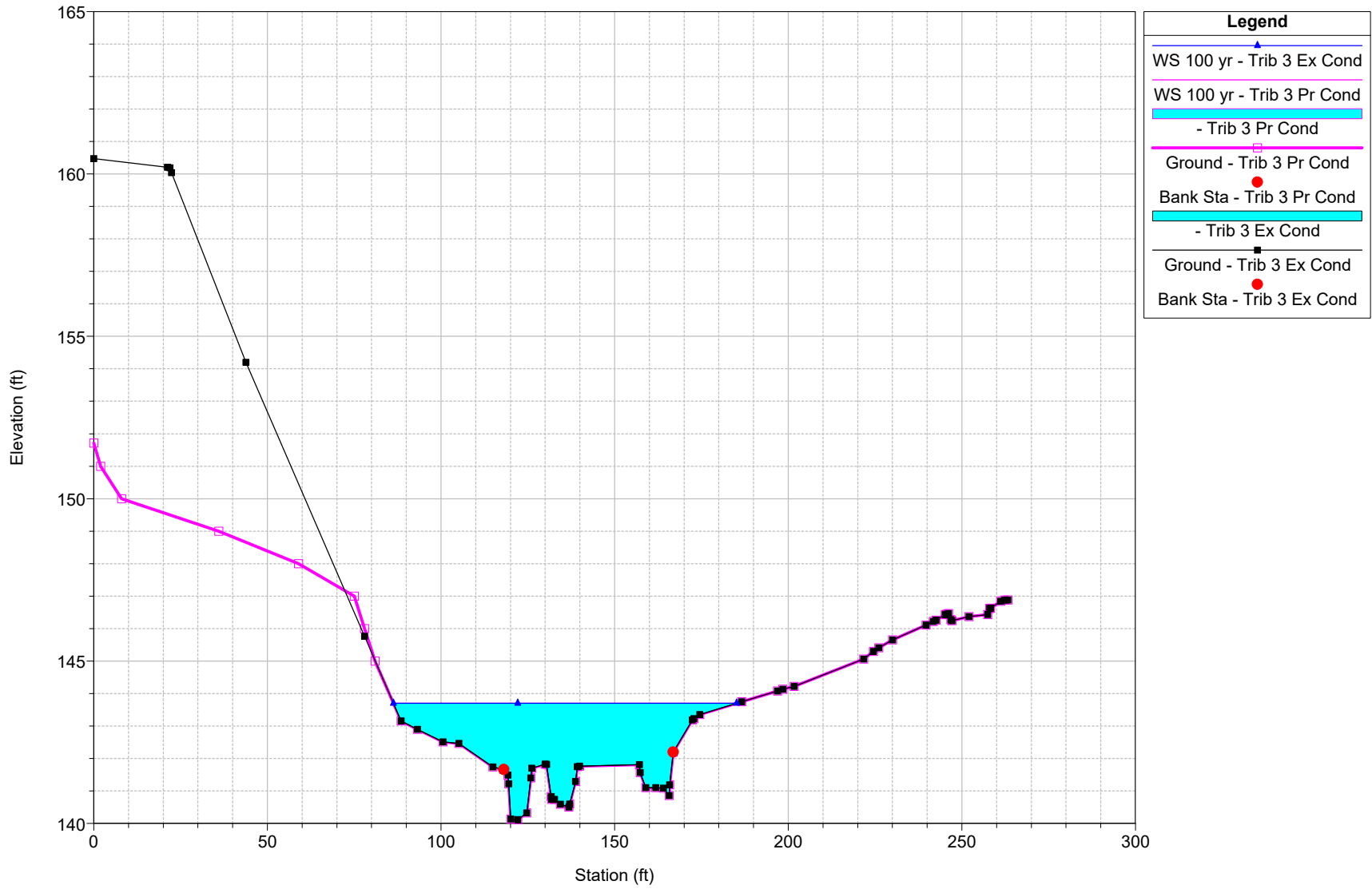
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Geom: Ex Condition Flow: Tuckahoe CK Trib 3

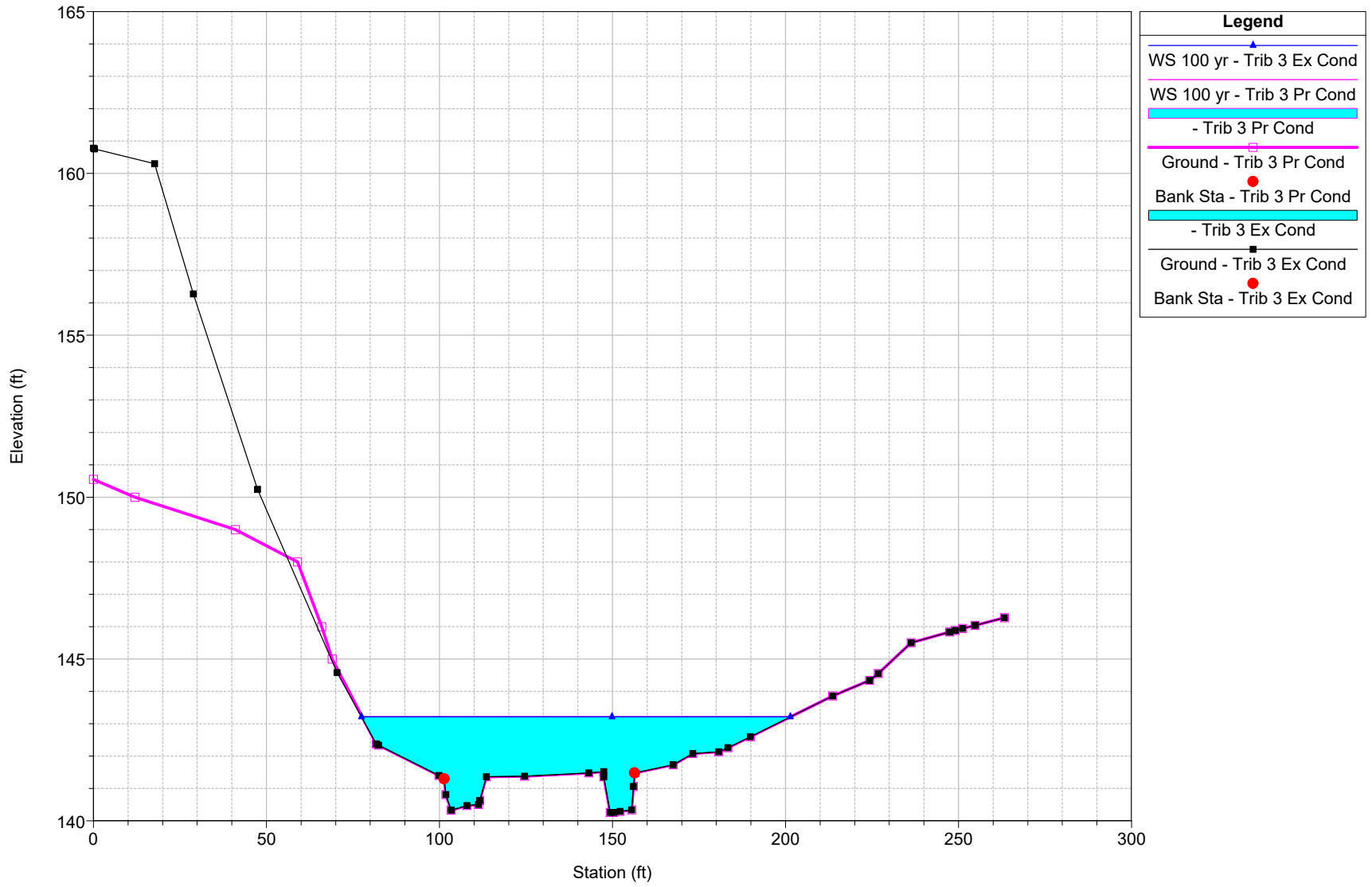
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Geom: Ex Condition Flow: Tuckahoe CK Trib 3

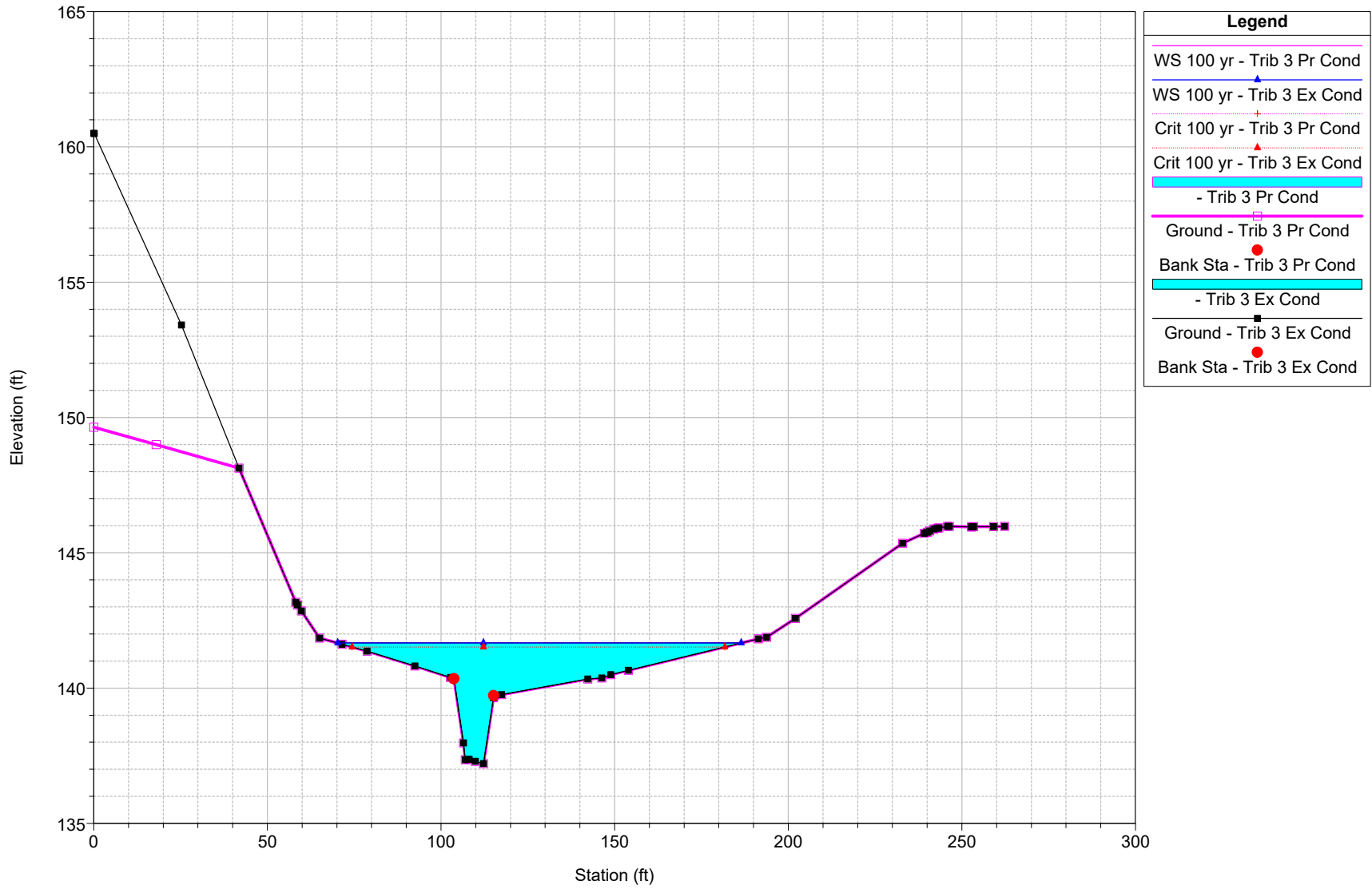
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

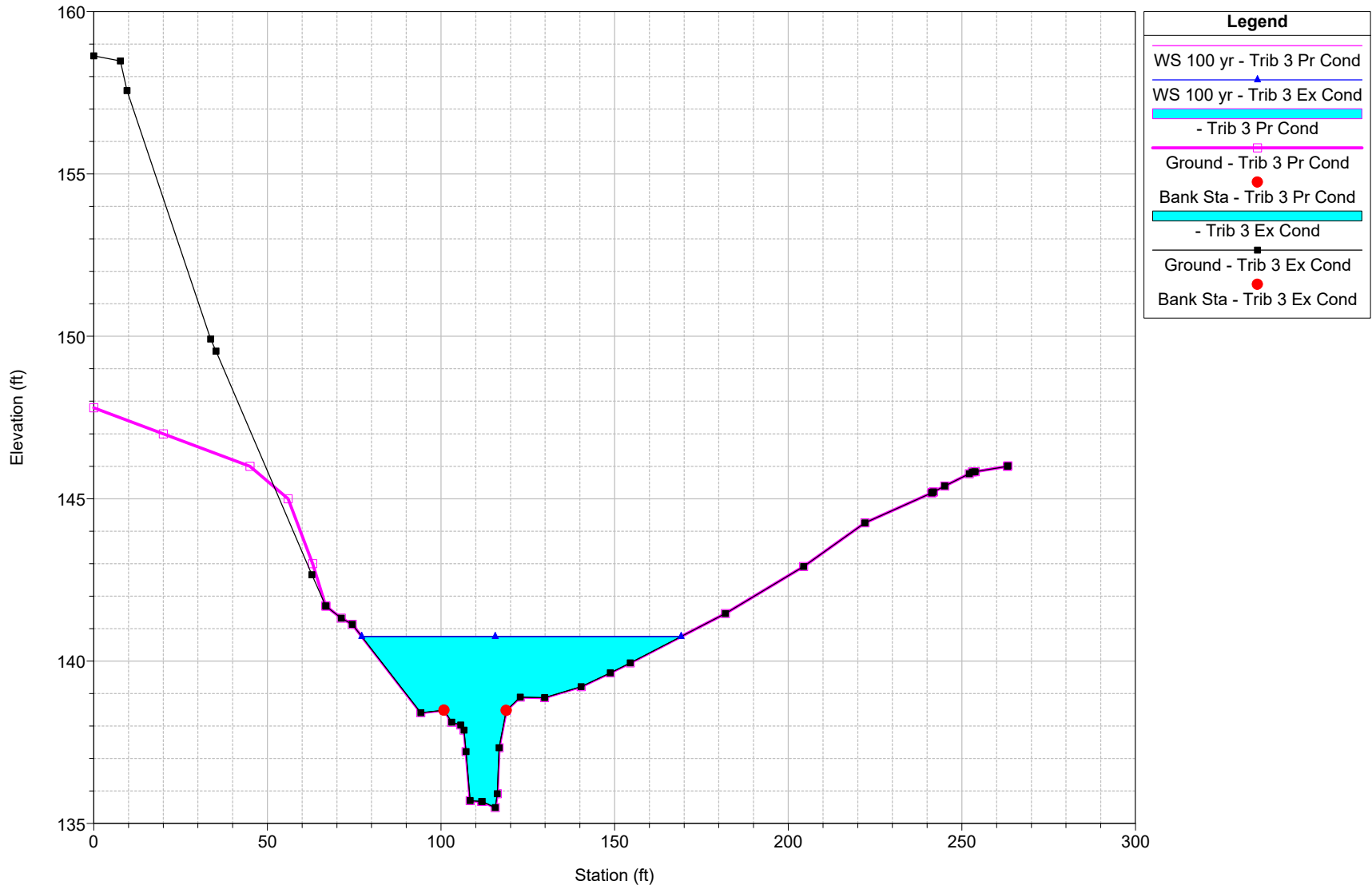
RS = 3409.13



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

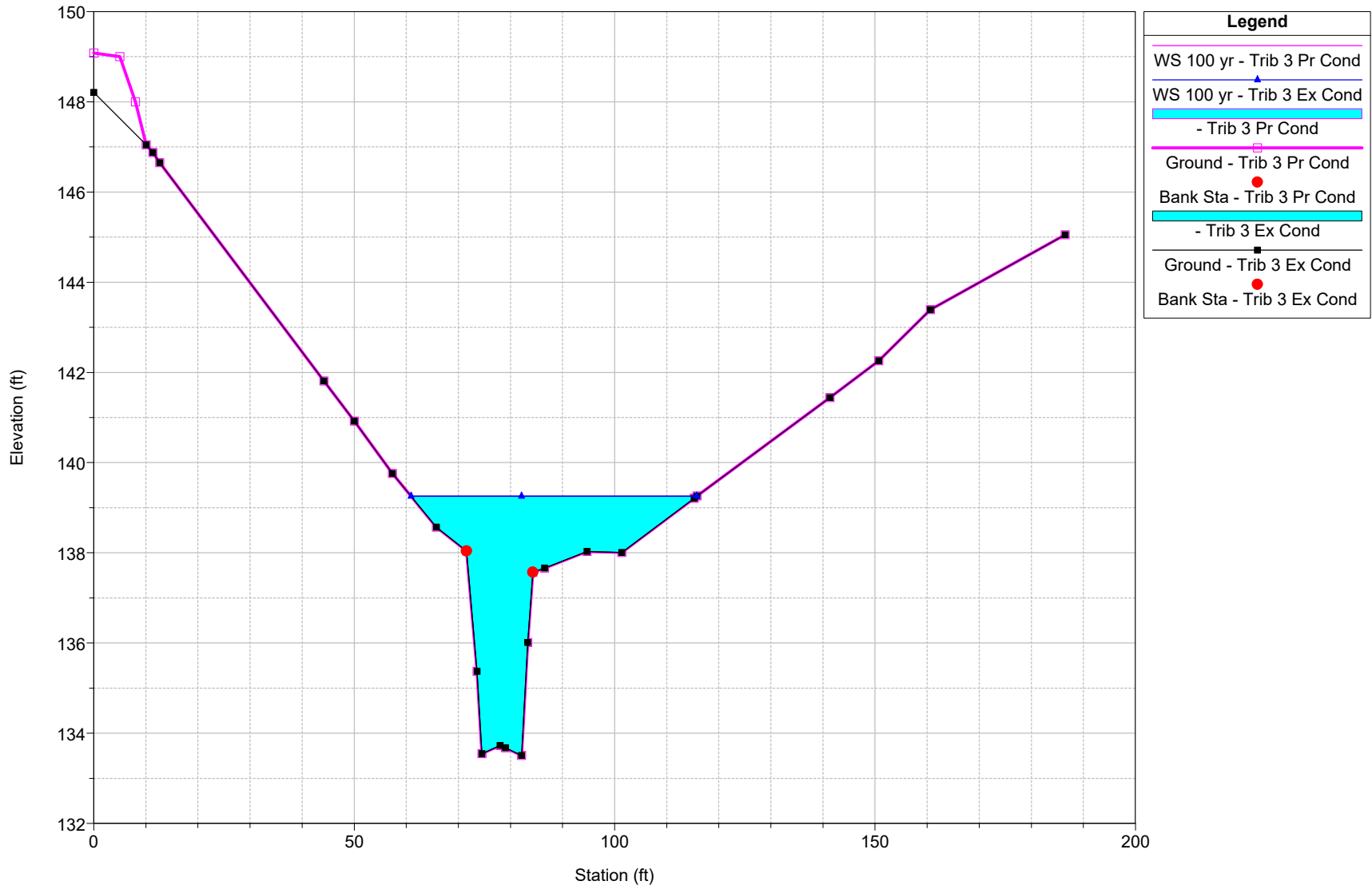
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

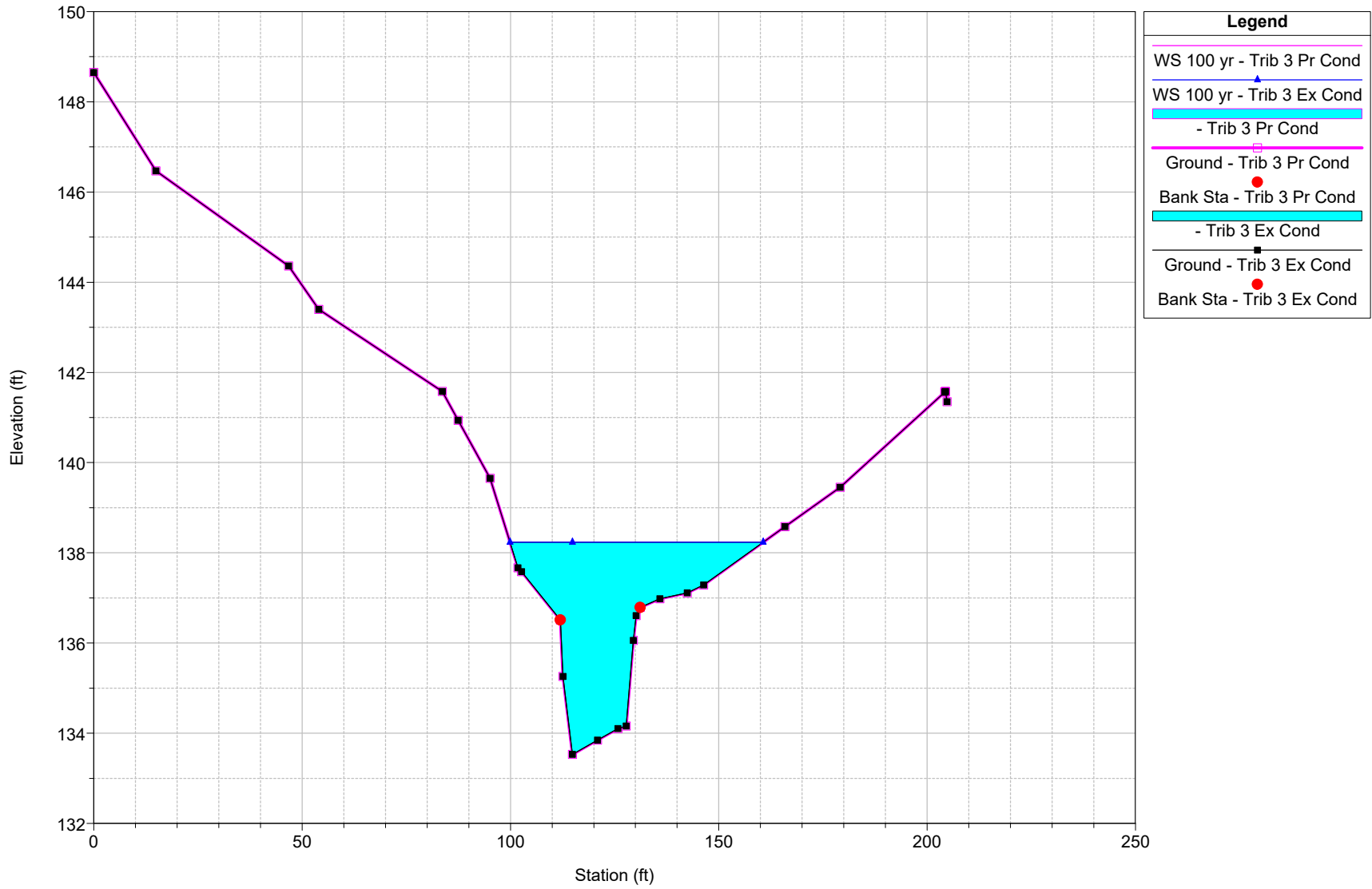
RS = 3195.49



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 3102.46



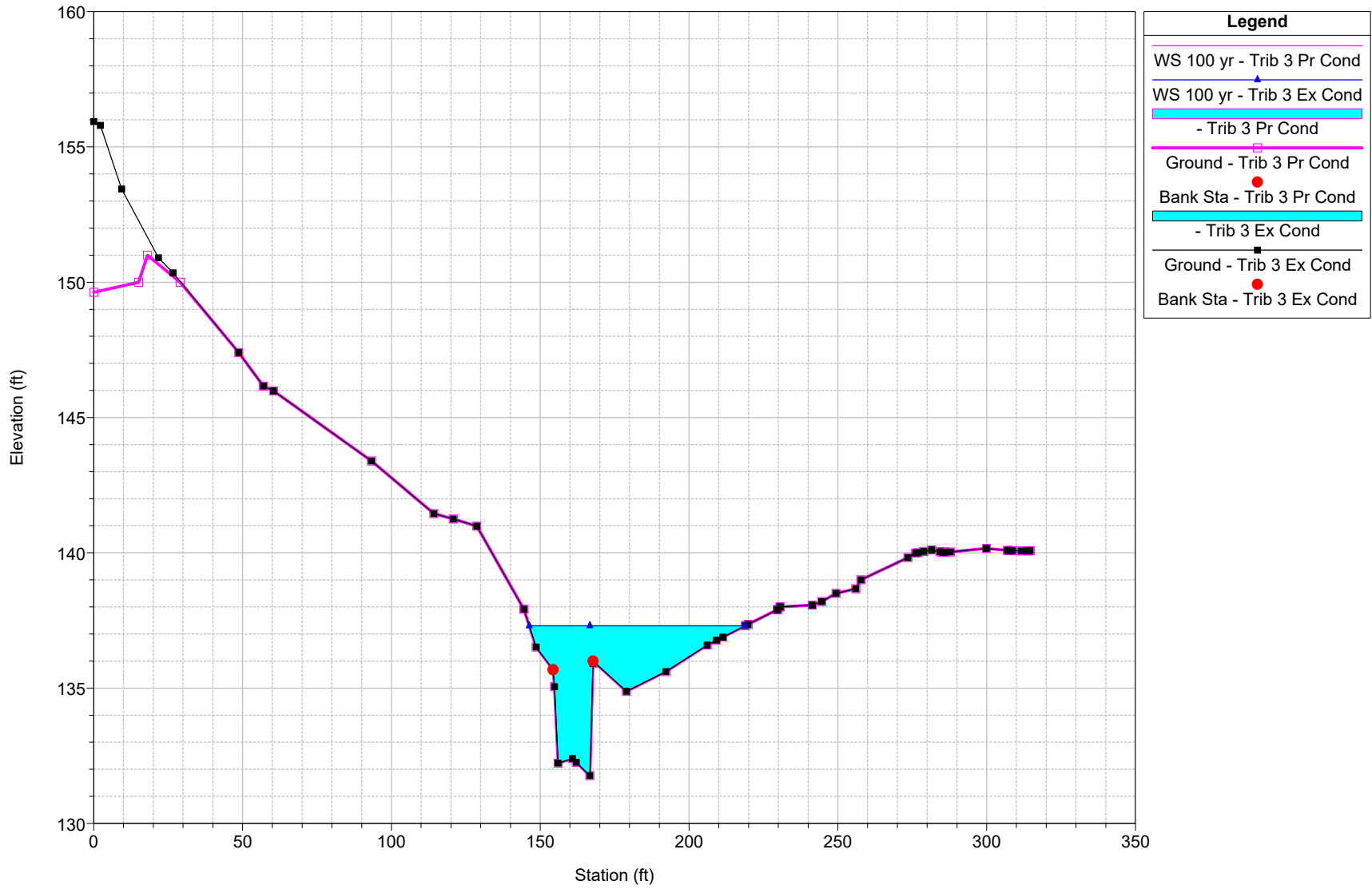
Legend

- WS 100 yr - Trib 3 Pr Cond
- WS 100 yr - Trib 3 Ex Cond
- Trib 3 Pr Cond
- Ground - Trib 3 Pr Cond
- Bank Sta - Trib 3 Pr Cond
- Trib 3 Ex Cond
- Ground - Trib 3 Ex Cond
- Bank Sta - Trib 3 Ex Cond

Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

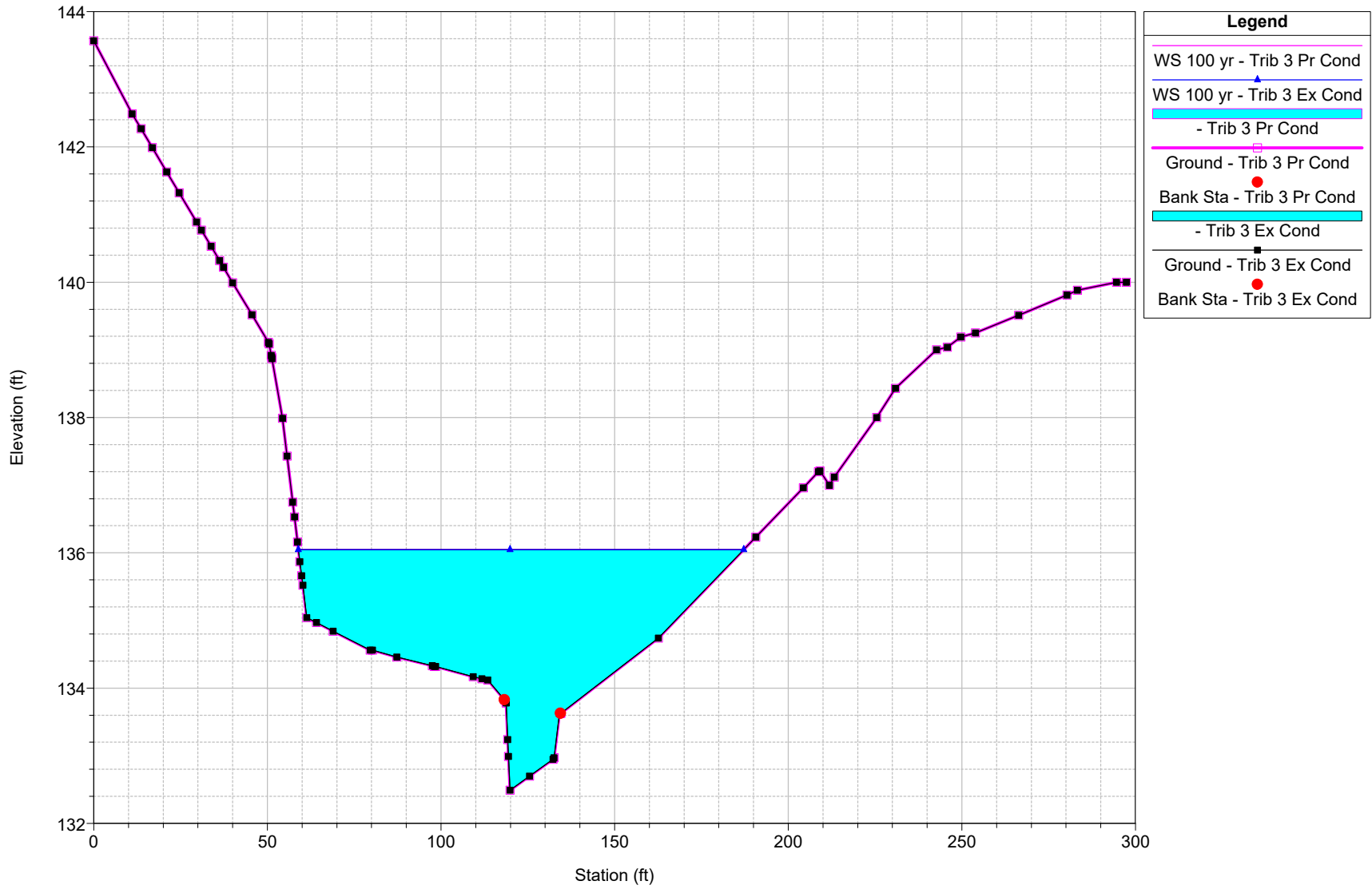
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

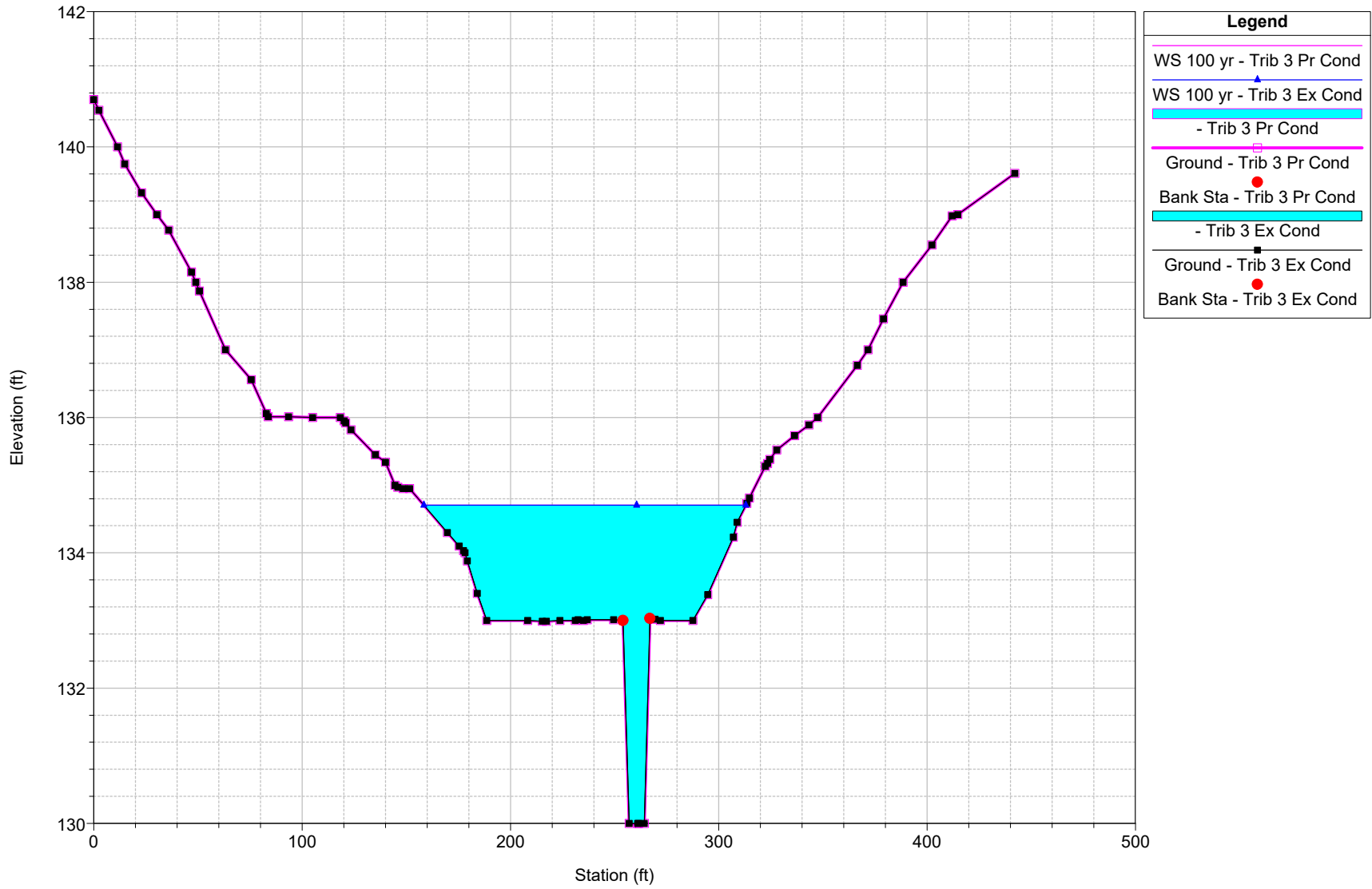
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

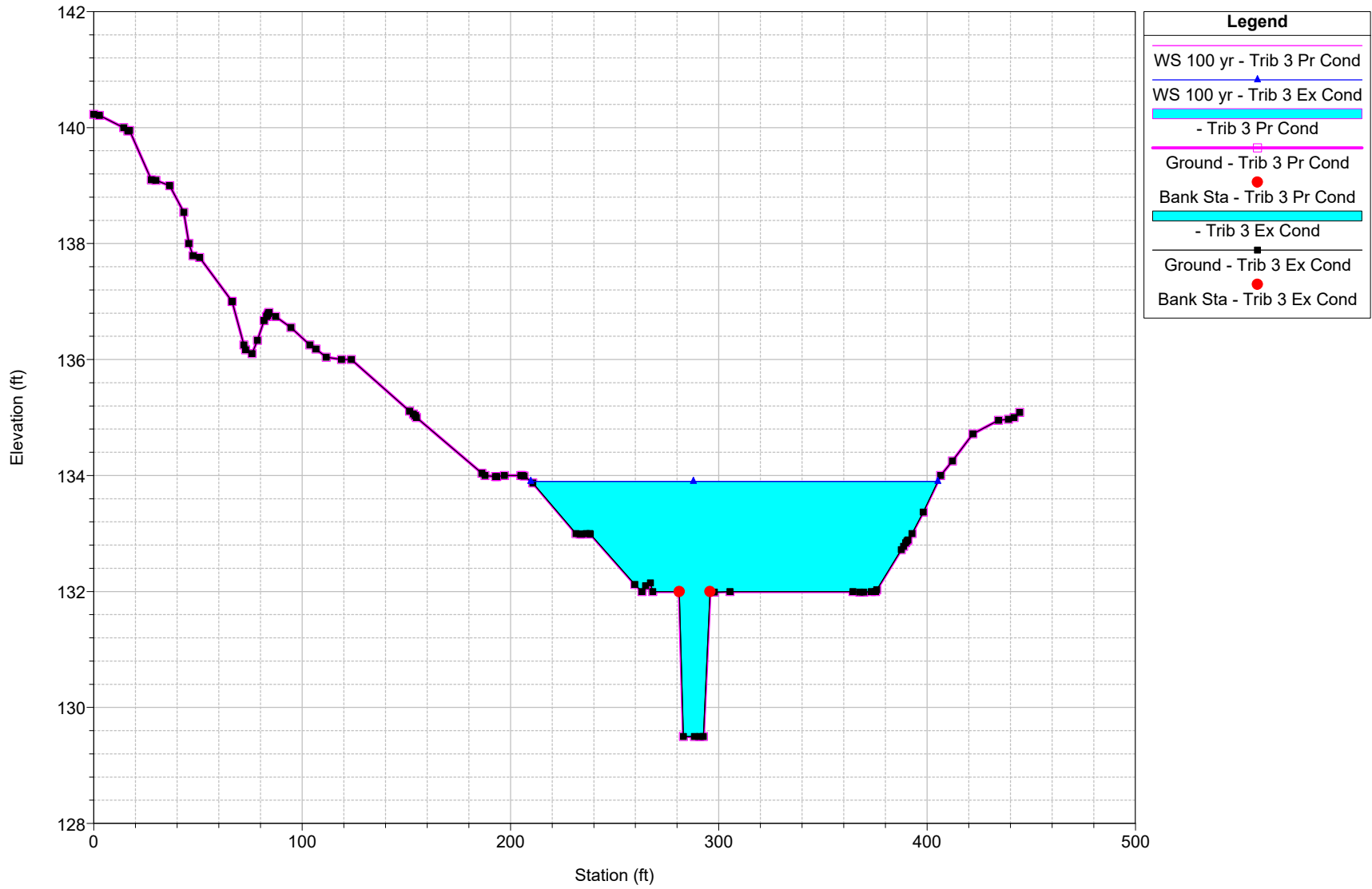
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

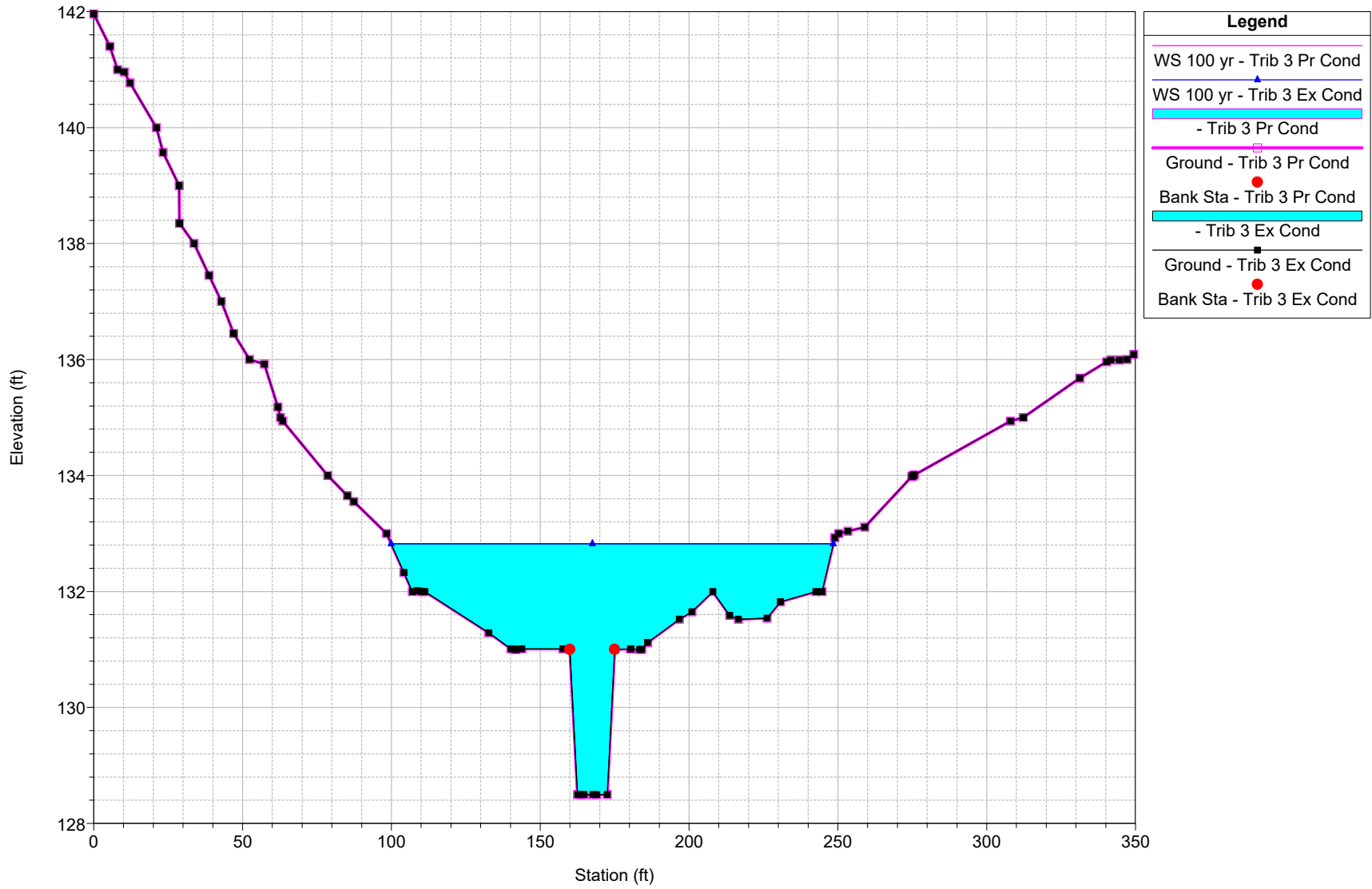
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

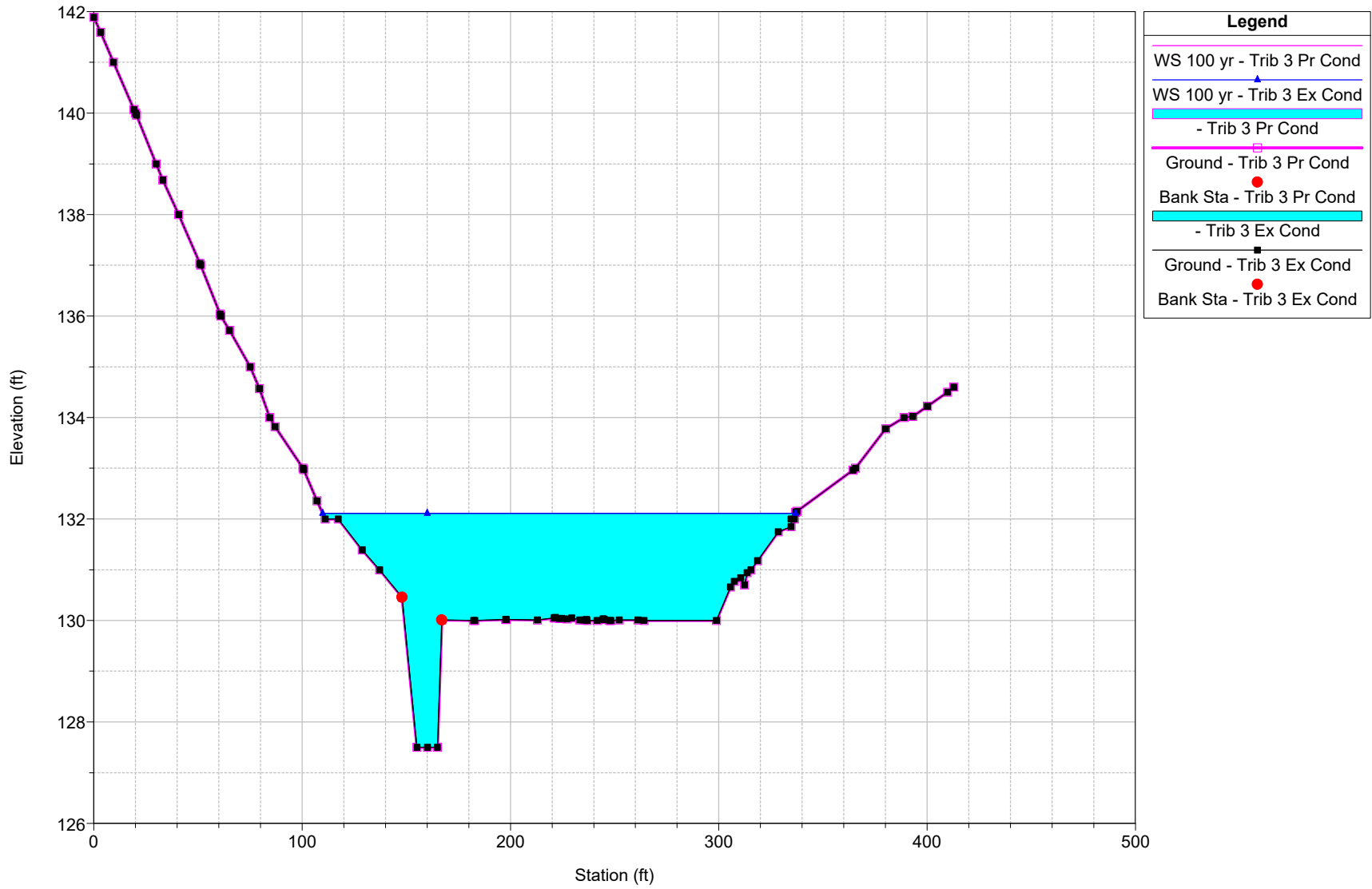
RS = 2564.96



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 2413.06



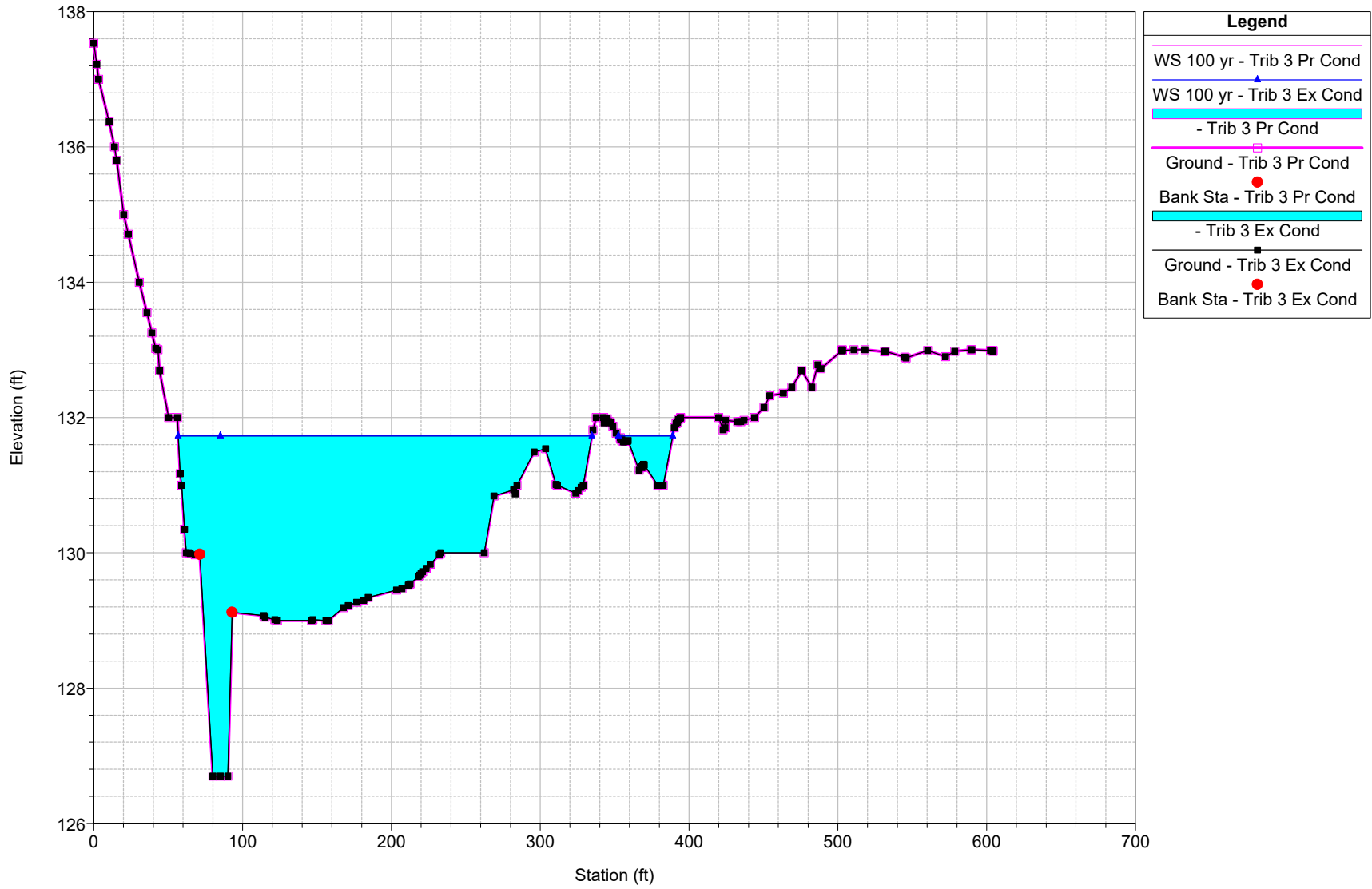
Legend

- WS 100 yr - Trib 3 Pr Cond
- WS 100 yr - Trib 3 Ex Cond
- Trib 3 Pr Cond
- Ground - Trib 3 Pr Cond
- Bank Sta - Trib 3 Pr Cond
- Trib 3 Ex Cond
- Ground - Trib 3 Ex Cond
- Bank Sta - Trib 3 Ex Cond

Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

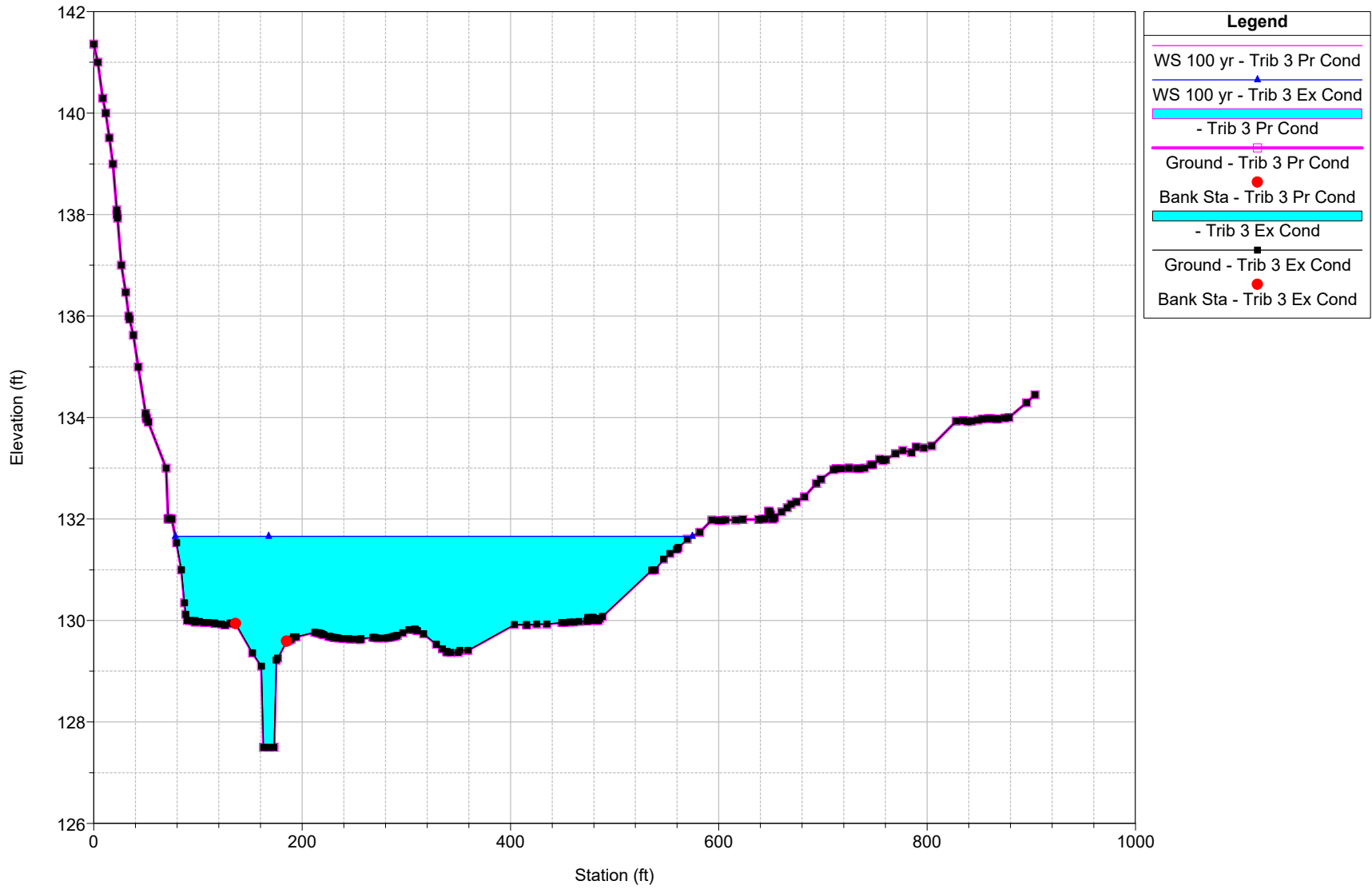
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

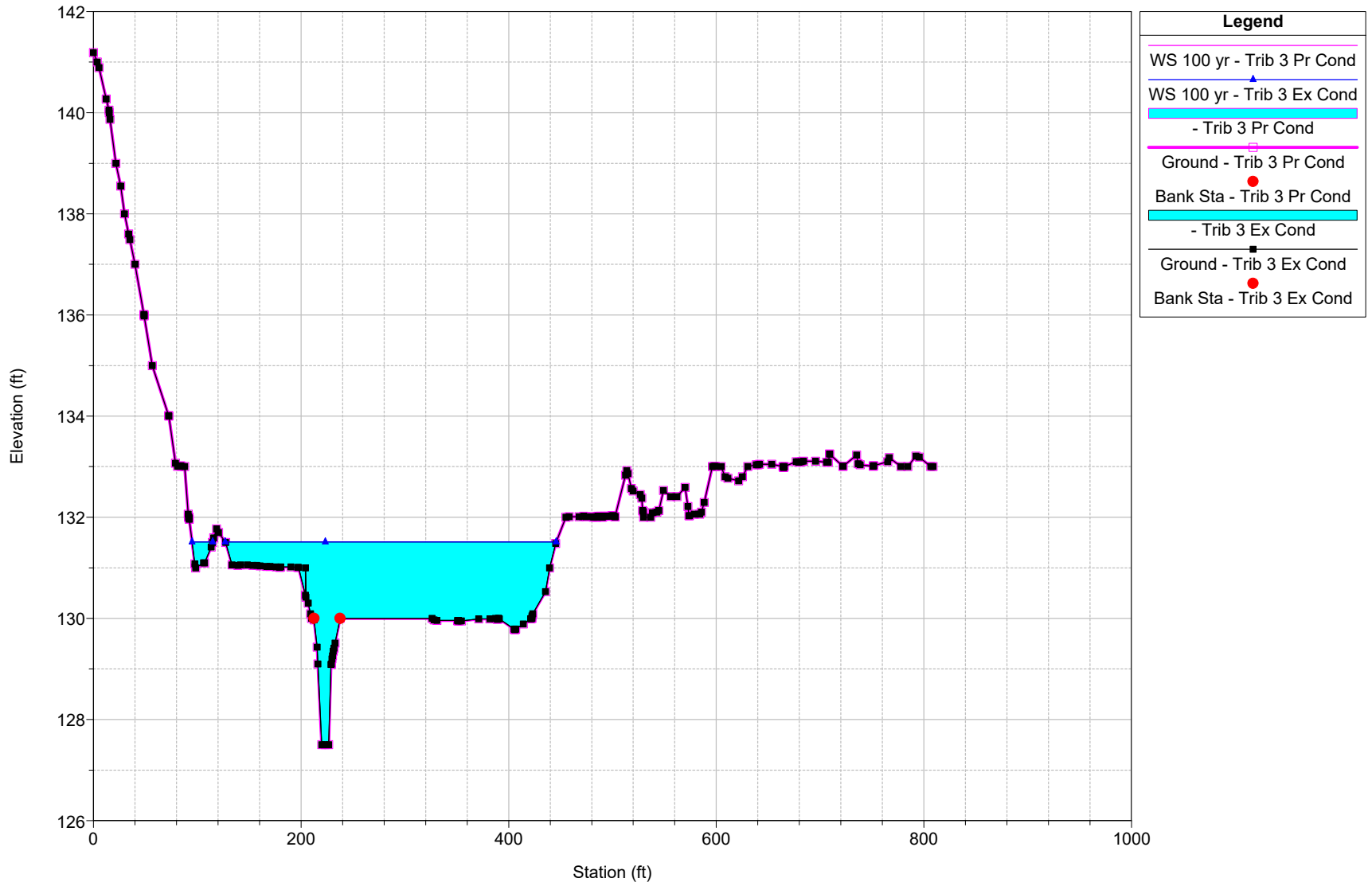
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

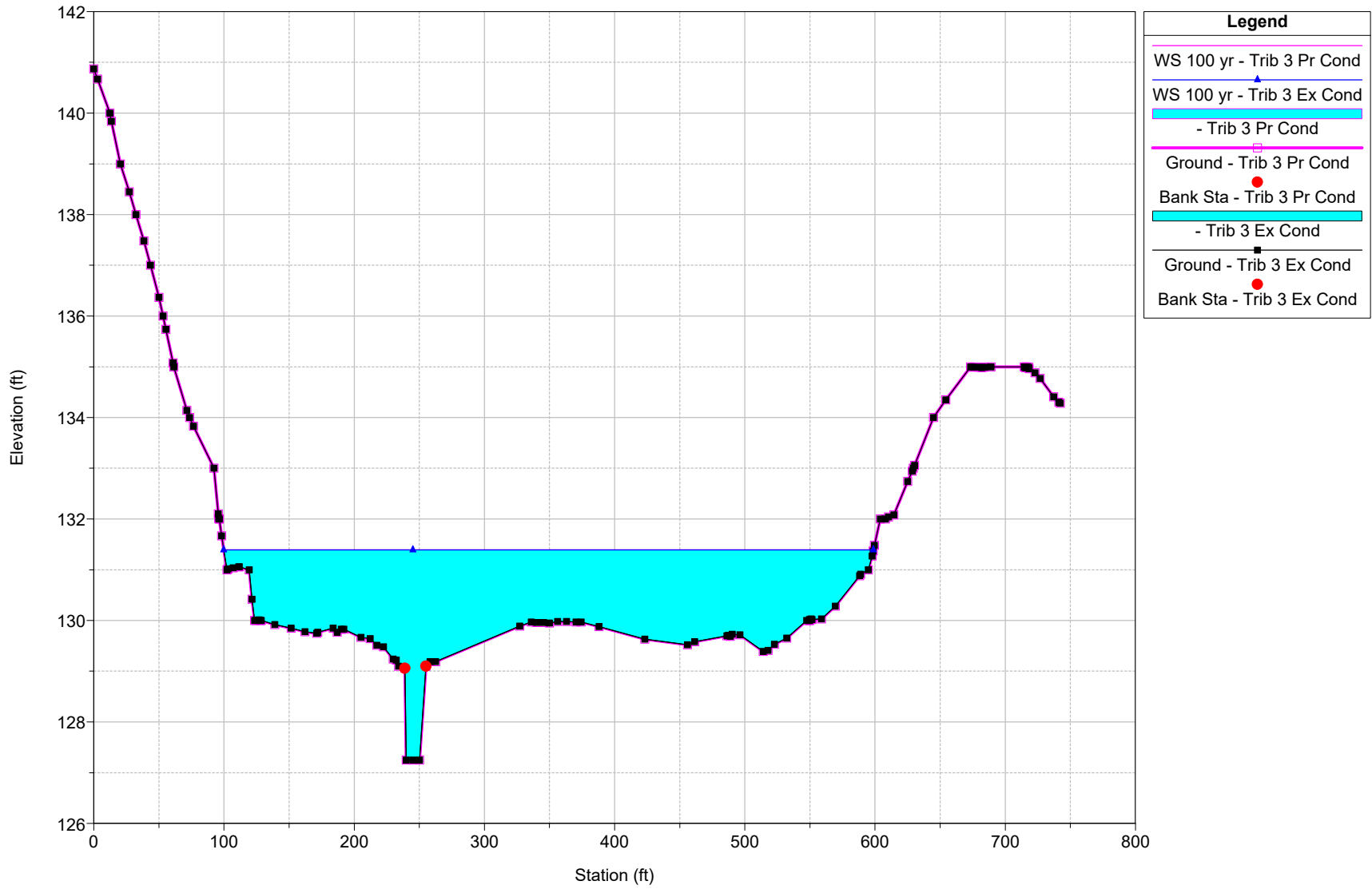
RS = 2100.19



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

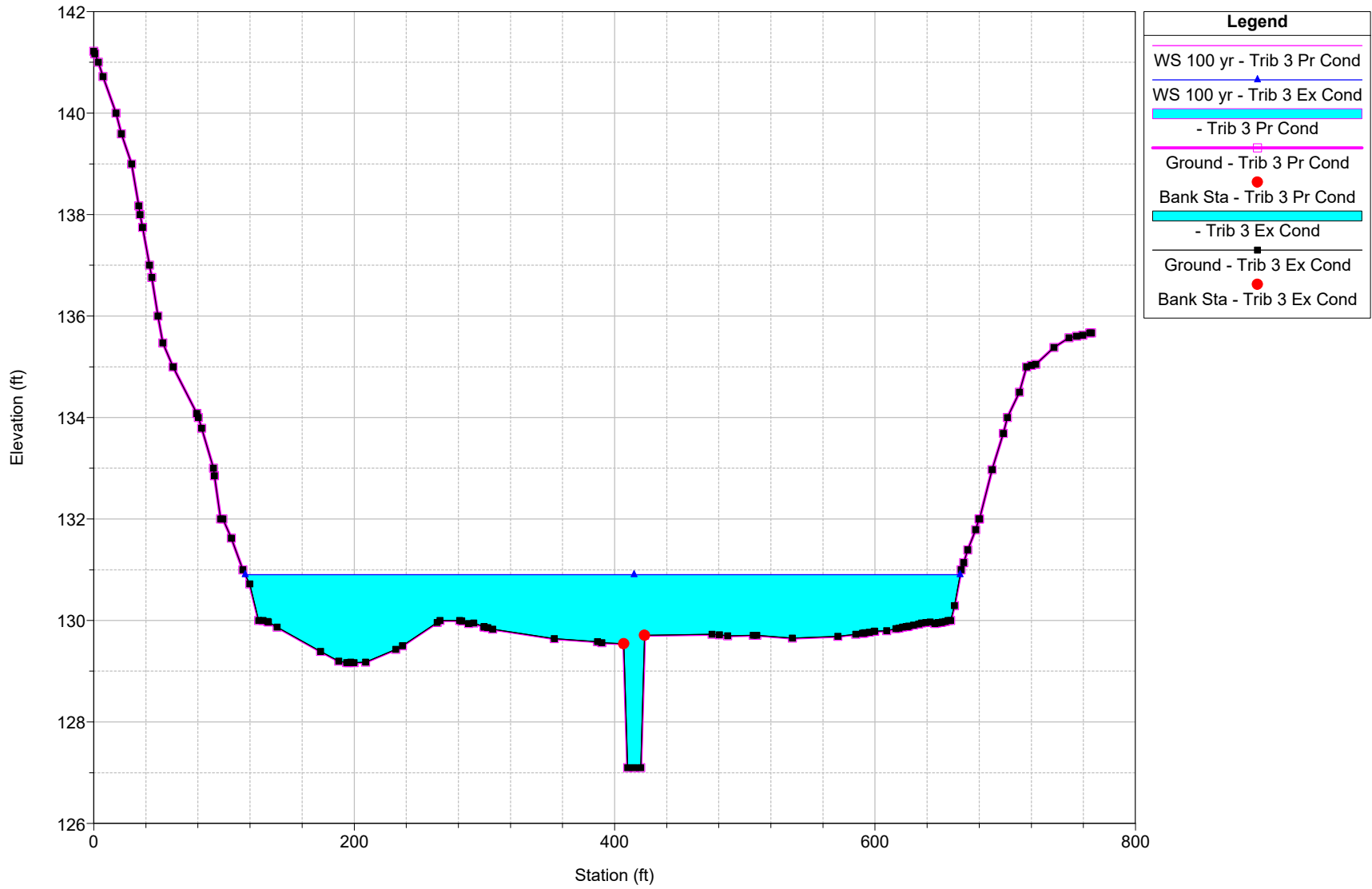
RS = 2066.3



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

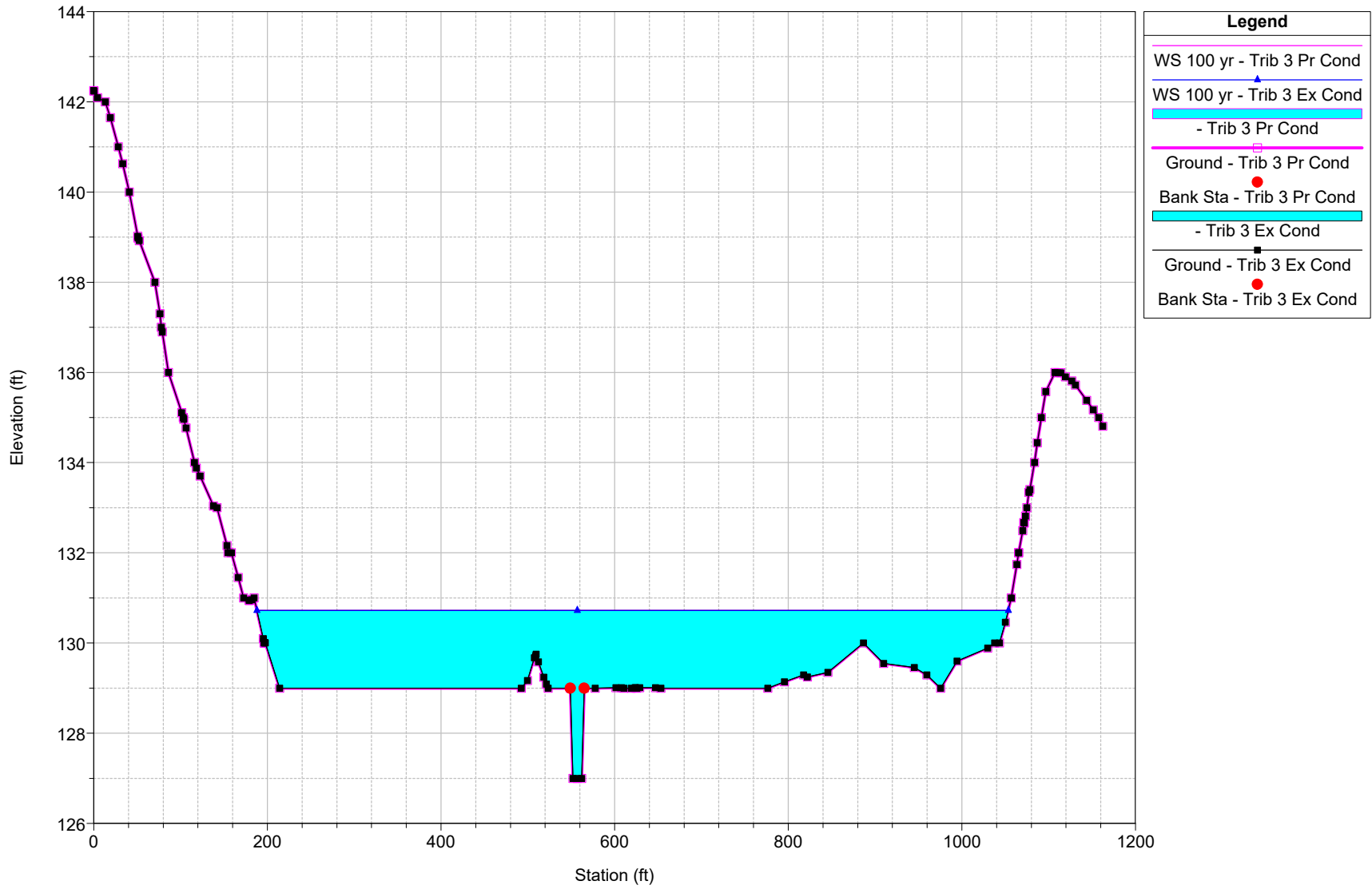
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

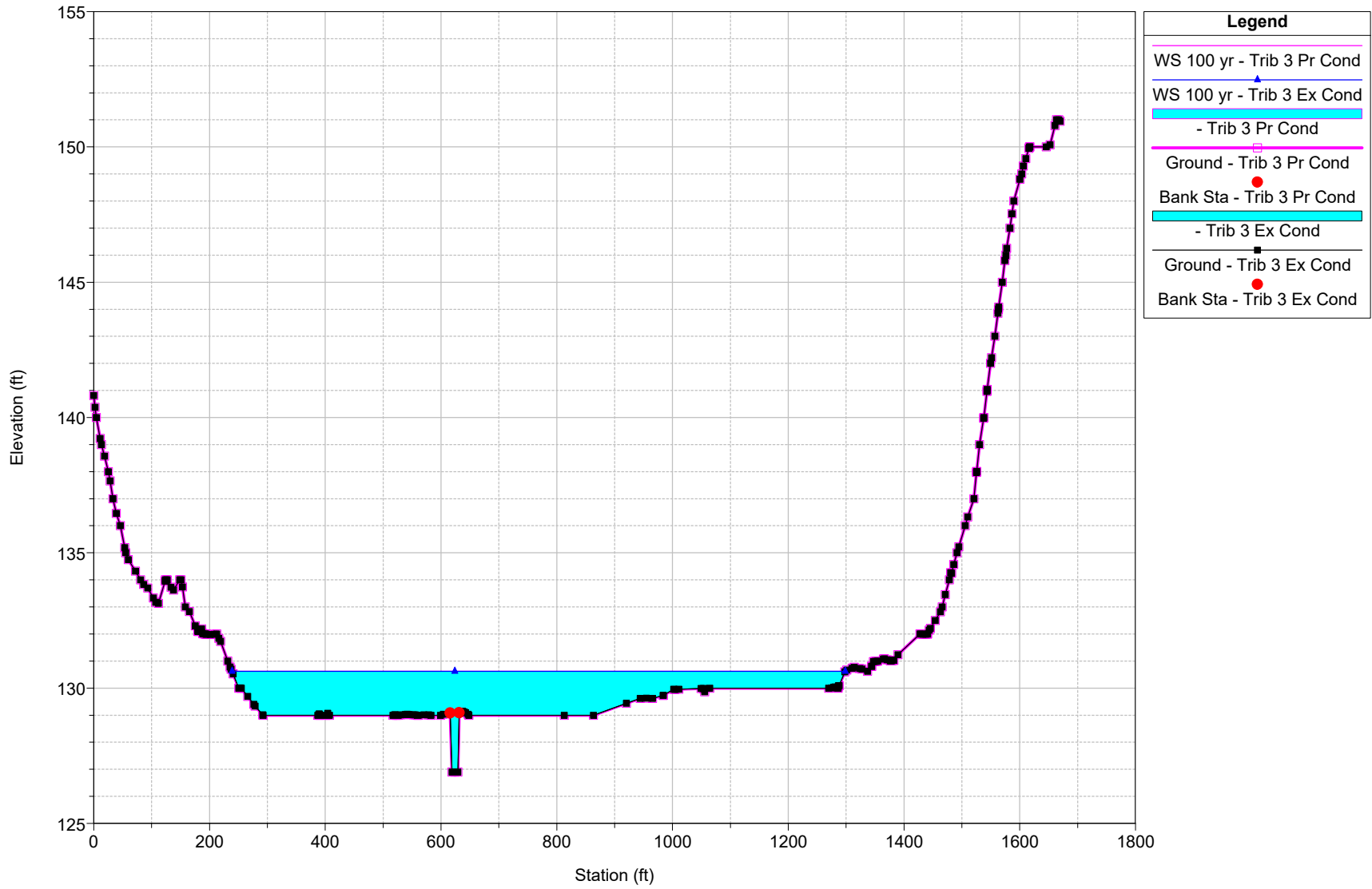
RS = 1600.28



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

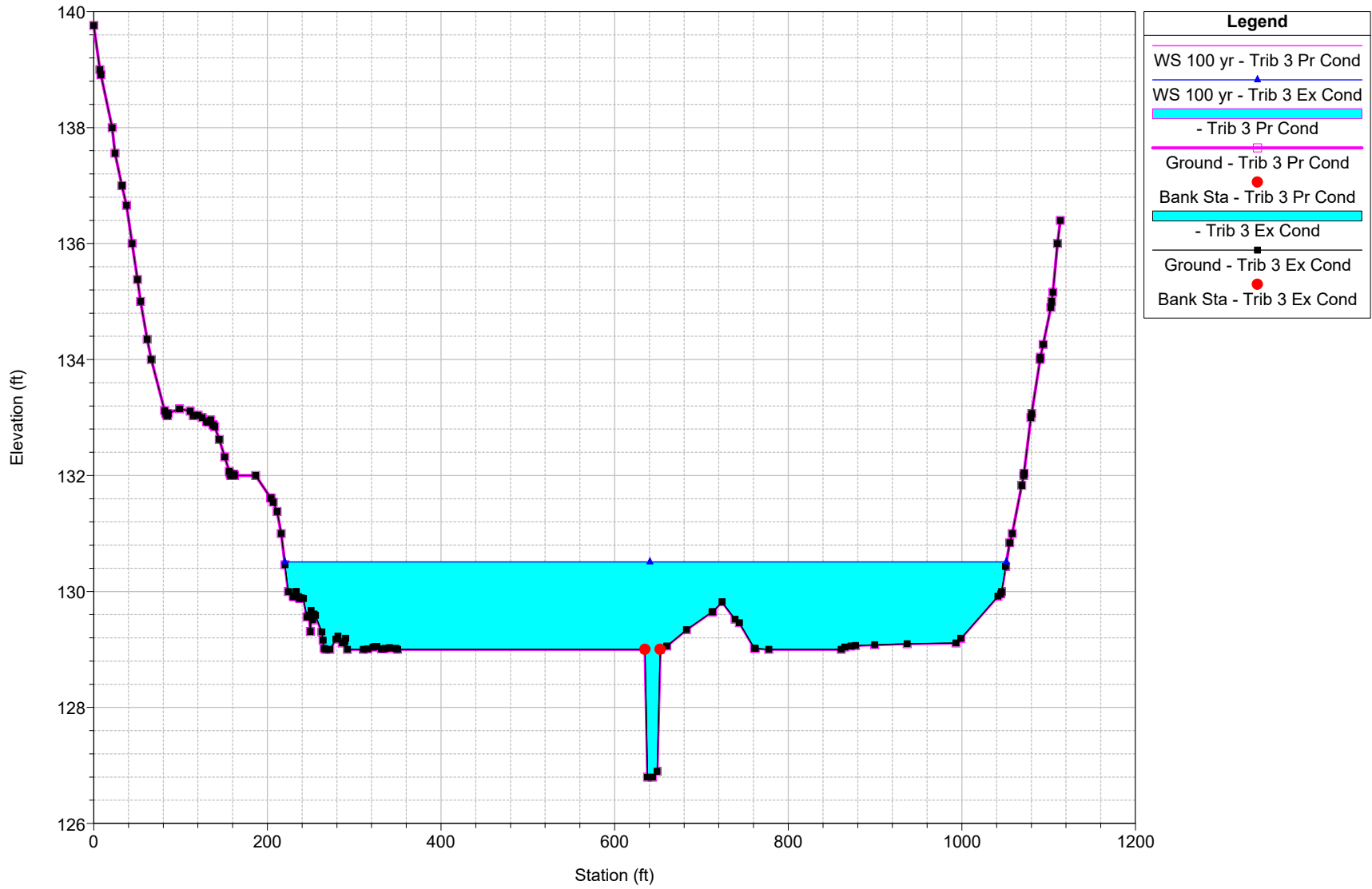
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

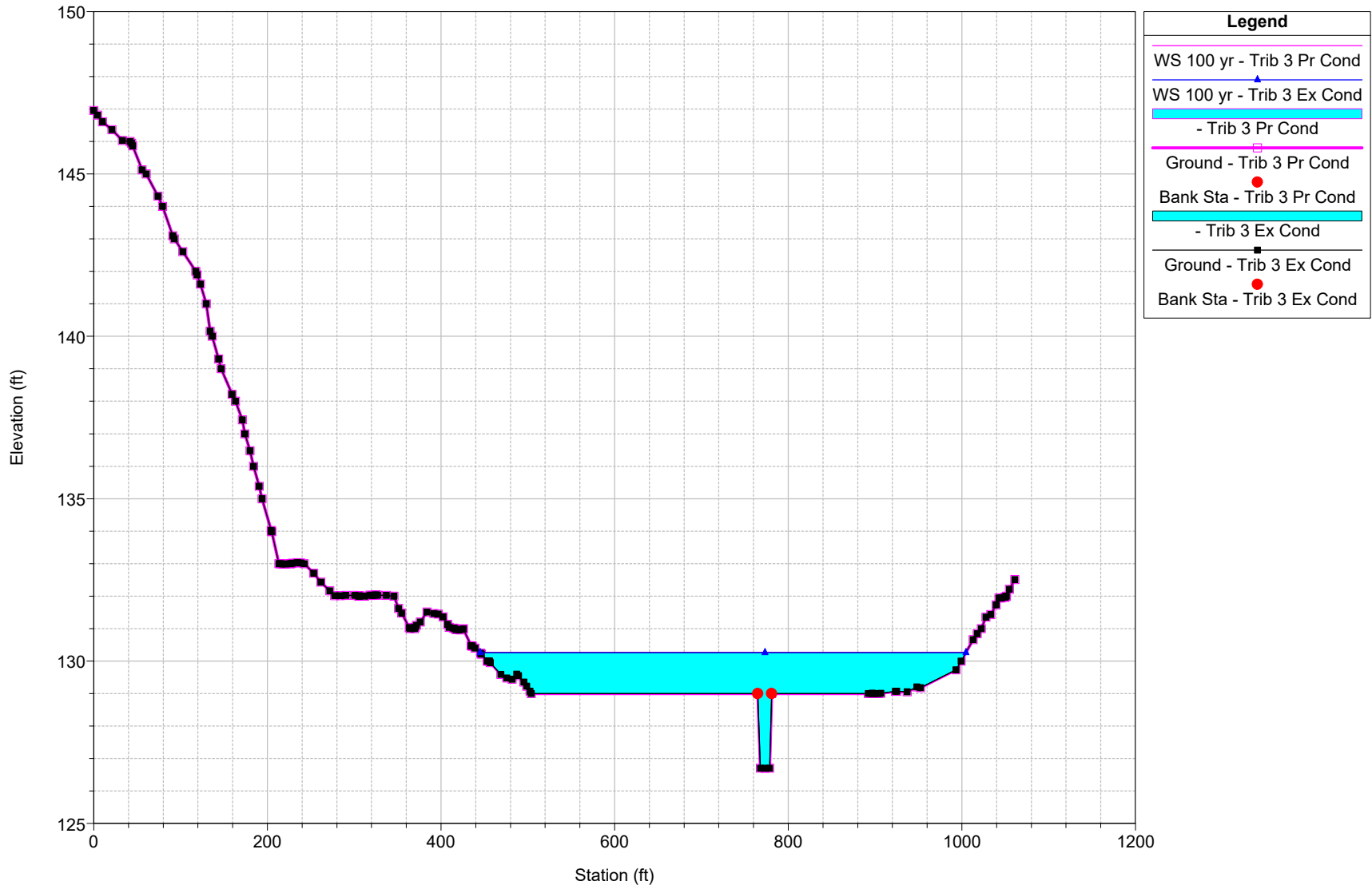
RS = 1406.3



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

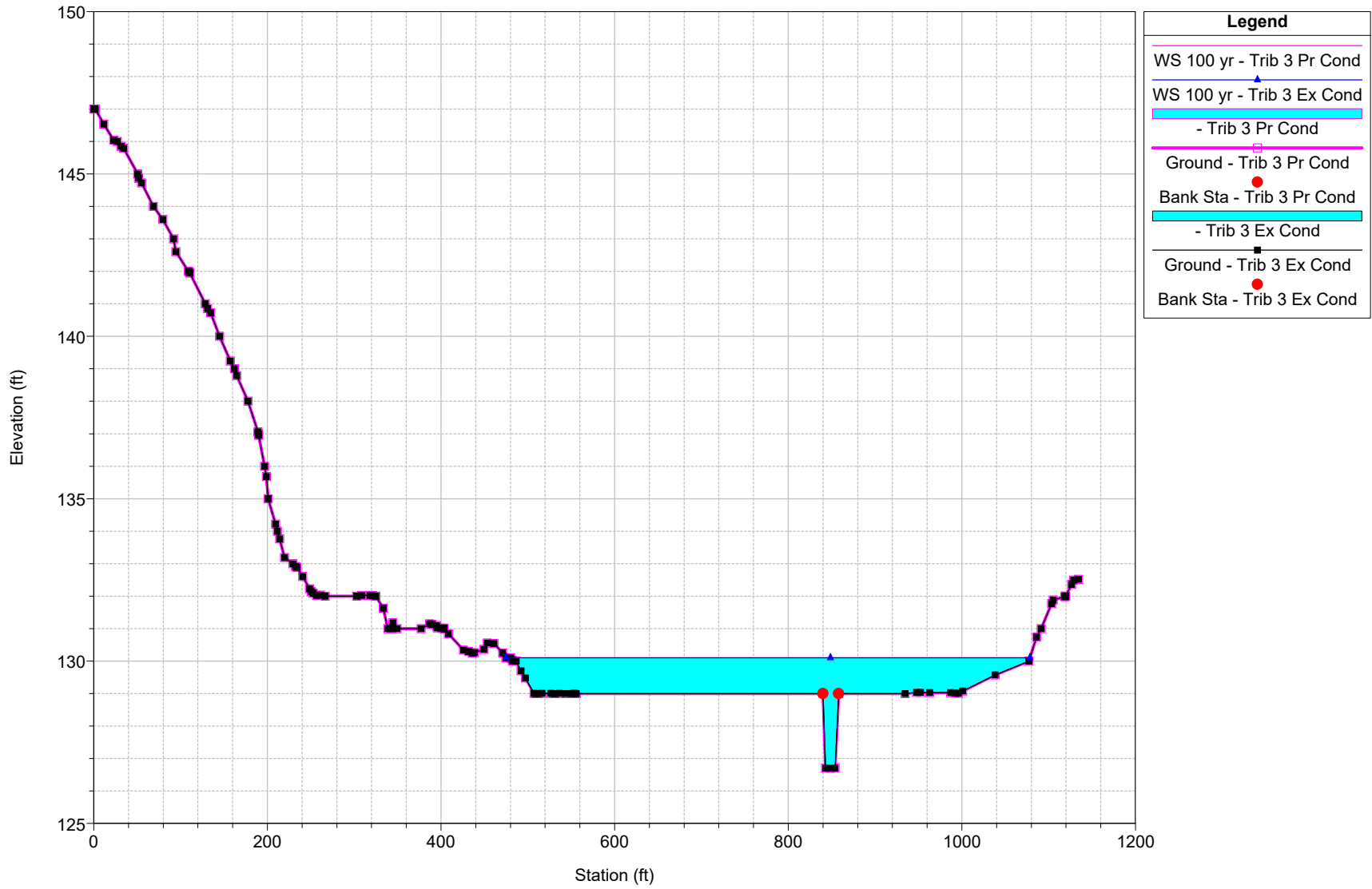
RS = 1201.38



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

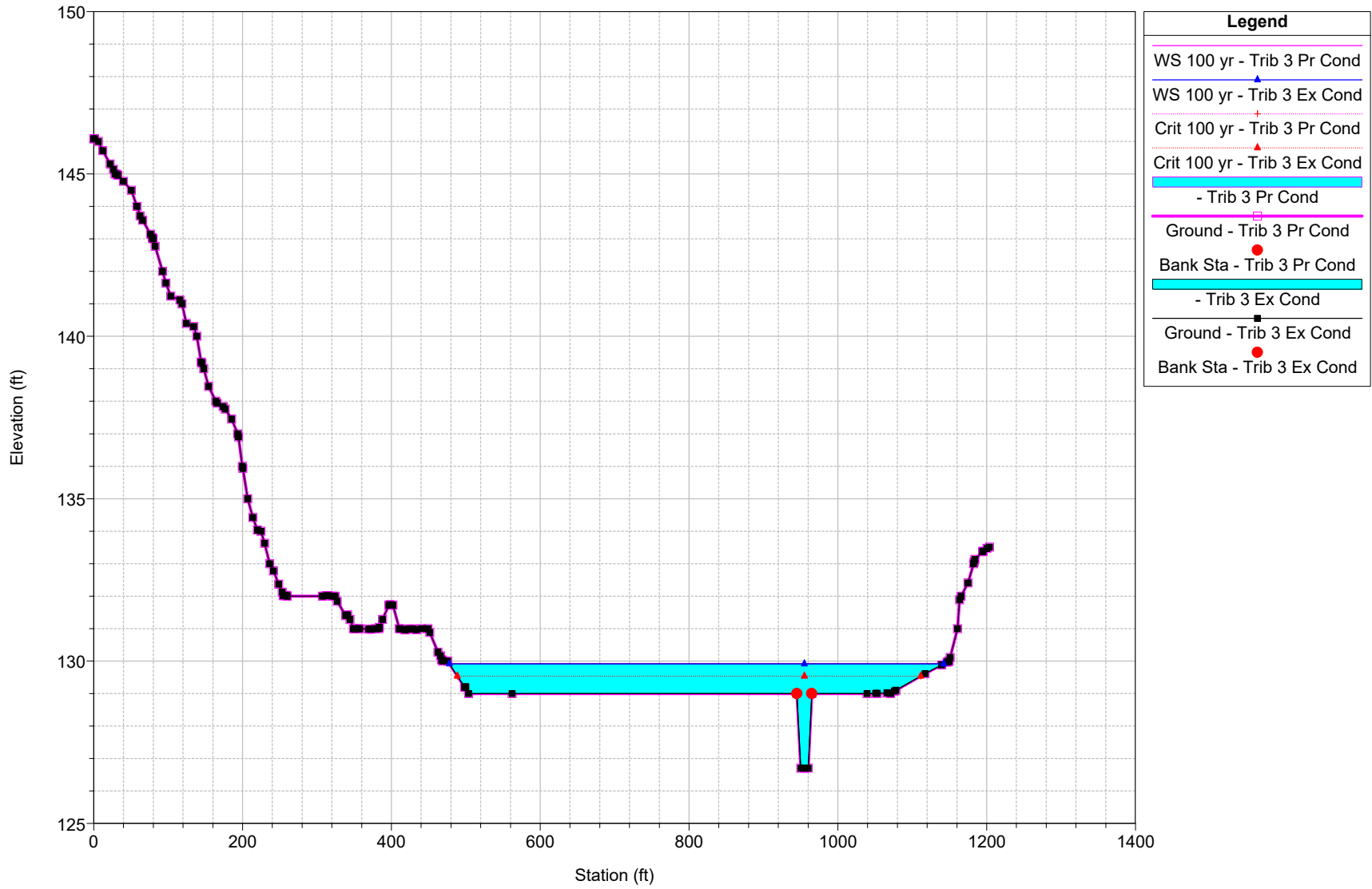
RS = 1099.53



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 1013.78



APPENDIX 3

Supporting Maps



LOCATION OF PROPOSED WORK

POA-1

DA-1	88.3
135 Ac	

DA-2	82.12
79.5 Ac	

TRIBUTARY 3 TO TUCKAHOE CREEK

POA-2

TOTAL	86
214.5 Ac	

LEGEND

DA LABEL	SCS CURVE NUMBER	DRAINAGE AREA ID
DA TOTAL AREA (ACRES)		DRAINAGE AREA BOUNDARY
		STREAM CENTERLINE

VERTICAL DATUM: NAVD88

THIS DRAWING PREPARED AT THE
CORPORATE OFFICE
 1001 Boulder Parkway, Suite 300 | Richmond, VA 23225
 TEL 804.200.0300 FAX 804.580.1016 www.timmons.com

YOUR VISION ACHIEVED THROUGH OURS.

DATE	REVISION DESCRIPTION
08/20/2020	

DRAWN BY
B. CICHOCKI

DESIGNED BY
B. CICHOCKI

CHECKED BY
S. REEVES

SCALE
 1" = 250'

TIMMONS GROUP

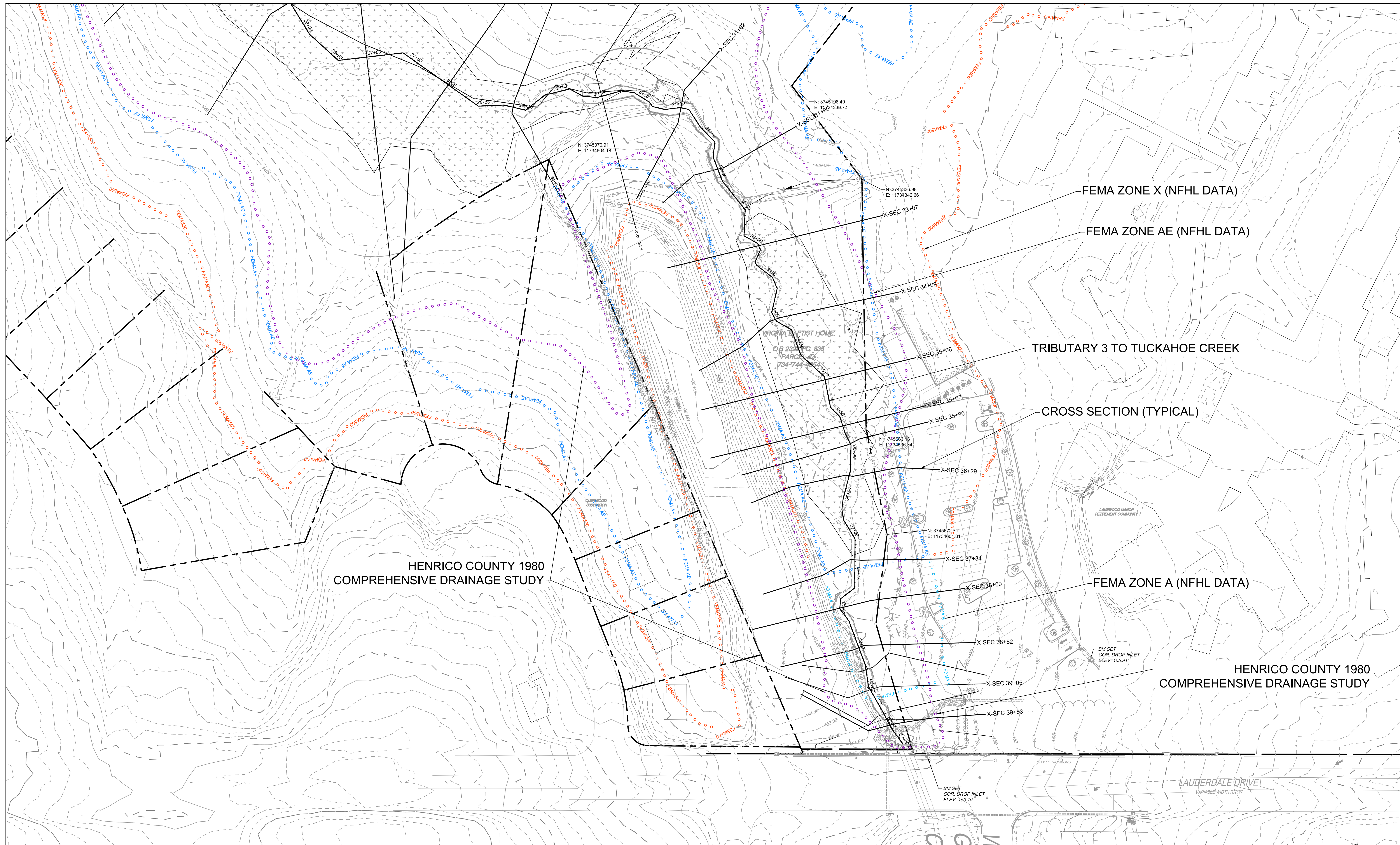
TUCKAHOE CREEK TRIBUTARY 3 FLOOD STUDY
 HENRICO COUNTY - VA
DRAINAGE AREA MAP

JOB NO.
45692

SHEET NO.
EXBT-1

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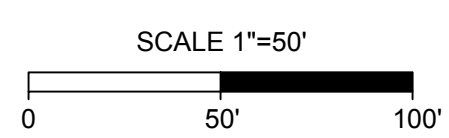
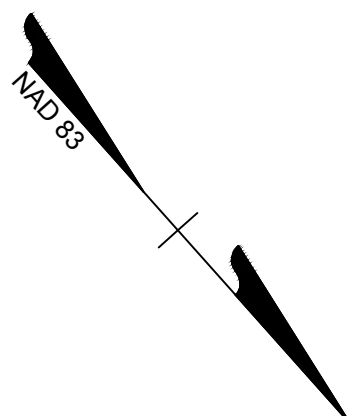
L:\2021\45692_Lakewood\501\DWG\Sheet\Exhibit-1-Hydrology.dwg | Plotted on 02/20/2021 7:01 PM | by Bryan Cichocki



LAKWOOD MANOR

SATELLITE PARKING

FEMA EFFECTIVE NFHL DATA WORK MAP - December 18, 2020



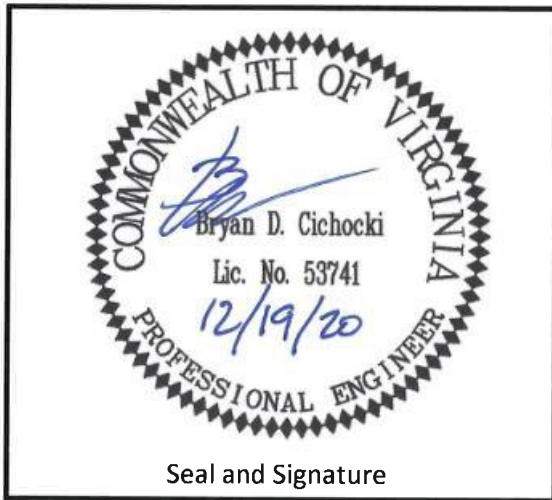
LEGEND	
	FEMA AE
	FEMA A
	FEMA 500 YR
	HENRICO COUNTY 1980 COMPREHENSIVE DRAINAGE STUDY
	FEMA ZONE AE 100 YR
	FEMA ZONE A 100 YR
	FEMA ZONE X 500 YR



APPENDIX 4
No Rise Certification

NO-RISE CERTIFICATION

This document is to certify that I am a duly qualified engineer licensed to practice in the Commonwealth of Virginia. It is to further certify that the attached technical data supports the fact that the proposed Lakewood Manor Satellite Parking Project will not increase the 100yr base flood elevations, floodway elevations or impact the floodway widths, on Tuckahoe Creek at published cross-sections in the Flood Insurance Study for Henrico County (Community Number 510077), effective date December 18, 2007 and will not increase the base flood elevations on Tributary 3 to Tuckahoe Creek at unpublished cross-sections in the area of the proposed development.



Bryan Cichocki, PE

Name

Project Manager

Title

608 Preston Avenue, Suite 200

Charlottesville, VA 22902

Address

12/19/2020

Date

FOR COMMUNITY USE ONLY		
<input type="checkbox"/> APPROVED	<input type="checkbox"/> DISAPPROVED	
_____ Name and Title	_____ Signature	_____ Date

APPENDIX 5

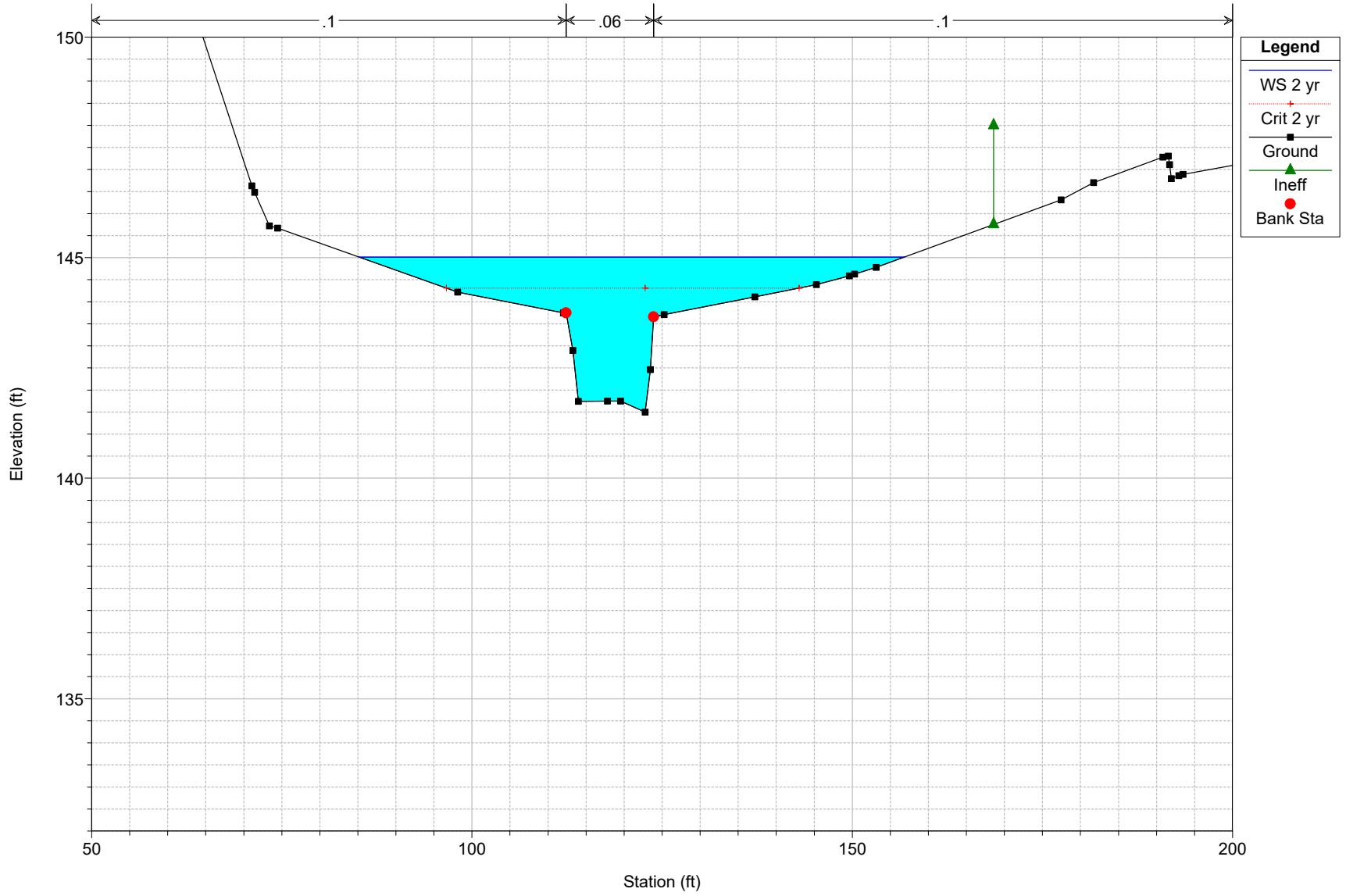
2 & 10YR STORM CROSS SECTIONS AND COMPUTATIONS

**2 YR STORM CROSS SECTIONS AND
COMPUTATIONS**

Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

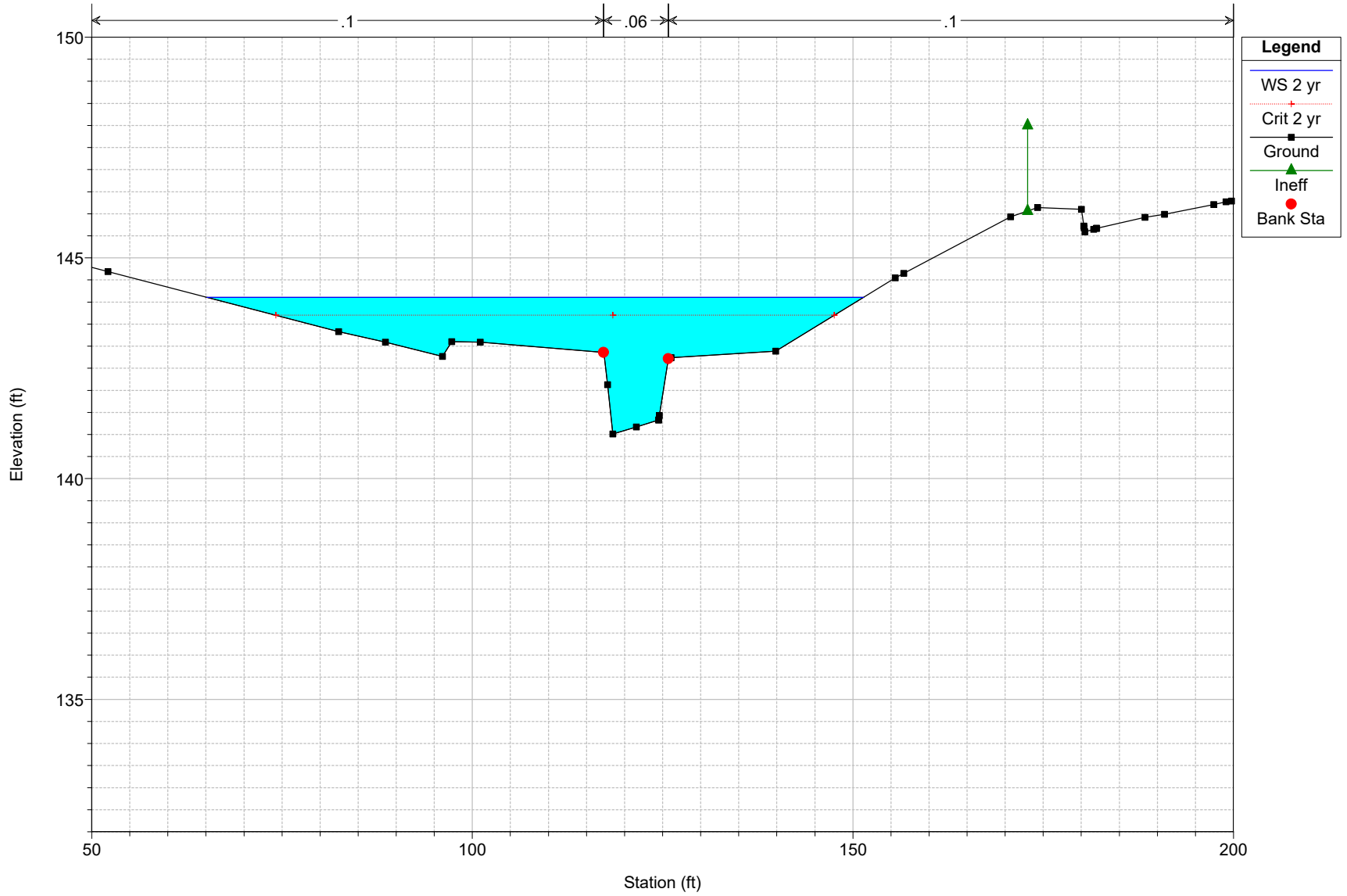
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

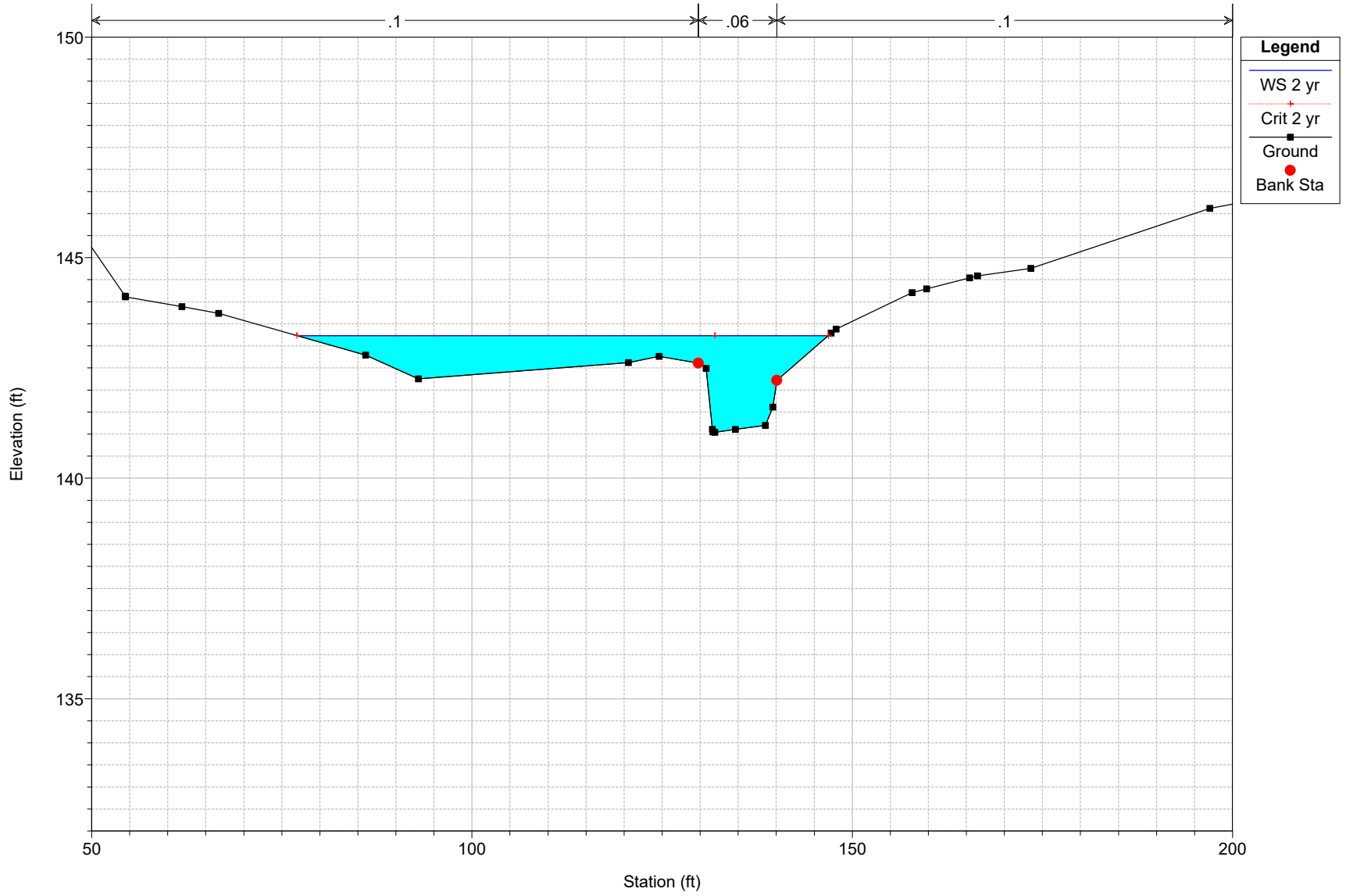
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

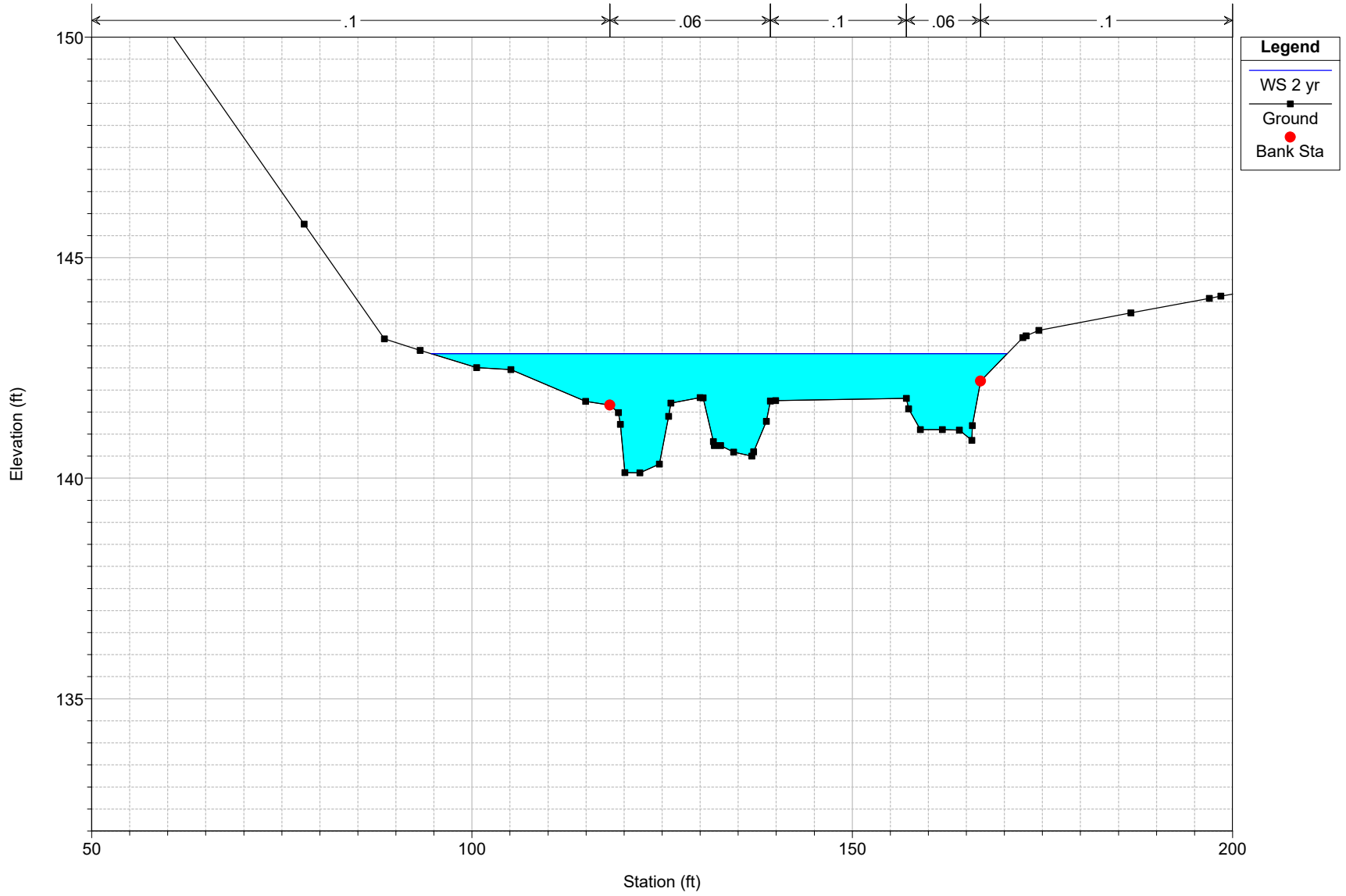
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

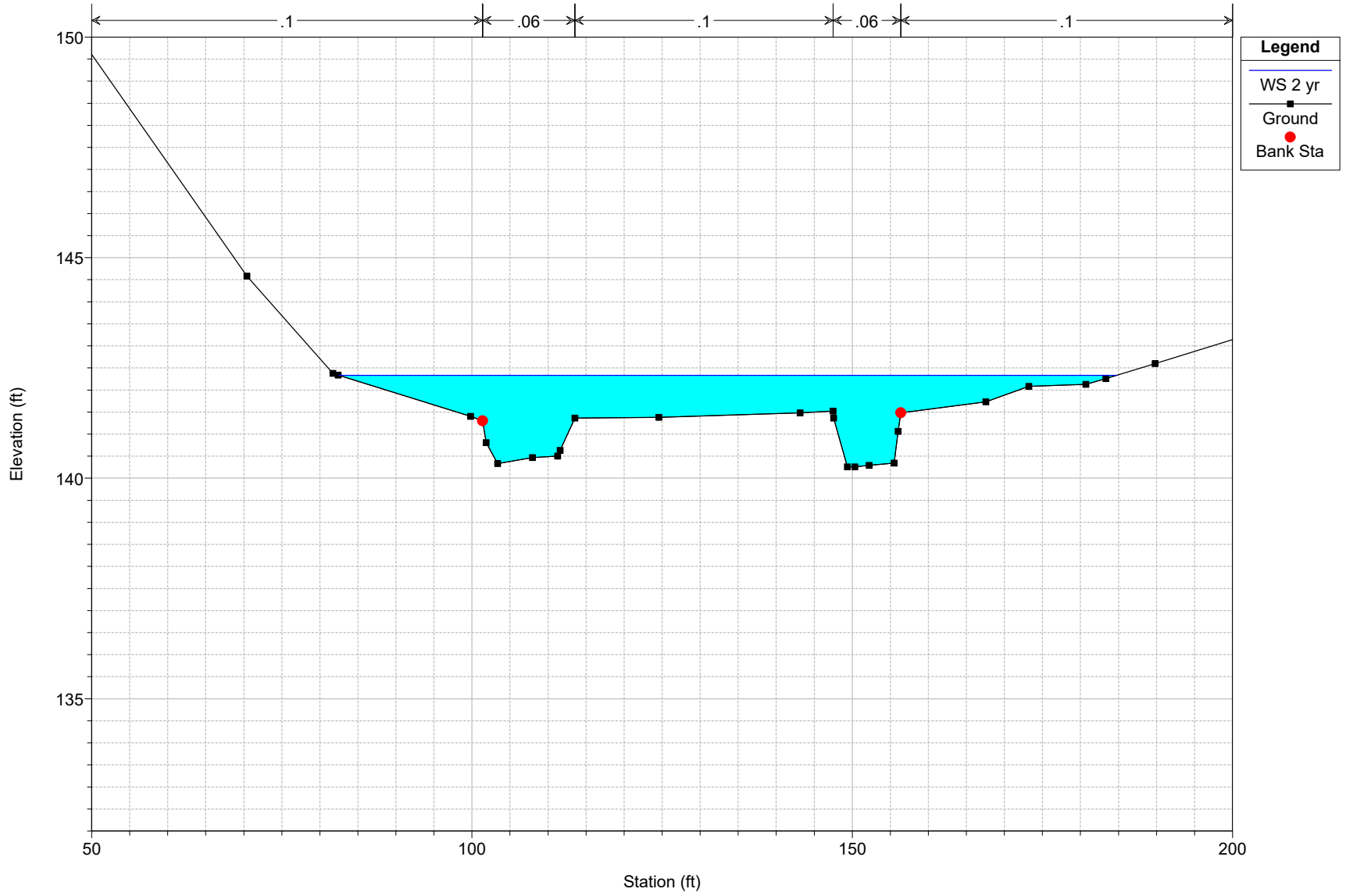
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

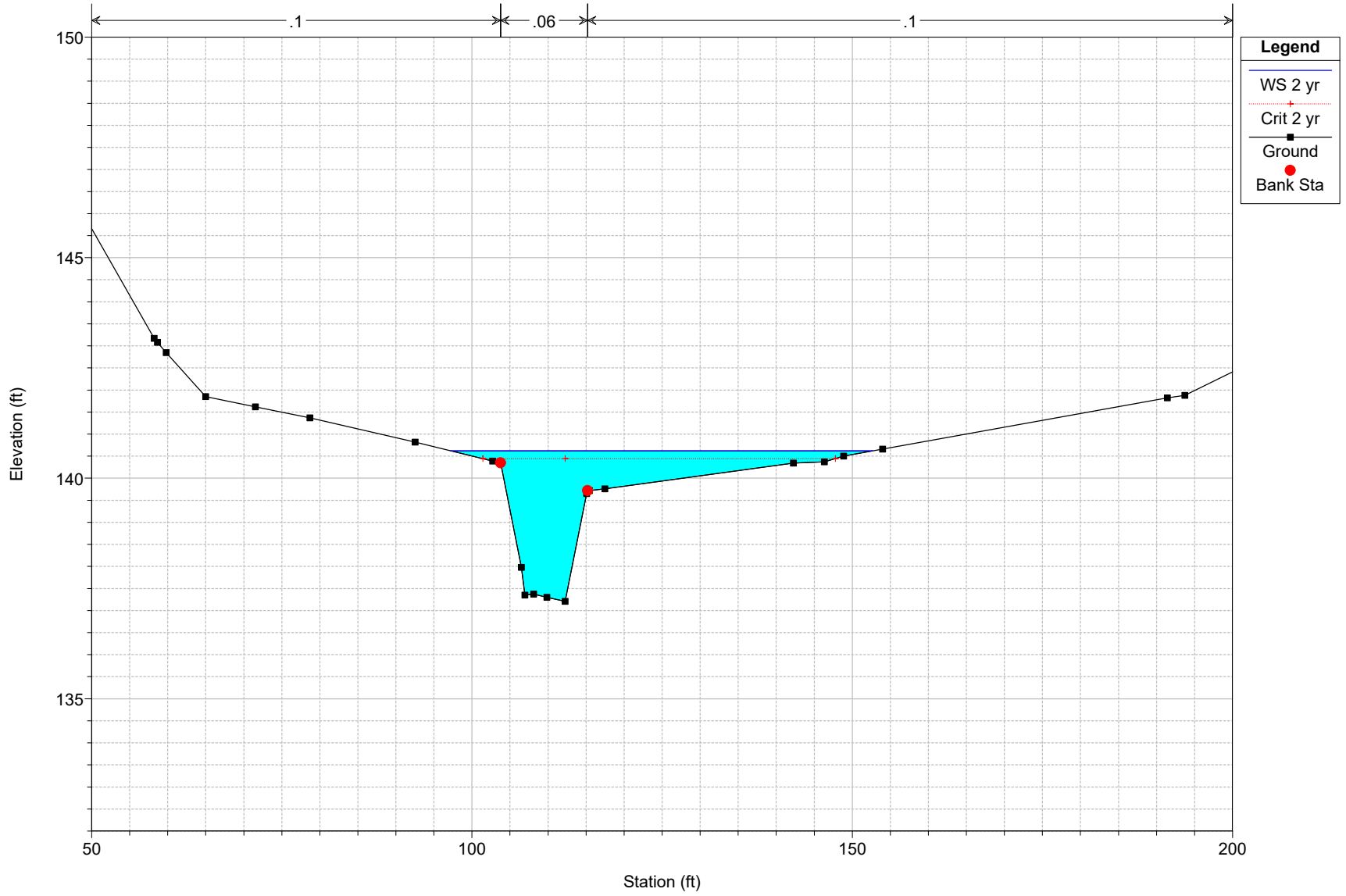
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

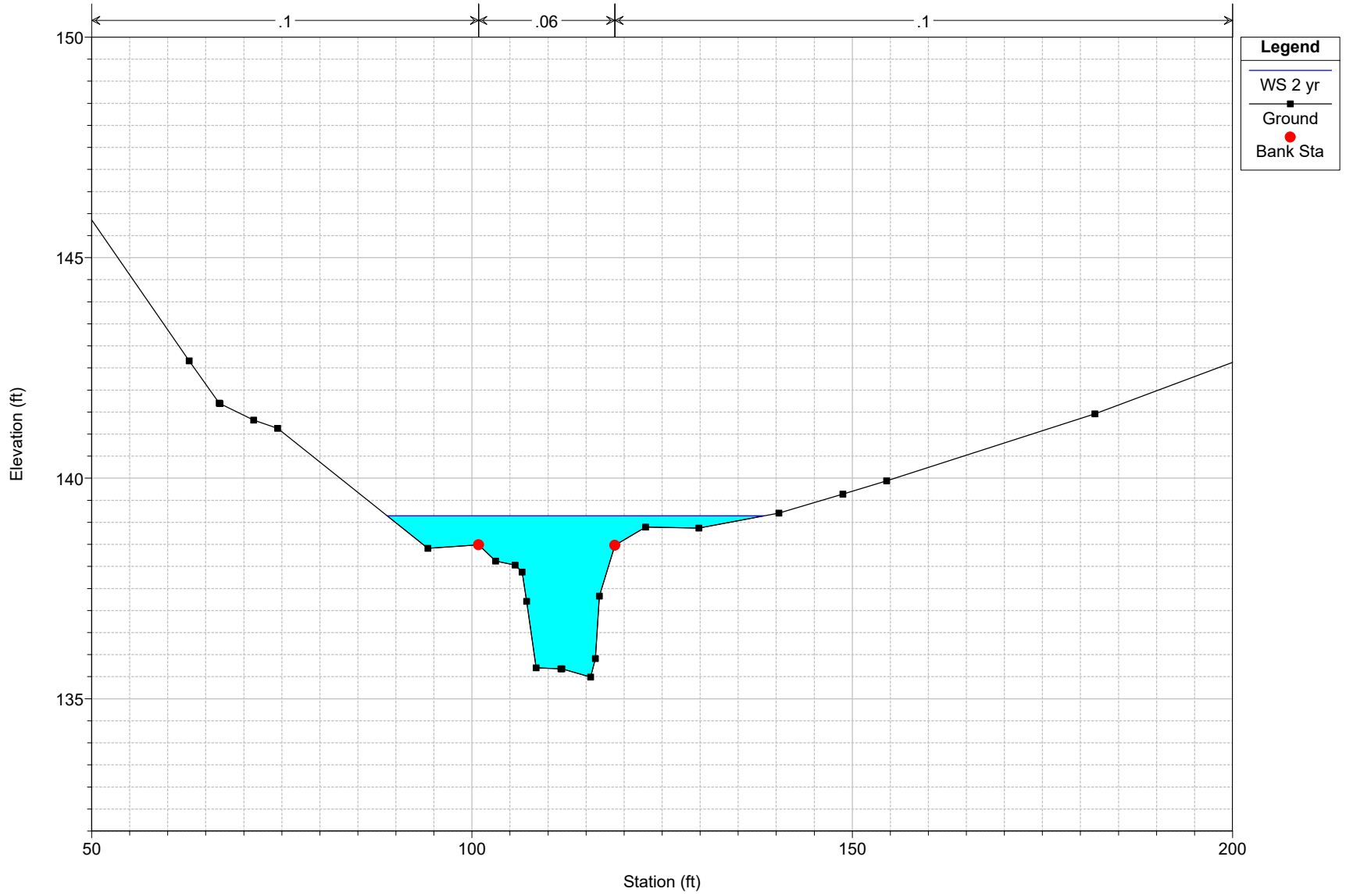
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

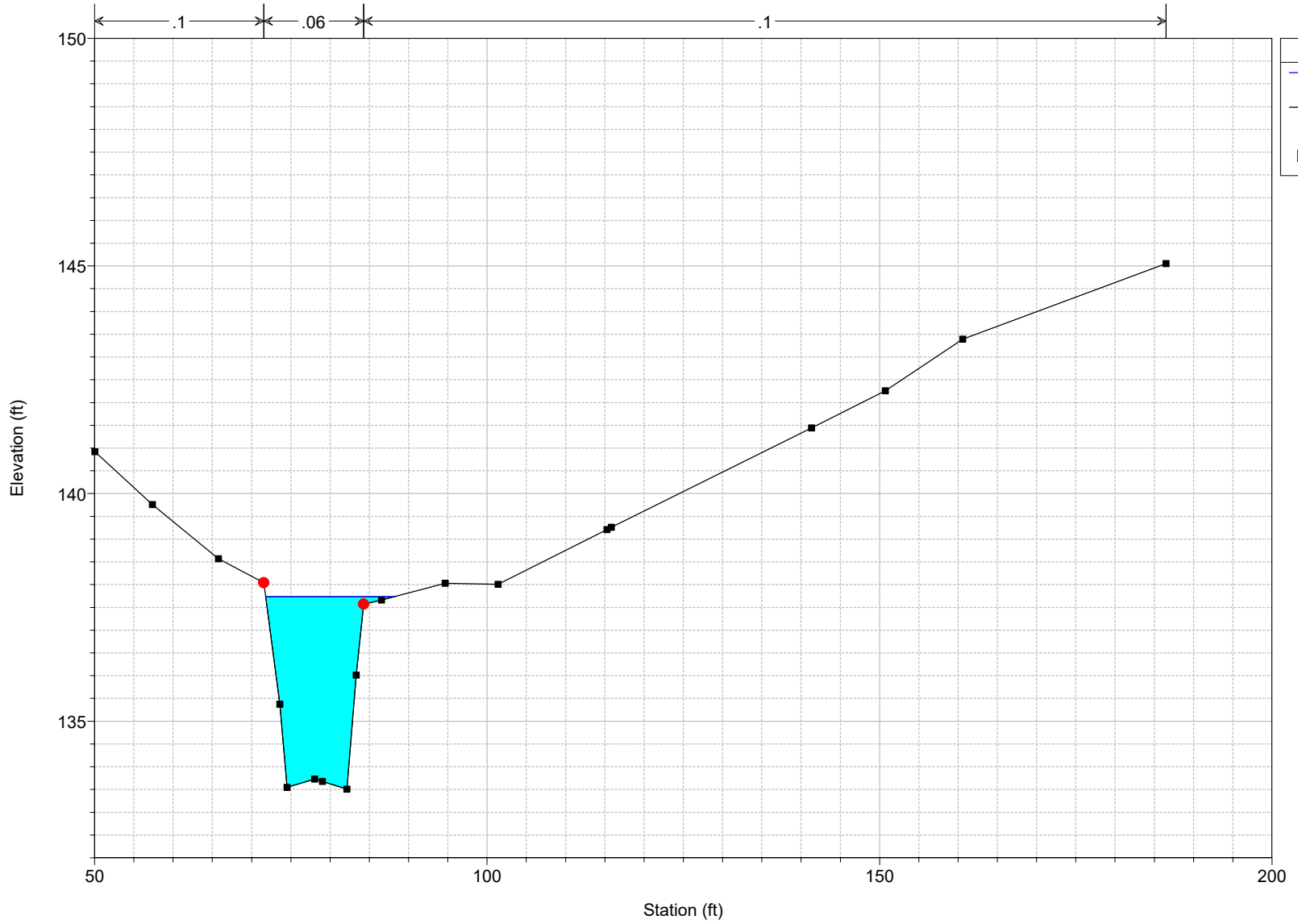
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

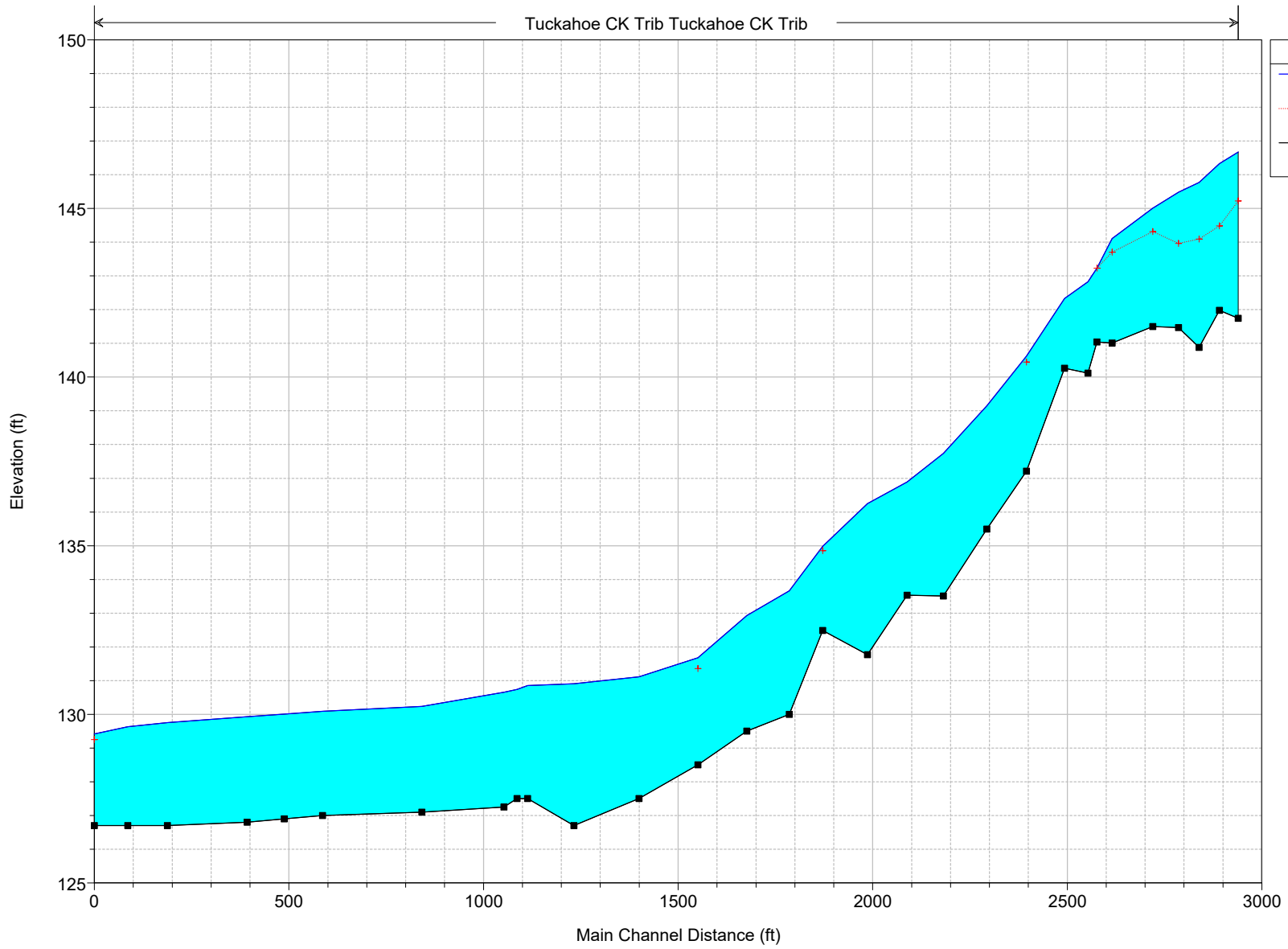
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

Tuckahoe CK Trib Tuckahoe CK Trib



Legend

- WS 2 yr
- Crit 2 yr
- Ground

HEC-RAS River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib Profile: 2 yr

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Hydr Radius (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Vel Left (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	Max Chl Dpth (ft)	Q Channel (cfs)
Tuckahoe CK Trib	3952.9	2 yr	Trib 3 Ex Cond	194.00	141.74	146.67	145.23	1.65	0.012678	5.04	43.16	22.88	0.47		1.12	4.50	4.93	187.29
Tuckahoe CK Trib	3952.9	2 yr	Trib 3 Pr Cond	194.00	141.74	145.86	145.23	1.67	0.029720	6.74	29.15	13.26	0.71		0.71	6.66	4.12	193.70
Tuckahoe CK Trib	3937.90	2 yr	Trib 3 Pr Cond	194.00	141.75	146.15	143.18	4.40	0.001095	2.20	88.09	63.73	0.19			2.20	4.40	194.00
Tuckahoe CK Trib	3904.75	2 yr	Trib 3 Ex Cond	194.00	141.98	146.33	144.48	1.64	0.007060	3.92	52.68	27.12	0.37		0.53	3.68	4.35	192.06
Tuckahoe CK Trib	3880	2 yr	Trib 3 Pr Cond	194.00	141.50	146.12	142.93	4.62	0.000937	2.10	92.30	49.54	0.17			2.10	4.62	194.00
Tuckahoe CK Trib	3852.34	2 yr	Trib 3 Ex Cond	194.00	140.88	145.77	144.09	1.15	0.011044	4.73	51.98	40.43	0.44		0.93	3.73	4.89	181.25
Tuckahoe CK Trib	3852.34	2 yr	Trib 3 Pr Cond	194.00	140.88	145.77	144.09	1.43	0.011058	4.73	49.84	40.32	0.44		1.11	3.89	4.89	181.11
Tuckahoe CK Trib	3799.63	2 yr	Trib 3 Ex Cond	194.00	141.47	145.48	143.97	1.26	0.005847	3.48	83.97	62.54	0.34		0.99	2.31	4.01	155.14
Tuckahoe CK Trib	3799.63	2 yr	Trib 3 Pr Cond	194.00	141.47	145.48	143.97	1.29	0.005821	3.47	83.81	62.49	0.34		1.00	2.31	4.01	154.66
Tuckahoe CK Trib	3733.79	2 yr	Trib 3 Ex Cond	194.00	141.50	145.01	144.31	1.08	0.007875	4.11	80.26	71.64	0.41	1.07	1.10	2.42	3.51	145.32
Tuckahoe CK Trib	3733.79	2 yr	Trib 3 Pr Cond	194.00	141.50	145.01	144.31	1.09	0.007873	4.11	80.14	71.59	0.41	1.07	1.11	2.42	3.51	145.19
Tuckahoe CK Trib	3628.75	2 yr	Trib 3 Ex Cond	194.00	141.01	144.11	143.70	1.05	0.009935	4.25	92.75	86.21	0.46	1.33	1.46	2.09	3.10	97.67
Tuckahoe CK Trib	3628.75	2 yr	Trib 3 Pr Cond	194.00	141.01	144.11	143.70	1.05	0.009923	4.25	92.95	86.65	0.46	1.33	1.46	2.09	3.10	97.60
Tuckahoe CK Trib	3590.08	2 yr	Trib 3 Ex Cond	194.00	141.04	143.23	143.23	0.80	0.032651	6.27	56.61	69.86	0.81	2.00	1.70	3.43	2.19	119.89
Tuckahoe CK Trib	3590.08	2 yr	Trib 3 Pr Cond	194.00	141.04	143.23	143.23	0.80	0.032651	6.27	56.61	69.86	0.81	2.00	1.70	3.43	2.19	119.89
Tuckahoe CK Trib	3567.08	2 yr	Trib 3 Ex Cond	194.00	140.12	142.82		1.12	0.006799	2.46	88.47	75.70	0.35	0.83	0.56	2.19	2.70	182.48
Tuckahoe CK Trib	3567.08	2 yr	Trib 3 Pr Cond	194.00	140.12	142.82		1.12	0.006799	2.46	88.47	75.70	0.35	0.83	0.56	2.19	2.70	182.48
Tuckahoe CK Trib	3506.4	2 yr	Trib 3 Ex Cond	194.00	140.26	142.33		0.88	0.009667	2.52	91.38	102.23	0.40	0.93	0.85	2.12	2.07	174.19
Tuckahoe CK Trib	3506.4	2 yr	Trib 3 Pr Cond	194.00	140.26	142.33		0.88	0.009667	2.52	91.38	102.23	0.40	0.93	0.85	2.12	2.07	174.19
Tuckahoe CK Trib	3409.13	2 yr	Trib 3 Ex Cond	194.00	137.21	140.62	140.44	0.83	0.020056	5.85	47.93	55.38	0.65	0.56	1.28	4.05	3.41	170.55
Tuckahoe CK Trib	3409.13	2 yr	Trib 3 Pr Cond	194.00	137.21	140.62	140.44	0.83	0.020056	5.85	47.93	55.38	0.65	0.56	1.28	4.05	3.41	170.55
Tuckahoe CK Trib	3306.96	2 yr	Trib 3 Ex Cond	194.00	135.49	139.15		1.01	0.012625	4.45	52.76	49.55	0.52	1.12	0.66	3.68	3.66	183.33
Tuckahoe CK Trib	3306.96	2 yr	Trib 3 Pr Cond	194.00	135.49	139.15		1.01	0.012625	4.45	52.76	49.55	0.52	1.12	0.66	3.68	3.66	183.33
Tuckahoe CK Trib	3195.49	2 yr	Trib 3 Ex Cond	194.00	133.51	137.74		1.94	0.011609	4.74	41.21	16.46	0.46		0.31	4.71	4.23	193.89
Tuckahoe CK Trib	3195.49	2 yr	Trib 3 Pr Cond	194.00	133.51	137.74		1.94	0.011609	4.74	41.21	16.46	0.46		0.31	4.71	4.23	193.89
Tuckahoe CK Trib	3102.46	2 yr	Trib 3 Ex Cond	194.00	133.53	136.89		1.82	0.008624	3.96	49.59	24.83	0.44	0.45	0.18	3.91	3.36	193.70
Tuckahoe CK Trib	3102.46	2 yr	Trib 3 Pr Cond	194.00	133.53	136.89		1.82	0.008624	3.96	49.59	24.83	0.44	0.45	0.18	3.91	3.36	193.70
Tuckahoe CK Trib	3000.61	2 yr	Trib 3 Ex Cond	194.00	131.77	136.25		1.34	0.005461	3.47	75.46	50.75	0.32	0.47	0.91	2.57	4.48	170.68
Tuckahoe CK Trib	3000.61	2 yr	Trib 3 Pr Cond	194.00	131.77	136.25		1.34	0.005461	3.47	75.46	50.75	0.32	0.47	0.91	2.57	4.48	170.68
Tuckahoe CK Trib	2885.24	2 yr	Trib 3 Ex Cond	259.00	132.49	134.98	134.85	0.83	0.018231	5.35	86.88	103.33	0.65	1.34	1.59	2.98	2.49	182.75
Tuckahoe CK Trib	2885.24	2 yr	Trib 3 Pr Cond	259.00	132.49	134.98	134.85	0.83	0.018231	5.35	86.88	103.33	0.65	1.34	1.59	2.98	2.49	182.75
Tuckahoe CK Trib	2799.51	2 yr	Trib 3 Ex Cond	259.00	130.00	133.66		0.85	0.011277	4.84	101.90	117.27	0.49	1.16	1.06	2.54	3.66	187.63
Tuckahoe CK Trib	2799.51	2 yr	Trib 3 Pr Cond	259.00	130.00	133.66		0.85	0.011277	4.84	101.90	117.27	0.49	1.16	1.06	2.54	3.66	187.63
Tuckahoe CK Trib	2690.12	2 yr	Trib 3 Ex Cond	259.00	129.50	132.93		0.99	0.005549	3.51	152.91	151.68	0.36	0.84	0.99	1.69	3.43	155.14
Tuckahoe CK Trib	2690.12	2 yr	Trib 3 Pr Cond	259.00	129.50	132.93		0.99	0.005549	3.51	152.91	151.68	0.36	0.84	0.99	1.69	3.43	155.14
Tuckahoe CK Trib	2564.96	2 yr	Trib 3 Ex Cond	259.00	128.50	131.68	131.35	0.76	0.014629	5.41	74.48	96.50	0.57	1.13	0.95	3.48	3.18	224.09
Tuckahoe CK Trib	2564.96	2 yr	Trib 3 Pr Cond	259.00	128.50	131.68	131.35	0.76	0.014629	5.41	74.48	96.50	0.57	1.13	0.95	3.48	3.18	224.09
Tuckahoe CK Trib	2413.06	2 yr	Trib 3 Ex Cond	259.00	127.50	131.12		1.16	0.002673	2.47	213.94	182.75	0.25	0.36	0.78	1.21	3.61	137.38
Tuckahoe CK Trib	2413.06	2 yr	Trib 3 Pr Cond	259.00	127.50	131.12		1.16	0.002673	2.47	213.94	182.75	0.25	0.36	0.78	1.21	3.61	137.38
Tuckahoe CK Trib	2246.04	2 yr	Trib 3 Ex Cond	259.00	126.70	130.91		1.53	0.000836	1.55	345.51	224.47	0.15	0.37	0.54	0.75	4.21	113.70
Tuckahoe CK Trib	2246.04	2 yr	Trib 3 Pr Cond	259.00	126.70	130.91		1.53	0.000836	1.55	345.51	224.47	0.15	0.37	0.54	0.75	4.21	113.70
Tuckahoe CK Trib	2126.75	2 yr	Trib 3 Ex Cond	259.00	127.50	130.86		1.10	0.000758	1.02	491.51	443.69	0.13	0.37	0.42	0.53	3.36	93.90

HEC-RAS River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib Profile: 2 yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Hydr Radius (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Vel Left (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	Max Chl Dpth (ft)	Q Channel (cfs)
Tuckahoe CK Trib	2126.75	2 yr	Trib 3 Pr Cond	259.00	127.50	130.86		1.10	0.000758	1.02	491.51	443.69	0.13	0.37	0.42	0.53	3.36	93.90
Tuckahoe CK Trib	2100.19	2 yr	Trib 3 Ex Cond	259.00	127.50	130.74		0.86	0.004641	2.63	203.93	236.27	0.33	0.64	0.83	1.27	3.24	132.54
Tuckahoe CK Trib	2100.19	2 yr	Trib 3 Pr Cond	259.00	127.50	130.74		0.86	0.004641	2.63	203.94	236.27	0.33	0.64	0.83	1.27	3.24	132.54
Tuckahoe CK Trib	2066.3	2 yr	Trib 3 Ex Cond	259.00	127.25	130.66		1.00	0.000986	1.55	460.67	460.61	0.16	0.44	0.44	0.56	3.41	76.96
Tuckahoe CK Trib	2066.3	2 yr	Trib 3 Pr Cond	259.00	127.25	130.66		1.00	0.000986	1.55	460.67	460.61	0.16	0.44	0.44	0.56	3.41	76.96
Tuckahoe CK Trib	1855.43	2 yr	Trib 3 Ex Cond	259.00	127.10	130.24		0.61	0.003025	2.43	325.79	536.10	0.26	0.58	0.50	0.79	3.14	103.70
Tuckahoe CK Trib	1855.43	2 yr	Trib 3 Pr Cond	259.00	127.10	130.24		0.61	0.003024	2.43	325.84	536.10	0.26	0.58	0.50	0.79	3.14	103.69
Tuckahoe CK Trib	1600.28	2 yr	Trib 3 Ex Cond	259.00	127.00	130.09		0.94	0.000421	0.94	800.26	849.19	0.10	0.31	0.27	0.32	3.09	40.97
Tuckahoe CK Trib	1600.28	2 yr	Trib 3 Pr Cond	259.00	127.00	130.09		0.94	0.000421	0.94	800.44	849.19	0.10	0.31	0.27	0.32	3.09	40.96
Tuckahoe CK Trib	1501.43	2 yr	Trib 3 Ex Cond	259.00	126.90	130.01		0.68	0.000717	1.21	696.34	1023.36	0.13	0.38	0.24	0.37	3.11	50.80
Tuckahoe CK Trib	1501.43	2 yr	Trib 3 Pr Cond	259.00	126.90	130.01		0.68	0.000717	1.21	696.62	1023.60	0.13	0.38	0.24	0.37	3.11	50.78
Tuckahoe CK Trib	1406.3	2 yr	Trib 3 Ex Cond	259.00	126.80	129.93		0.84	0.000633	1.15	679.37	809.27	0.12	0.34	0.30	0.38	3.13	54.10
Tuckahoe CK Trib	1406.3	2 yr	Trib 3 Pr Cond	259.00	126.80	129.93		0.84	0.000632	1.15	679.68	809.35	0.12	0.34	0.30	0.38	3.13	54.08
Tuckahoe CK Trib	1201.38	2 yr	Trib 3 Ex Cond	259.00	126.70	129.75		0.73	0.001958	1.97	389.19	530.45	0.21	0.51	0.49	0.67	3.05	83.71
Tuckahoe CK Trib	1201.38	2 yr	Trib 3 Pr Cond	259.00	126.70	129.75		0.73	0.001953	1.97	389.59	530.49	0.21	0.51	0.49	0.66	3.05	83.64
Tuckahoe CK Trib	1099.53	2 yr	Trib 3 Ex Cond	259.00	126.70	129.63		0.65	0.002488	2.15	357.04	549.66	0.24	0.54	0.49	0.73	2.93	96.21
Tuckahoe CK Trib	1099.53	2 yr	Trib 3 Pr Cond	259.00	126.70	129.63		0.65	0.002474	2.15	357.81	549.82	0.24	0.54	0.49	0.72	2.93	96.04
Tuckahoe CK Trib	1013.78	2 yr	Trib 3 Ex Cond	259.00	126.70	129.42	129.25	0.46	0.005001	2.82	282.28	610.82	0.34	0.59	0.54	0.92	2.72	121.12
Tuckahoe CK Trib	1013.78	2 yr	Trib 3 Pr Cond	259.00	126.70	129.42	129.25	0.46	0.005001	2.82	282.28	610.82	0.34	0.59	0.54	0.92	2.72	121.12

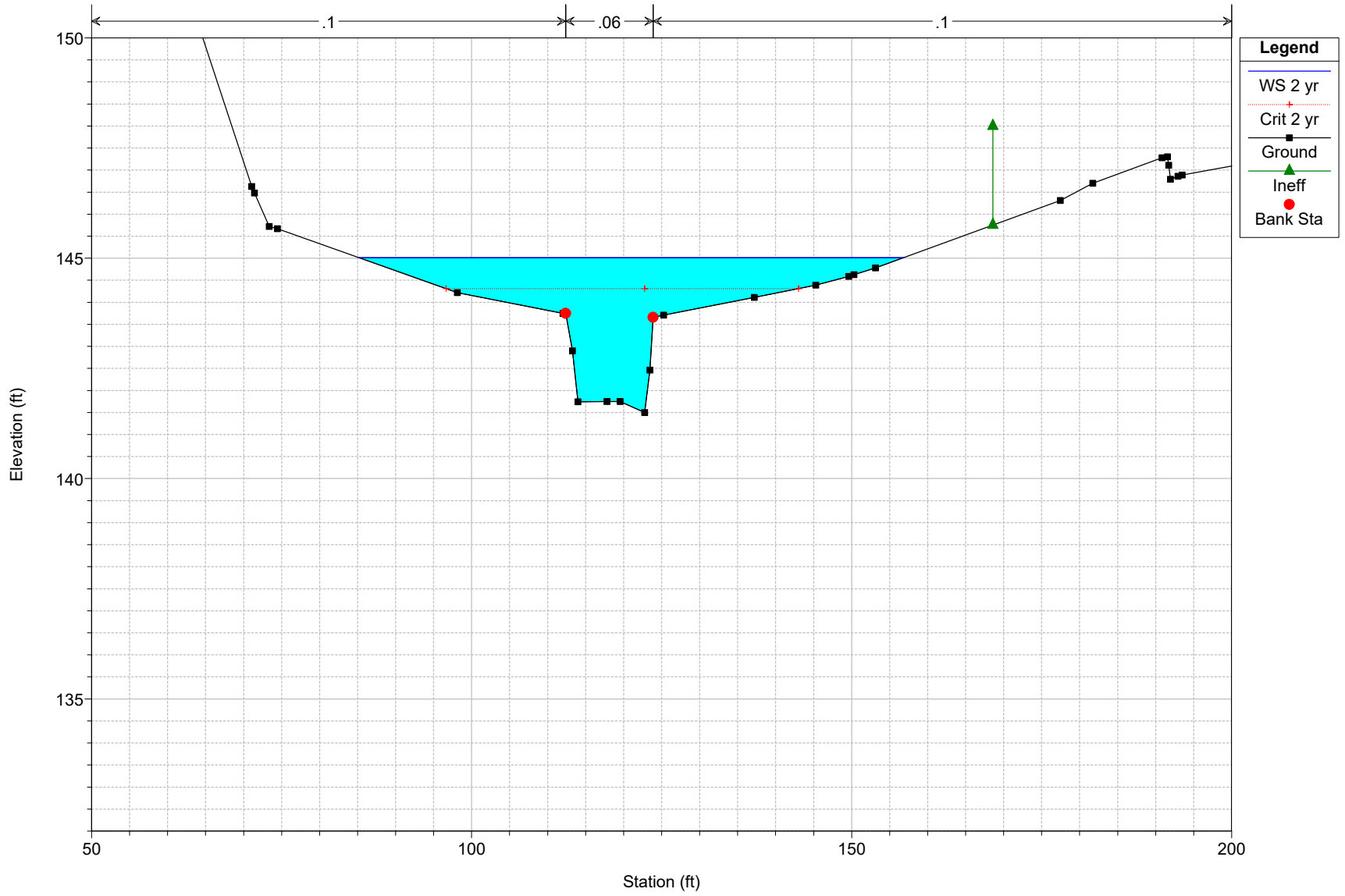
Plan: Trib 3 Pr Cond Tuckahoe CK Trib Tuckahoe CK Trib RS: 3909 Culv Group: Culvert #1 Profile: 2 yr

Q Culv Group (cfs)	194.00	Culv Full Len (ft)	
# Barrels	2	Culv Vel US (ft/s)	2.55
Q Barrel (cfs)	97.00	Culv Vel DS (ft/s)	2.42
E.G. US. (ft)	146.13	Culv Inv El Up (ft)	141.25
W.S. US. (ft)	145.23	Culv Inv El Dn (ft)	141.00
E.G. DS (ft)	146.10	Culv Frctn Ls (ft)	0.01
W.S. DS (ft)	145.77	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.03	Culv Entr Loss (ft)	0.02
Delta WS (ft)	0.54	Q Weir (cfs)	
E.G. IC (ft)	143.85	Weir Sta Lft (ft)	
E.G. OC (ft)	146.13	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	146.00	Weir Max Depth (ft)	
Culv WS Outlet (ft)	146.01	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.49	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.66	Min El Weir Flow (ft)	151.01

Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

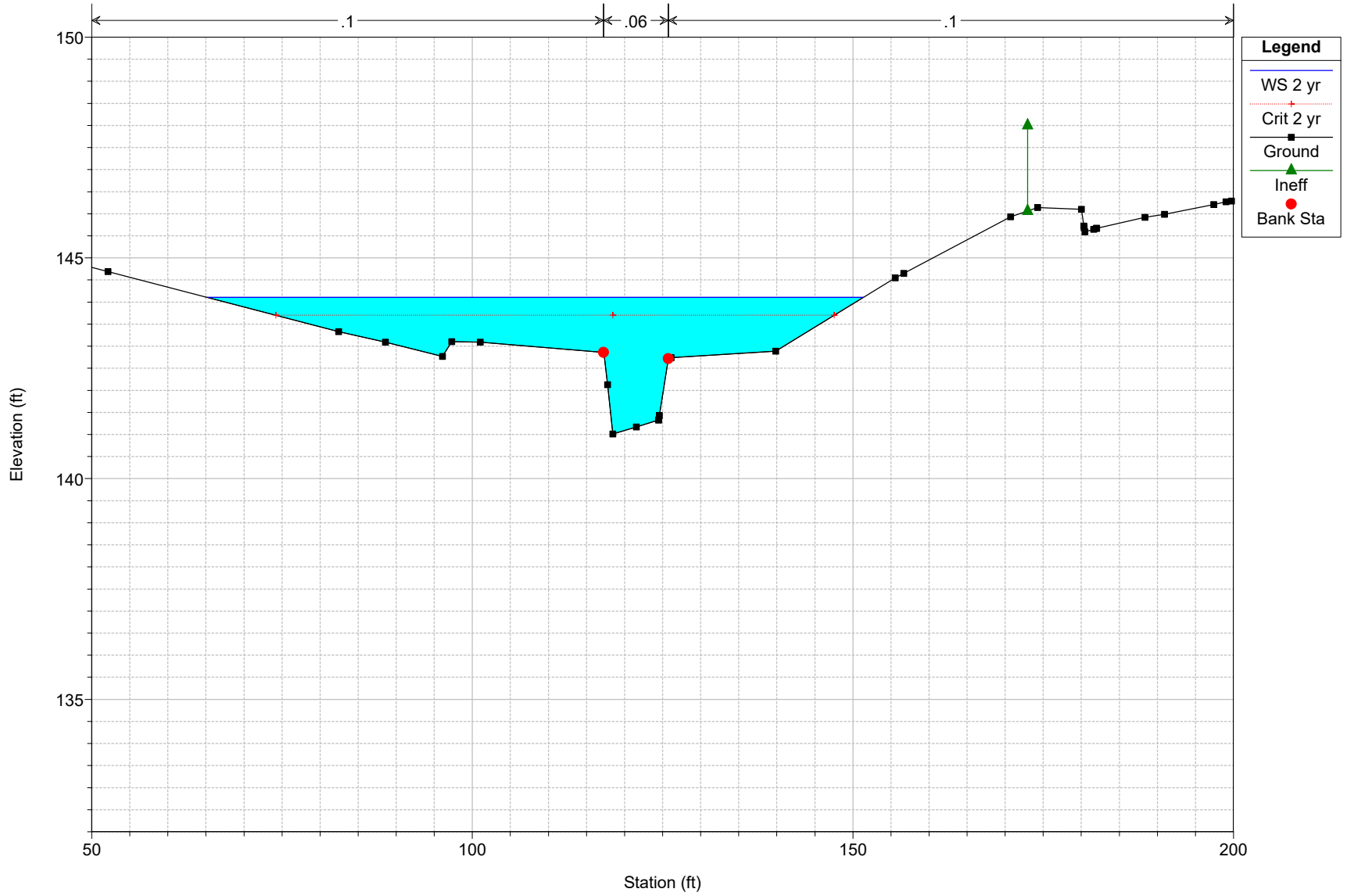
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

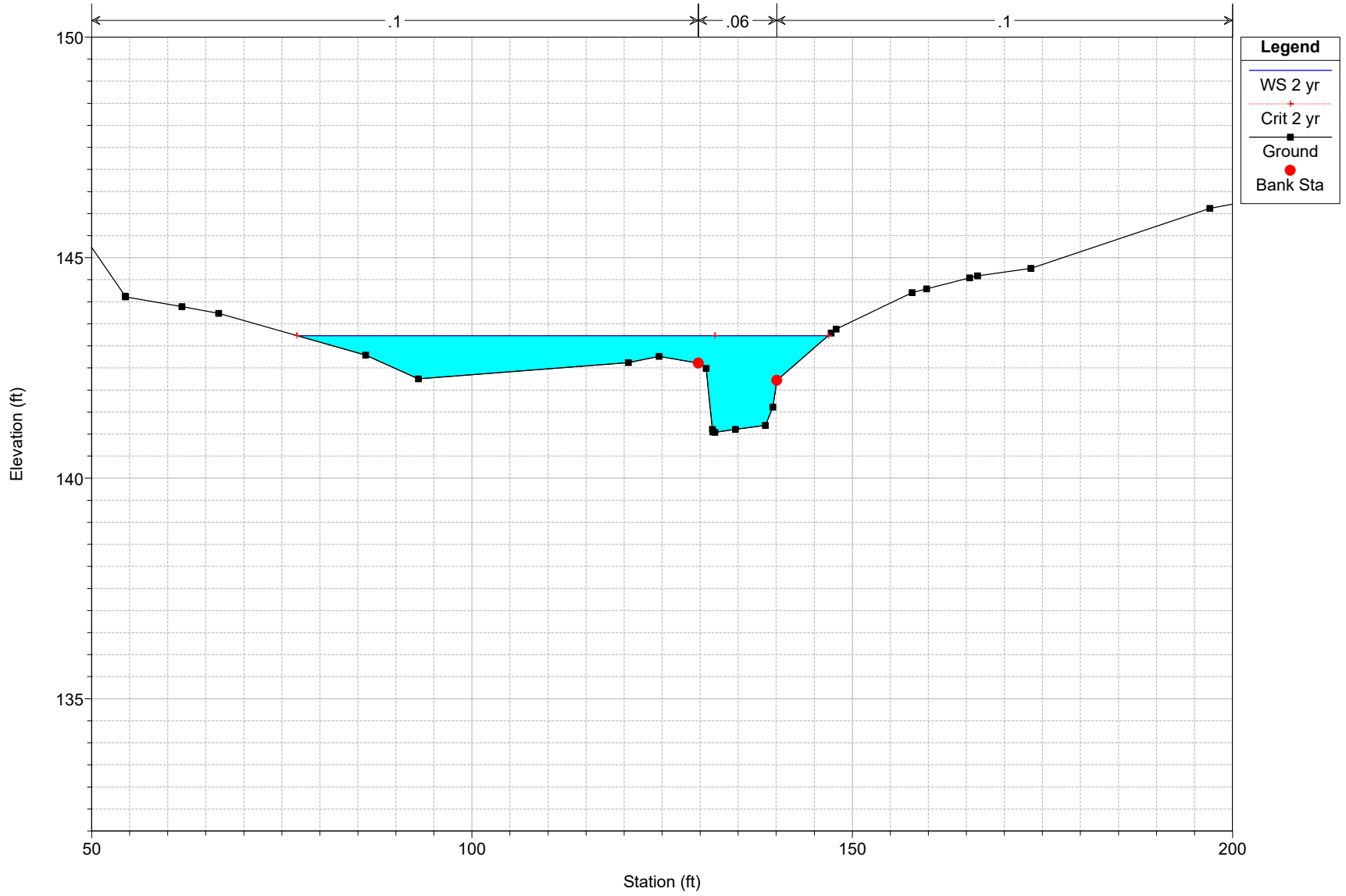
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

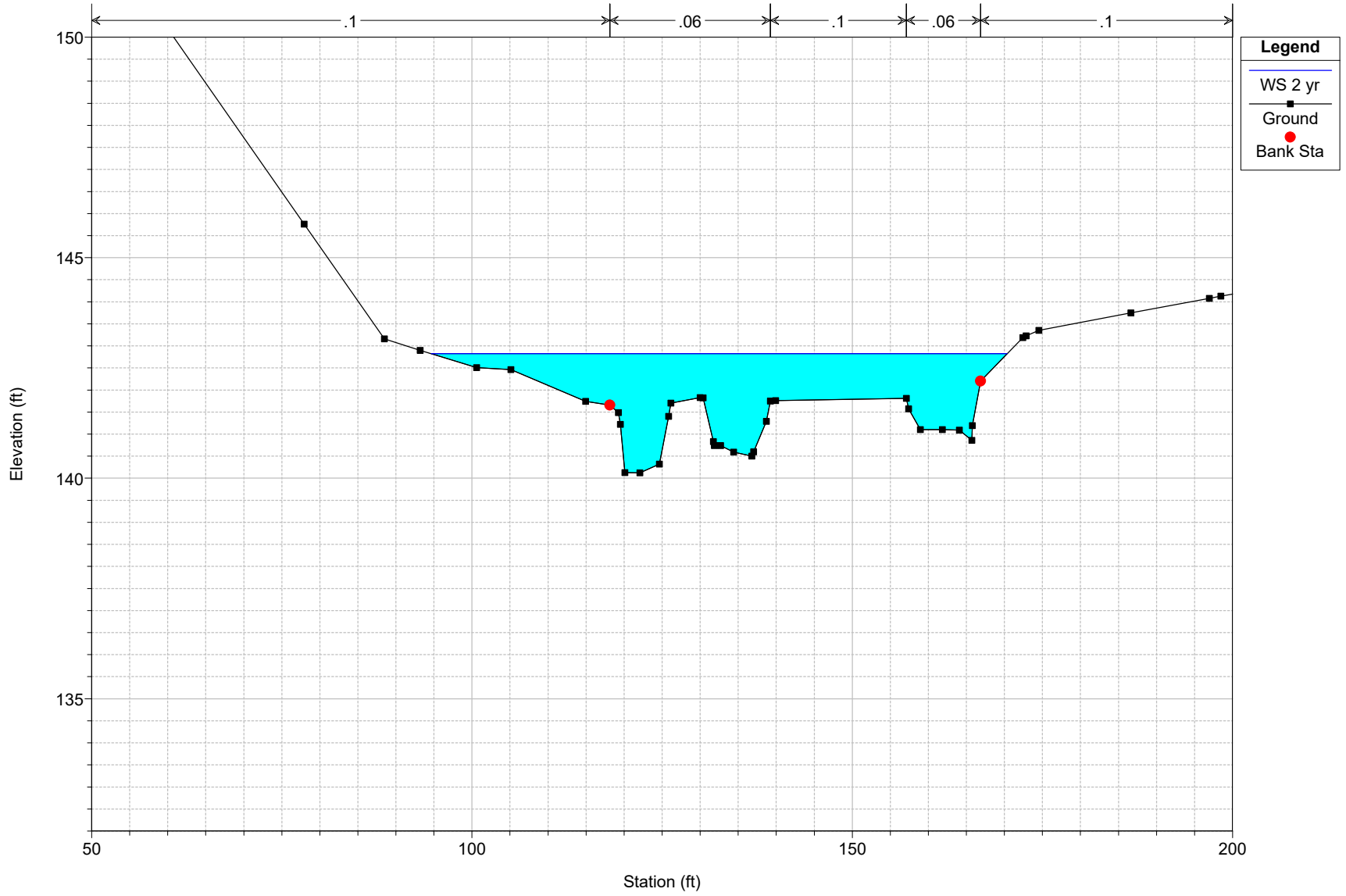
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

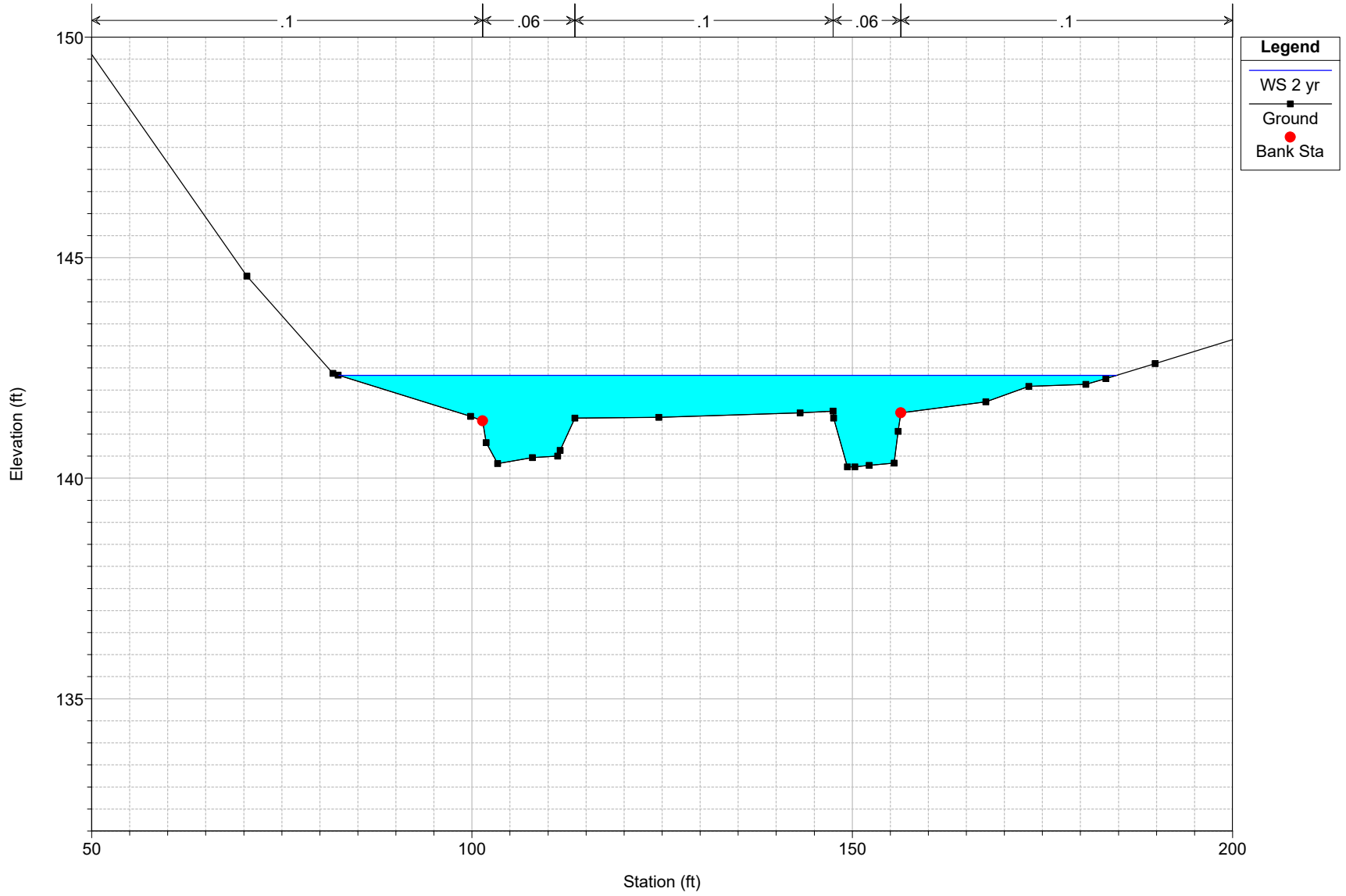
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

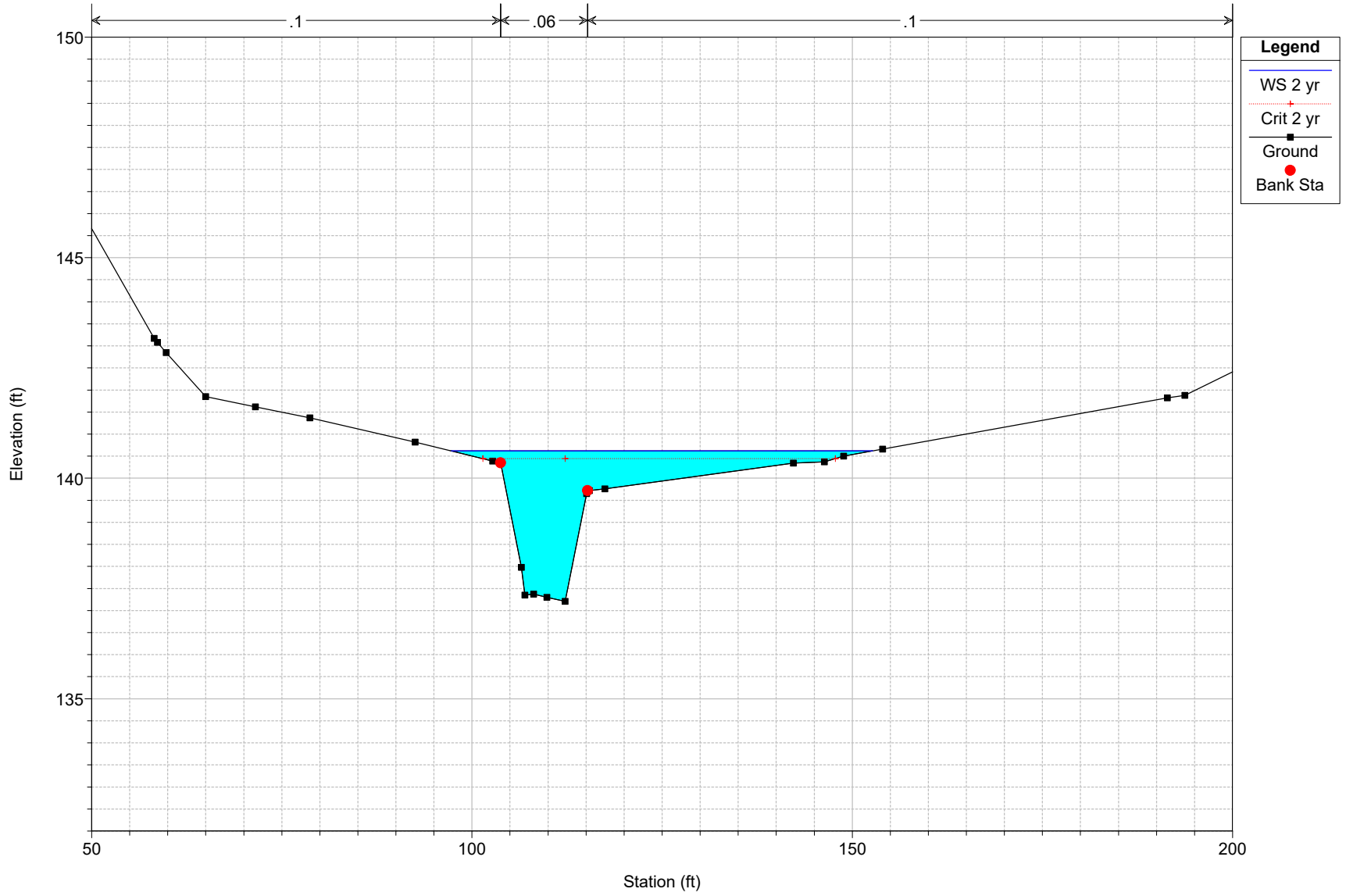
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

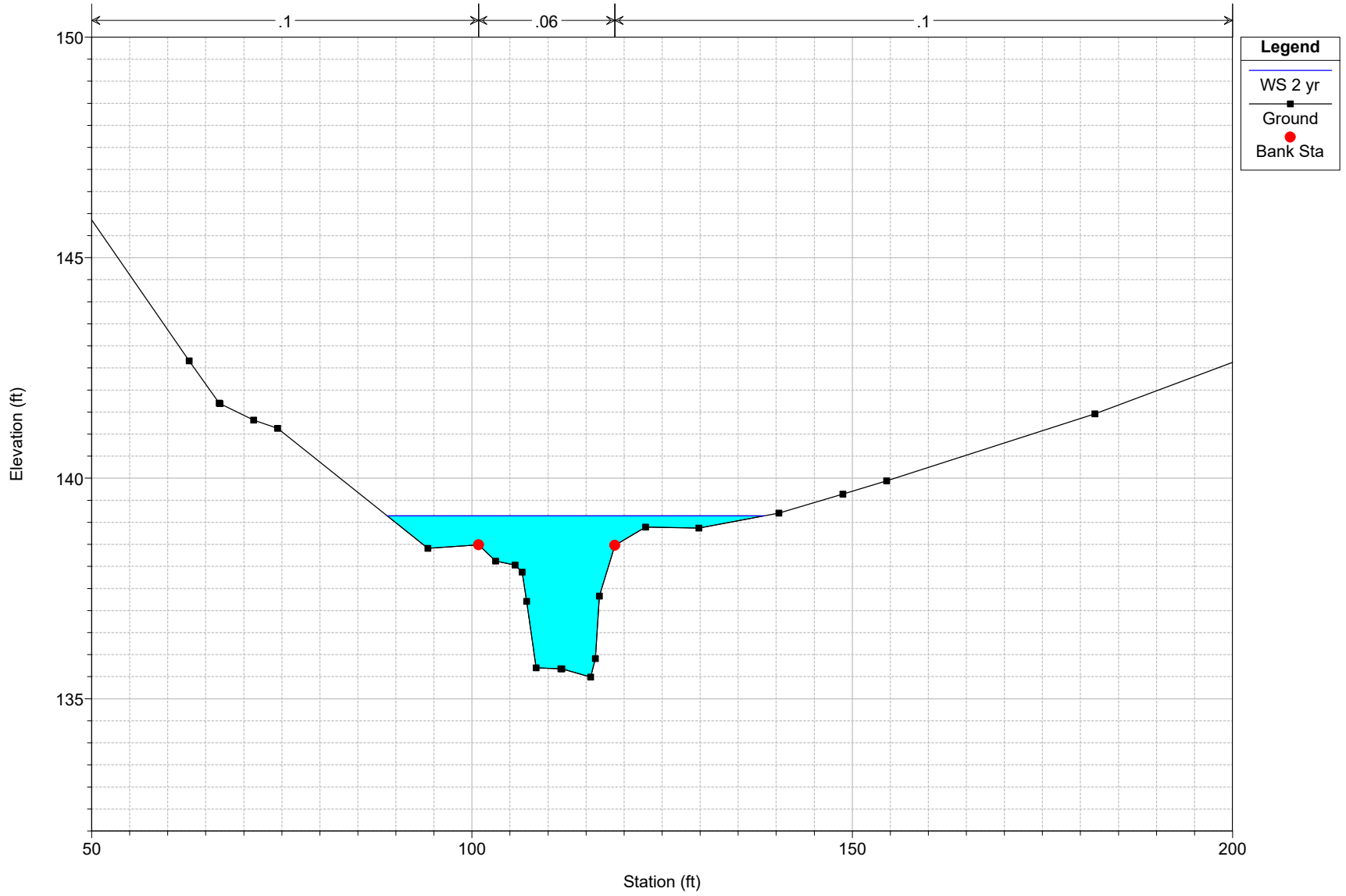
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

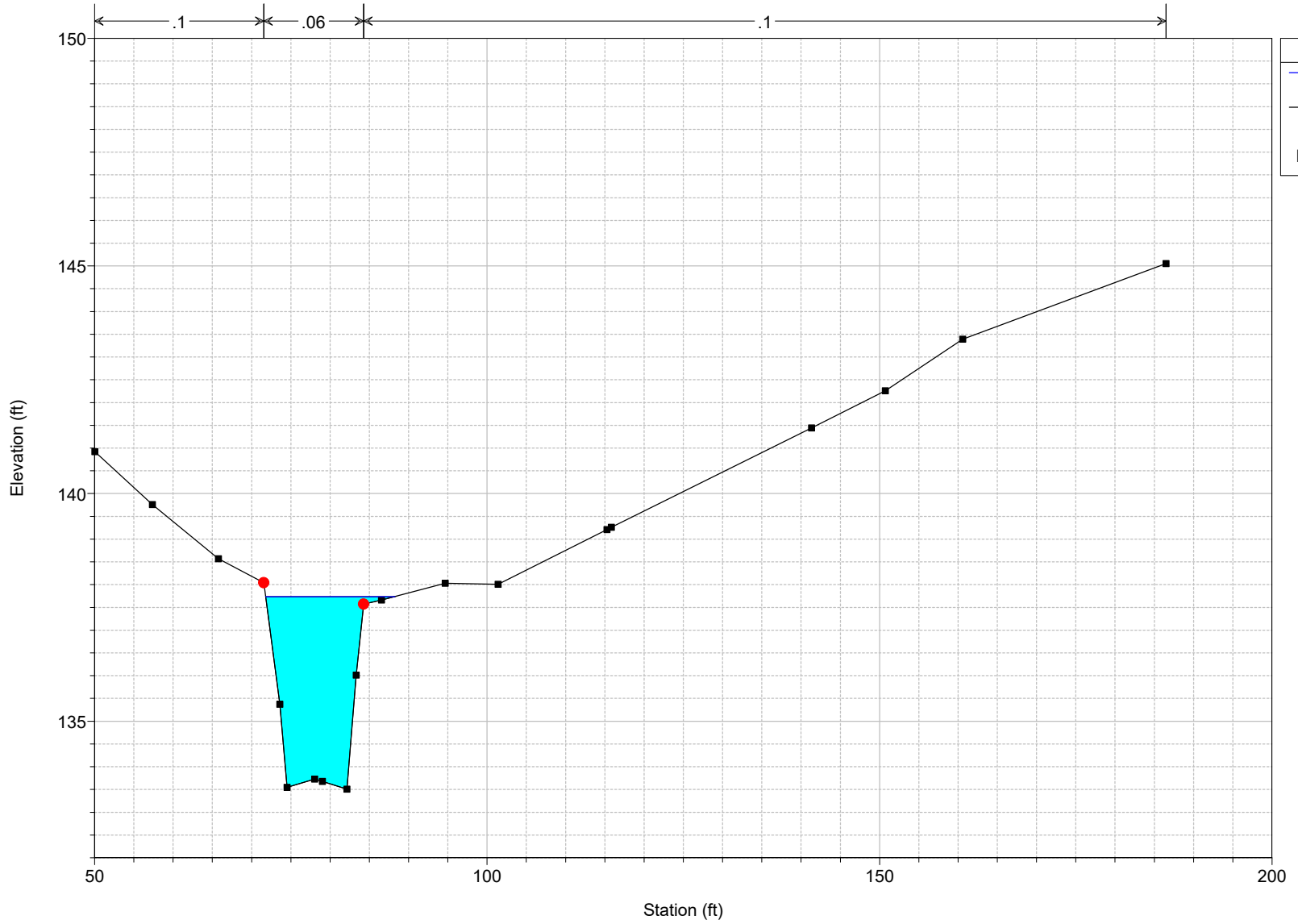
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

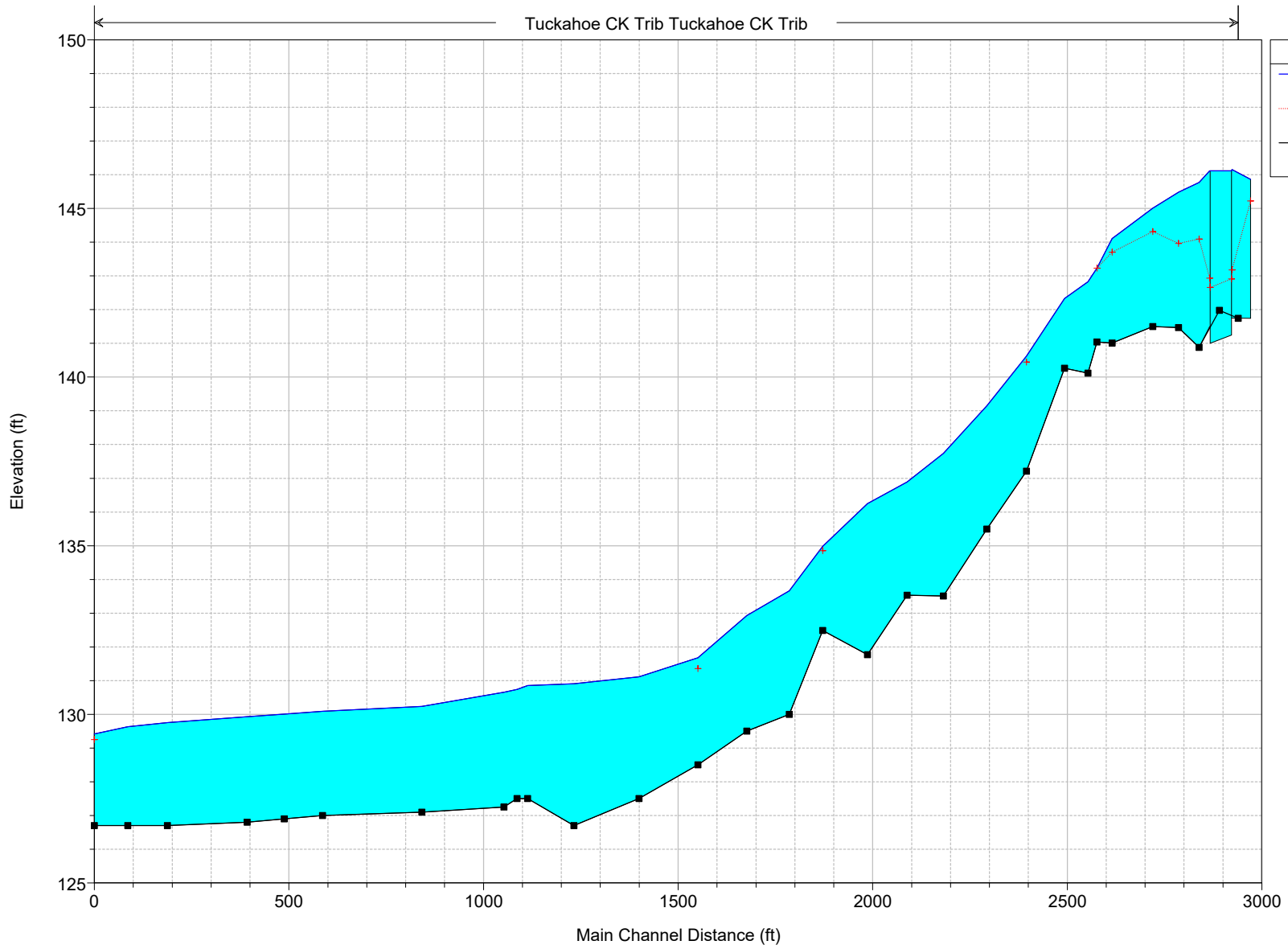
RS = 3195.49



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

Tuckahoe CK Trib Tuckahoe CK Trib



Legend

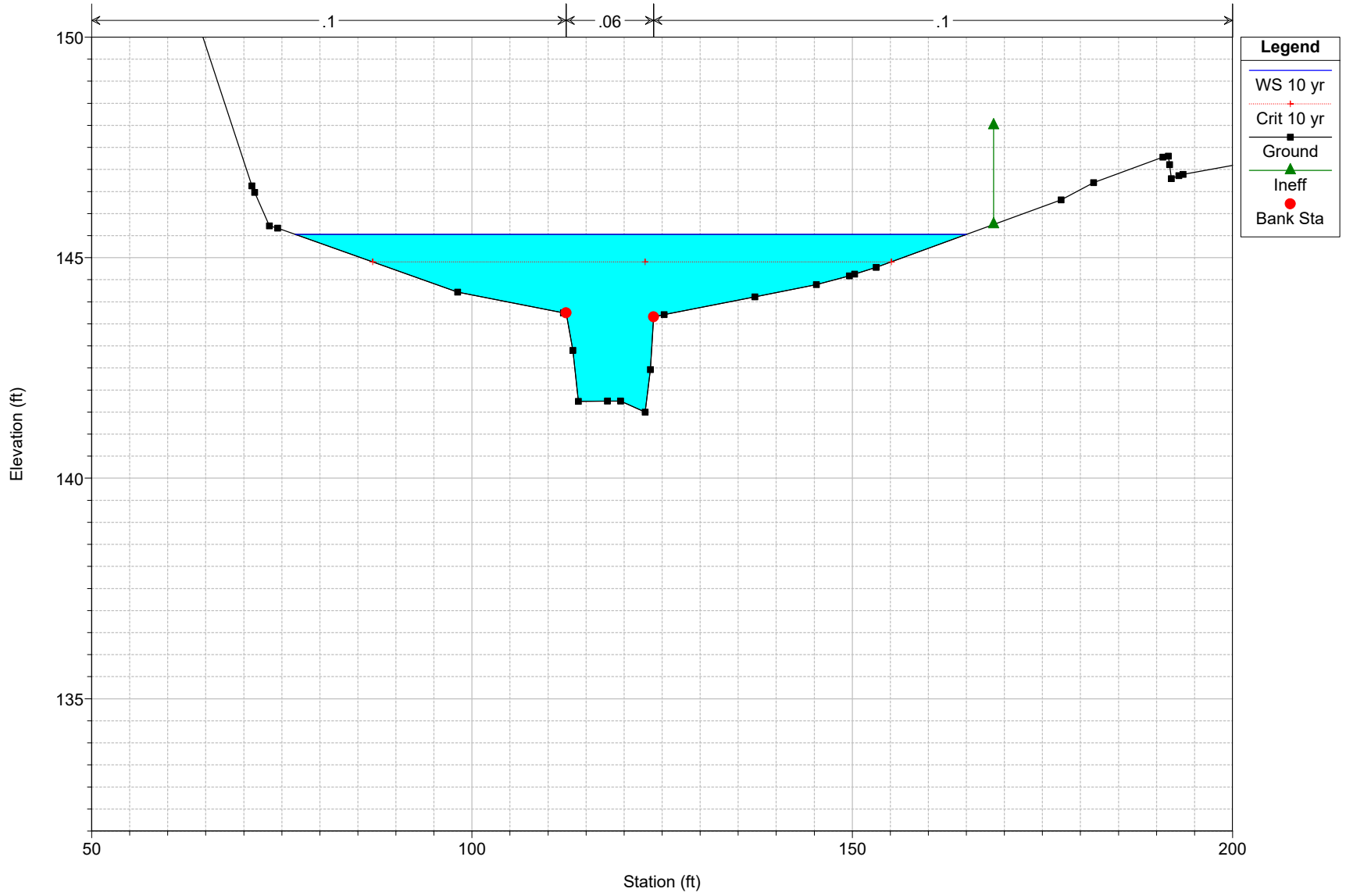
- WS 2 yr
- Crit 2 yr
- Ground

**10 YR STORM CROSS SECTIONS AND
COMPUTATIONS**

Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

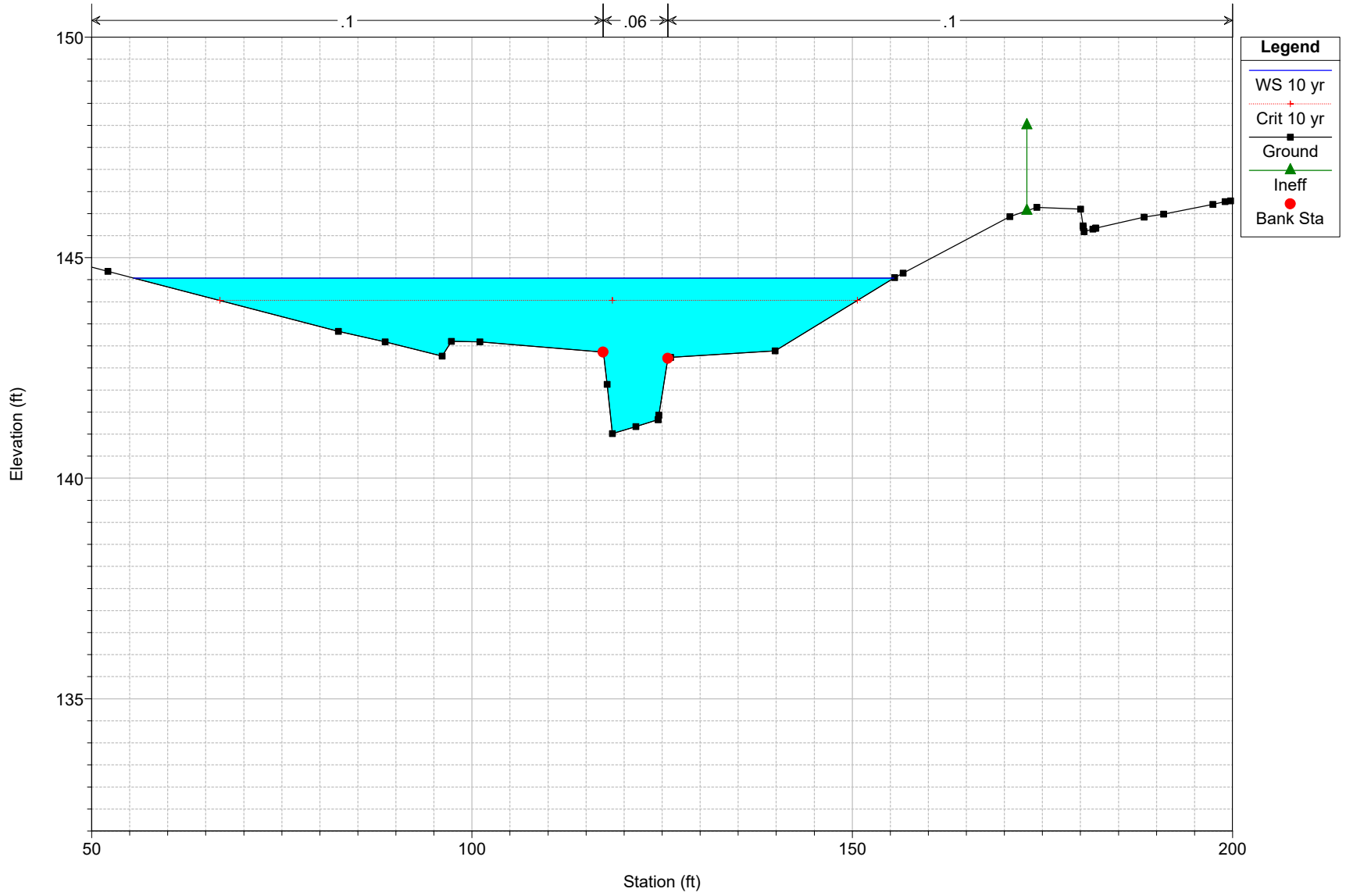
RS = 3733.79



Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

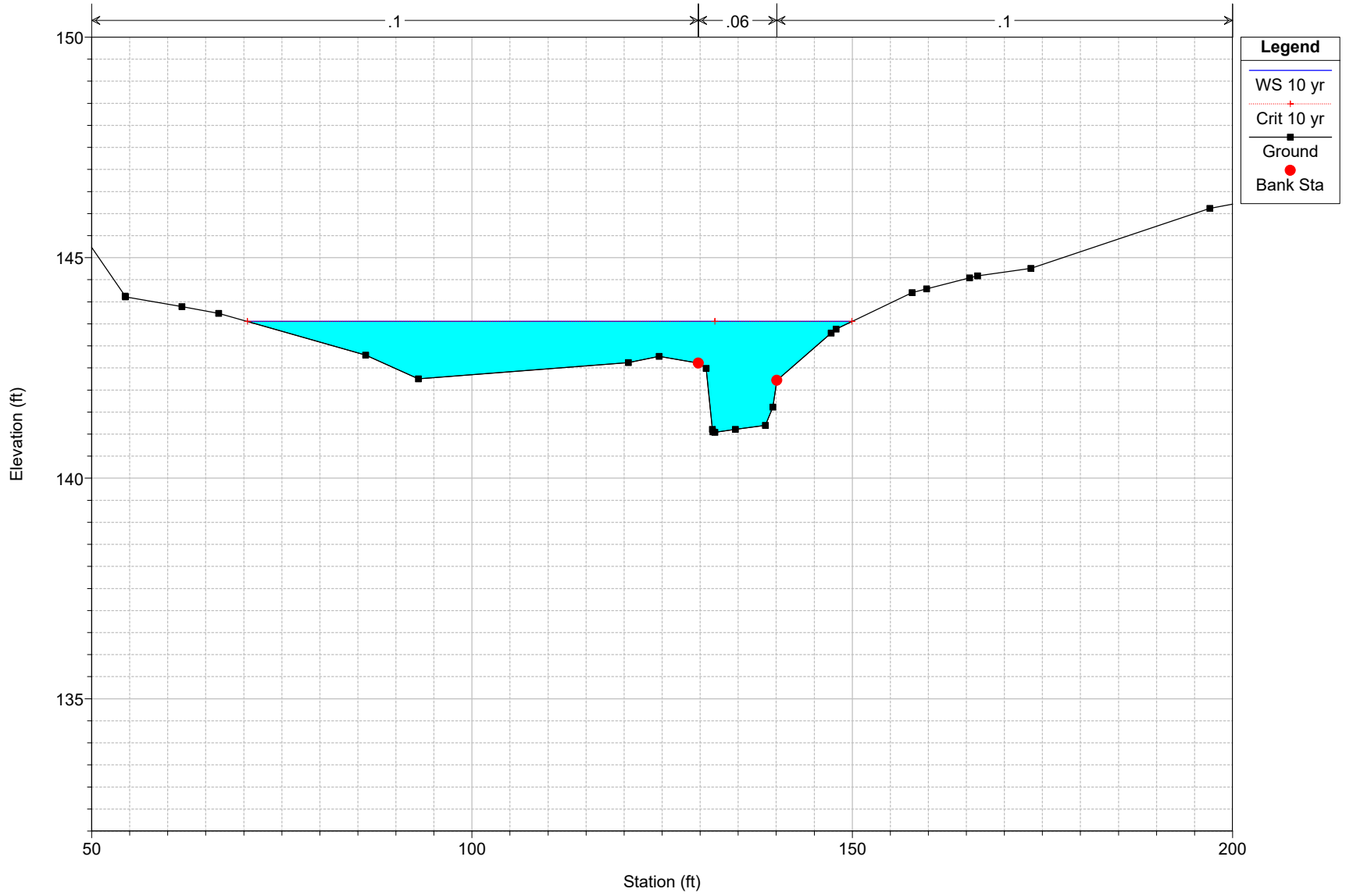
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

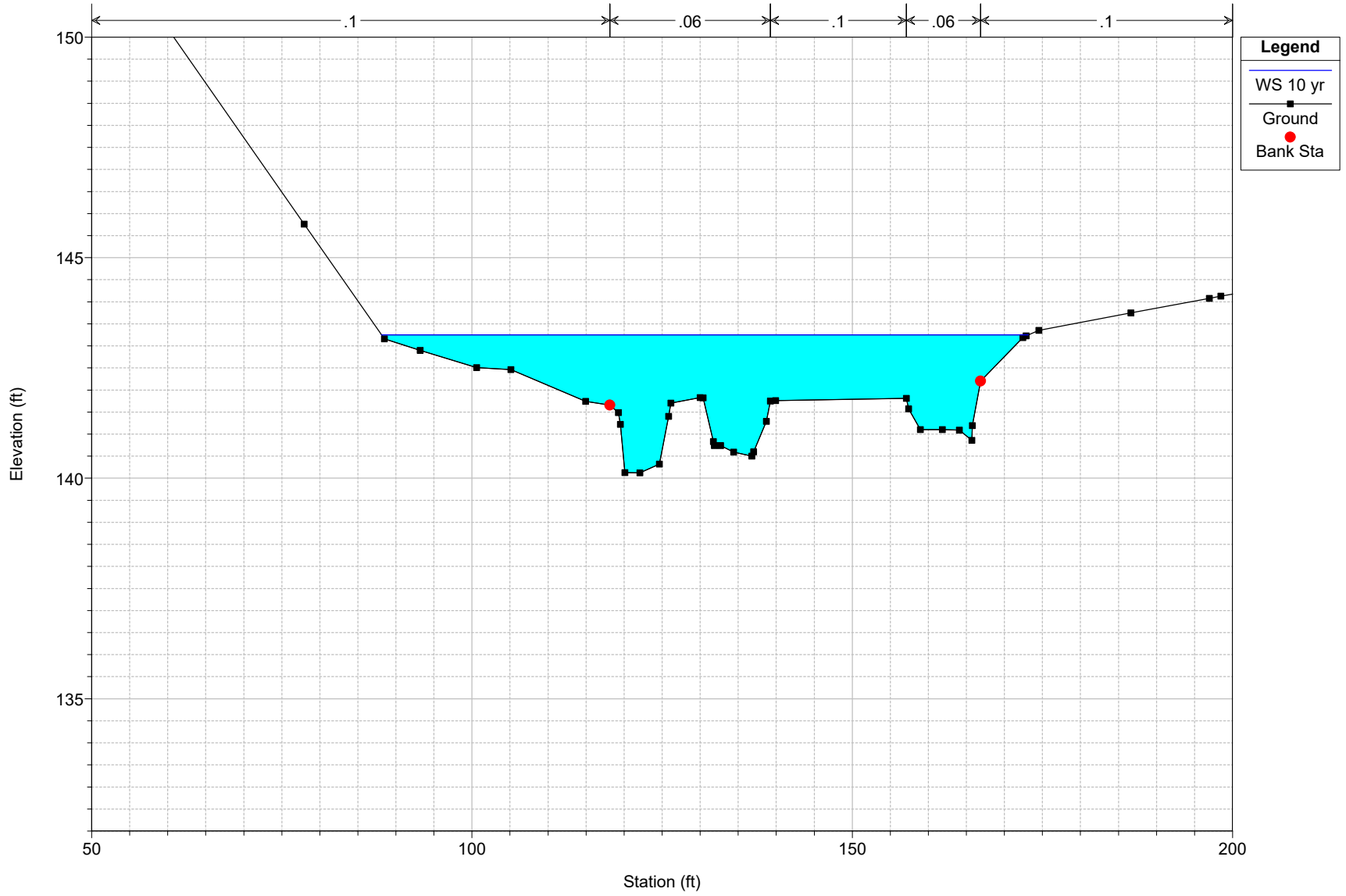
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

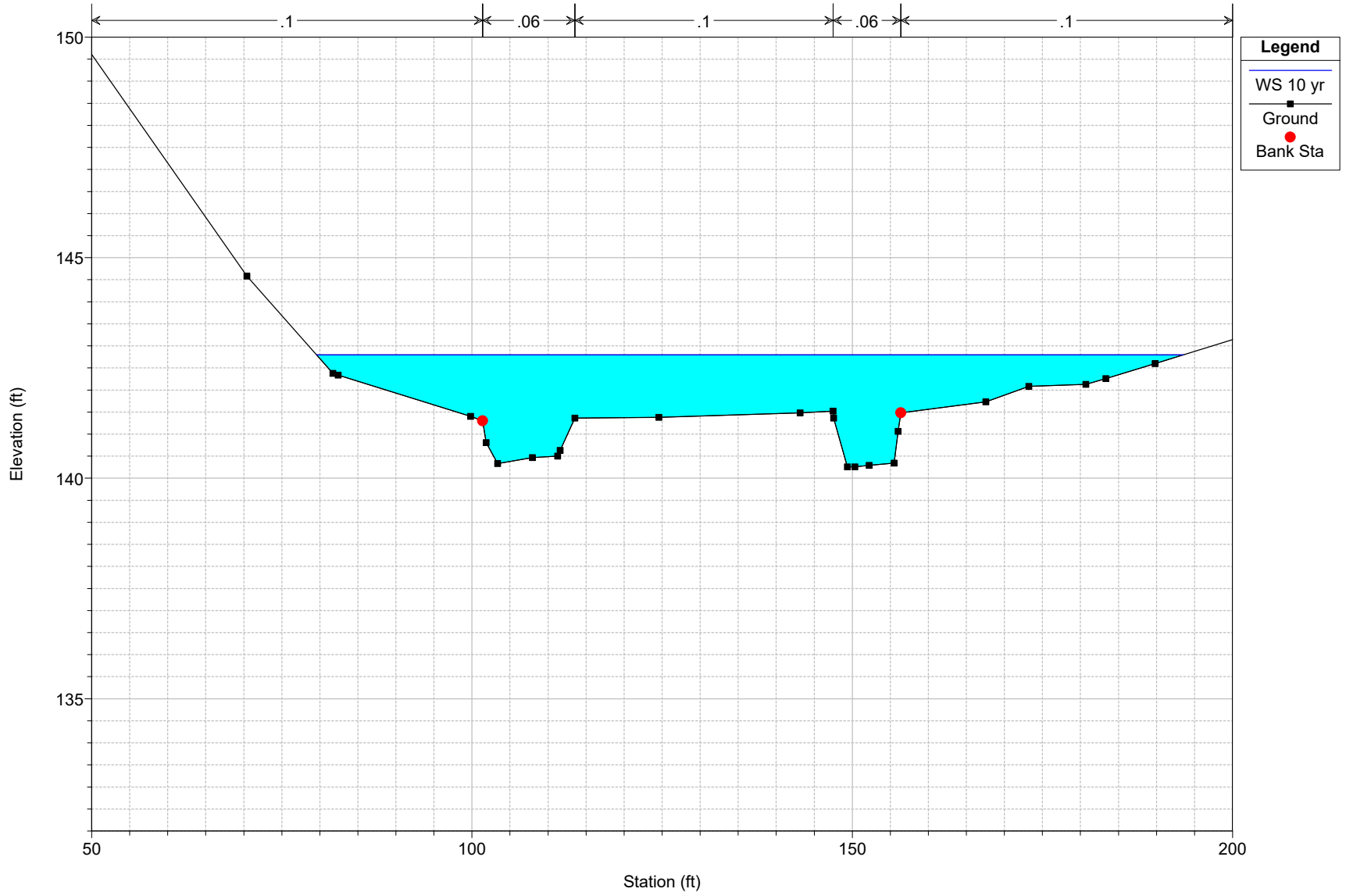
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

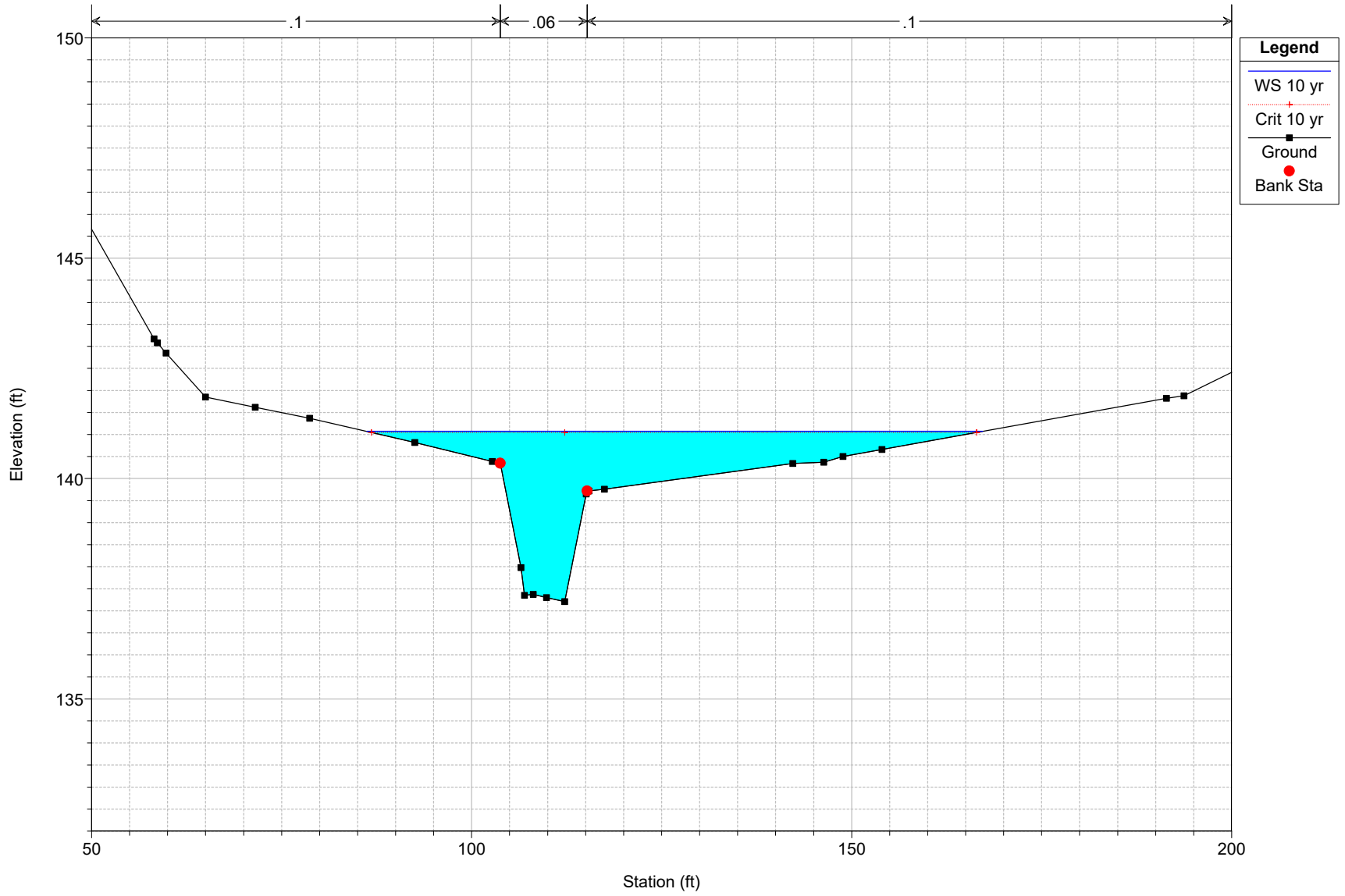
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

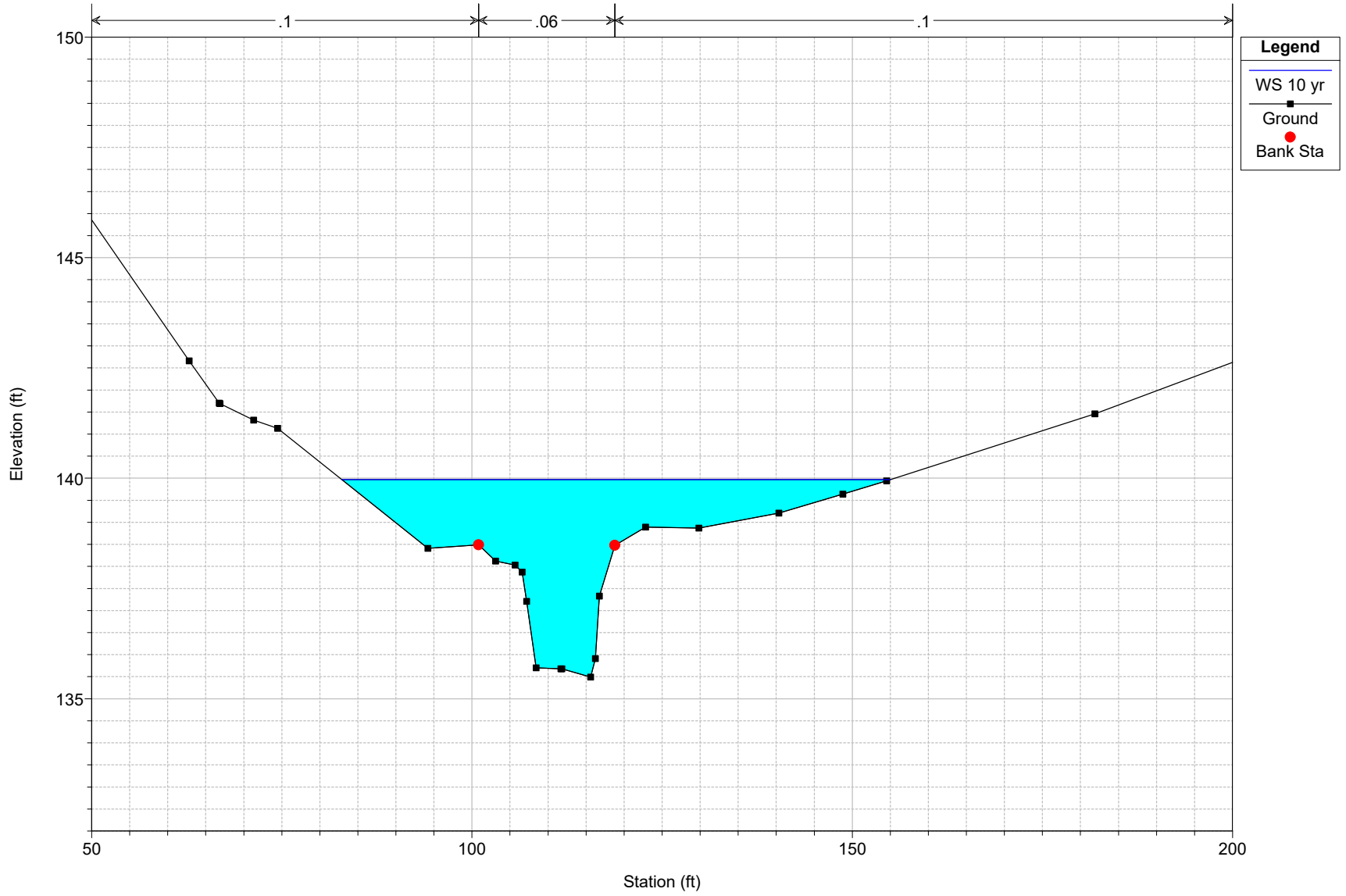
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

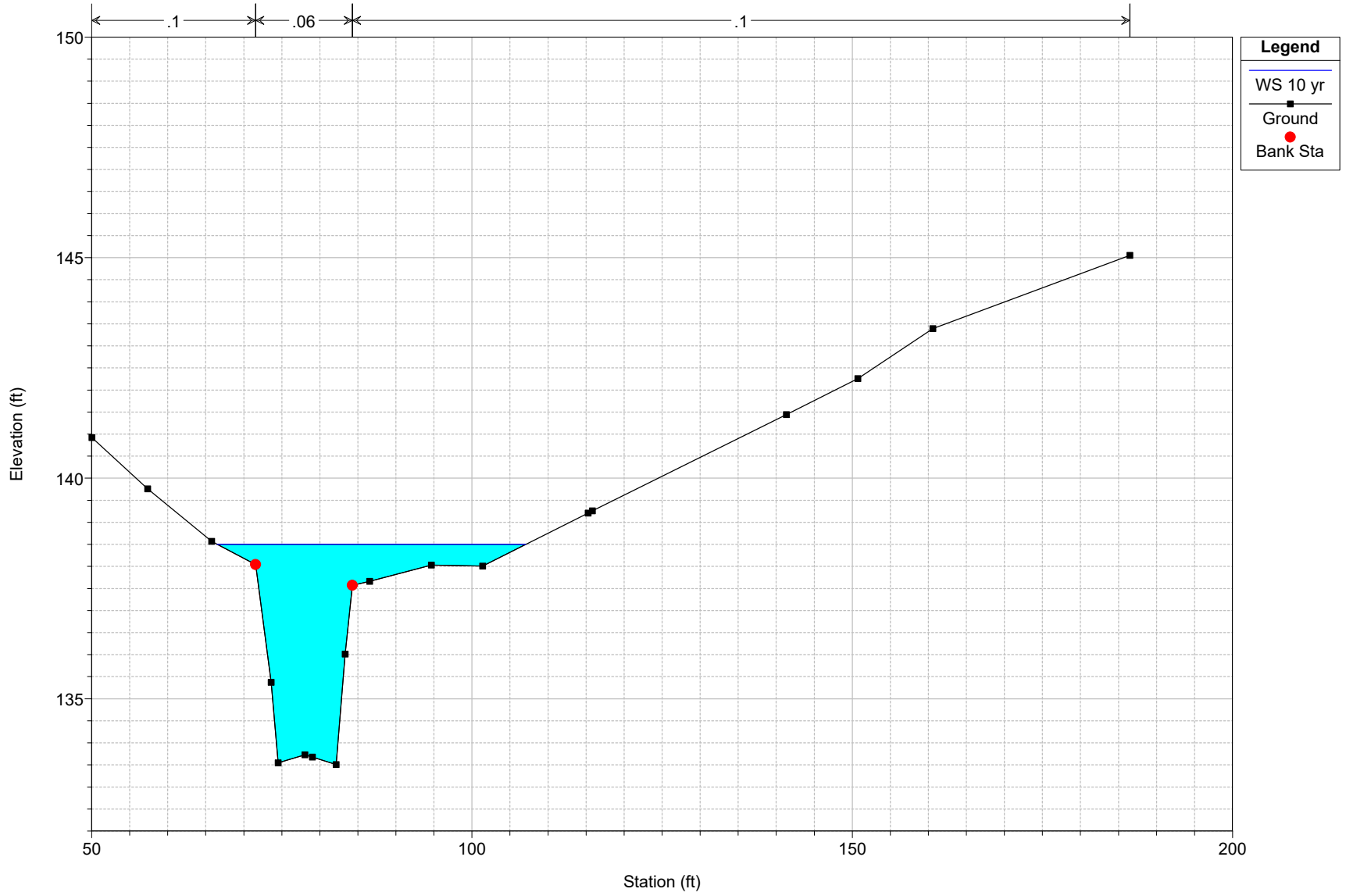
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

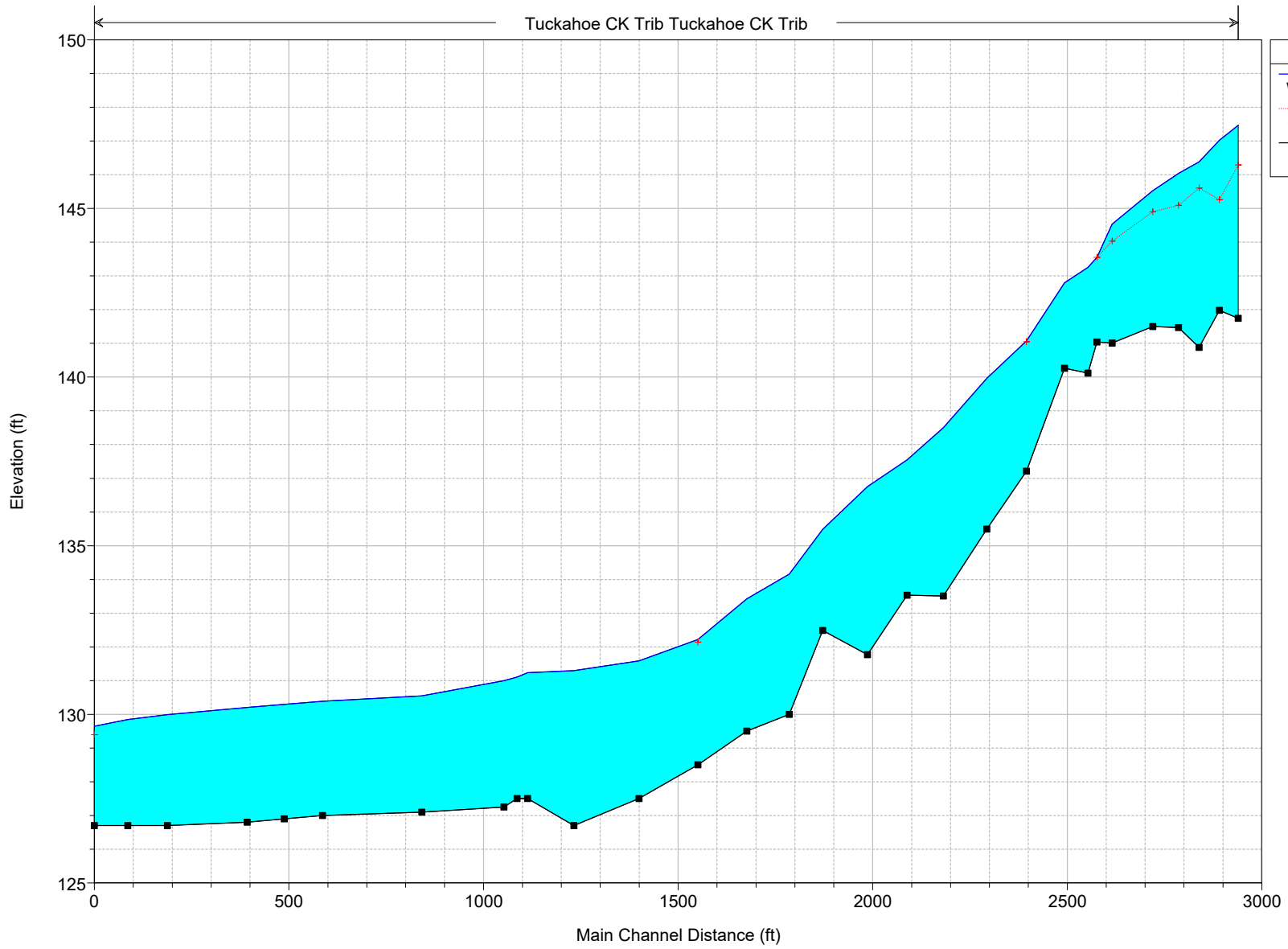
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Tuckahoe CK Trib 3 Plan: Tributary 3 Ex Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

Tuckahoe CK Trib Tuckahoe CK Trib



Legend

- WS 10 yr
- Crit 10 yr
- Ground

HEC-RAS River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib Profile: 10 yr

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Hydr Radius (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Vel Left (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	Max Chl Dpth (ft)	Q Channel (cfs)
Tuckahoe CK Trib	3952.9	10 yr	Trib 3 Ex Cond	311.00	141.74	147.47	146.29	1.94	0.014171	6.03	64.32	52.34	0.52	0.70	1.92	4.84	5.73	275.64
Tuckahoe CK Trib	3952.9	10 yr	Trib 3 Pr Cond	311.00	141.74	146.33	146.29	1.62	0.046012	9.11	36.48	17.97	0.90		1.68	8.52	4.59	306.16
Tuckahoe CK Trib	3937.90	10 yr	Trib 3 Pr Cond	311.00	141.75	146.89	143.71	5.14	0.001681	3.02	102.83	71.04	0.24			3.02	5.14	311.00
Tuckahoe CK Trib	3904.75	10 yr	Trib 3 Ex Cond	311.00	141.98	147.02	145.26	1.57	0.009319	4.96	77.20	43.54	0.43		1.05	4.03	5.04	291.74
Tuckahoe CK Trib	3880	10 yr	Trib 3 Pr Cond	311.00	141.50	146.81	143.46	5.31	0.001512	2.93	106.15	53.97	0.22			2.93	5.31	311.00
Tuckahoe CK Trib	3852.34	10 yr	Trib 3 Ex Cond	311.00	140.88	146.38	145.60	1.36	0.013474	5.65	81.09	54.50	0.50	0.78	1.58	3.84	5.50	255.01
Tuckahoe CK Trib	3852.34	10 yr	Trib 3 Pr Cond	311.00	140.88	146.33	145.60	1.75	0.015156	5.95	67.86	53.52	0.53	0.76	2.03	4.58	5.45	264.84
Tuckahoe CK Trib	3799.63	10 yr	Trib 3 Ex Cond	311.00	141.47	146.04	145.09	1.50	0.007027	4.14	122.68	77.72	0.38		1.33	2.54	4.57	217.46
Tuckahoe CK Trib	3799.63	10 yr	Trib 3 Pr Cond	311.00	141.47	146.02	145.09	1.78	0.006839	4.07	116.92	77.20	0.38		1.52	2.66	4.55	213.00
Tuckahoe CK Trib	3733.79	10 yr	Trib 3 Ex Cond	311.00	141.50	145.53	144.91	1.34	0.008655	4.77	121.38	88.21	0.44	1.39	1.45	2.56	4.03	197.08
Tuckahoe CK Trib	3733.79	10 yr	Trib 3 Pr Cond	311.00	141.50	145.52	144.91	1.45	0.008532	4.73	118.29	87.93	0.44	1.38	1.62	2.63	4.02	194.90
Tuckahoe CK Trib	3628.75	10 yr	Trib 3 Ex Cond	311.00	141.01	144.54	144.03	1.31	0.010700	4.87	133.09	99.97	0.49	1.66	1.78	2.34	3.53	129.98
Tuckahoe CK Trib	3628.75	10 yr	Trib 3 Pr Cond	311.00	141.01	144.54	144.04	1.31	0.010657	4.86	133.37	100.06	0.48	1.66	1.78	2.33	3.53	129.67
Tuckahoe CK Trib	3590.08	10 yr	Trib 3 Ex Cond	311.00	141.04	143.55	143.55	1.00	0.036122	7.34	80.41	79.47	0.88	2.59	2.02	3.87	2.51	164.44
Tuckahoe CK Trib	3590.08	10 yr	Trib 3 Pr Cond	311.00	141.04	143.55	143.55	1.00	0.036122	7.34	80.41	79.47	0.88	2.59	2.02	3.87	2.51	164.44
Tuckahoe CK Trib	3567.08	10 yr	Trib 3 Ex Cond	311.00	140.12	143.25		1.40	0.007428	2.95	123.09	85.05	0.37	1.13	0.79	2.53	3.13	280.56
Tuckahoe CK Trib	3567.08	10 yr	Trib 3 Pr Cond	311.00	140.12	143.25		1.40	0.007428	2.95	123.08	85.05	0.37	1.13	0.79	2.53	3.13	280.56
Tuckahoe CK Trib	3506.4	10 yr	Trib 3 Ex Cond	311.00	140.26	142.79		1.22	0.008318	2.72	141.30	113.91	0.37	1.24	1.12	2.20	2.53	256.30
Tuckahoe CK Trib	3506.4	10 yr	Trib 3 Pr Cond	311.00	140.26	142.79		1.22	0.008317	2.71	141.27	113.79	0.37	1.24	1.12	2.20	2.53	256.28
Tuckahoe CK Trib	3409.13	10 yr	Trib 3 Ex Cond	311.00	137.21	141.07	141.05	0.95	0.022205	6.86	78.72	81.03	0.70	1.11	1.80	3.95	3.86	235.48
Tuckahoe CK Trib	3409.13	10 yr	Trib 3 Pr Cond	311.00	137.21	141.07	141.05	0.95	0.022205	6.86	78.72	81.03	0.70	1.11	1.80	3.95	3.86	235.48
Tuckahoe CK Trib	3306.96	10 yr	Trib 3 Ex Cond	311.00	135.49	139.97		1.38	0.008590	4.50	102.98	72.11	0.45	1.42	1.16	3.02	4.48	251.43
Tuckahoe CK Trib	3306.96	10 yr	Trib 3 Pr Cond	311.00	135.49	139.97		1.38	0.008590	4.50	102.98	72.11	0.45	1.42	1.16	3.02	4.48	251.43
Tuckahoe CK Trib	3195.49	10 yr	Trib 3 Ex Cond	311.00	133.51	138.50		1.40	0.013771	5.87	63.69	40.56	0.52	0.65	1.13	4.88	4.99	296.67
Tuckahoe CK Trib	3195.49	10 yr	Trib 3 Pr Cond	311.00	133.51	138.50		1.40	0.013771	5.87	63.69	40.56	0.52	0.65	1.13	4.88	4.99	296.67
Tuckahoe CK Trib	3102.46	10 yr	Trib 3 Ex Cond	311.00	133.53	137.55		1.50	0.009589	4.87	74.46	47.30	0.48	0.93	0.83	4.18	4.02	299.74
Tuckahoe CK Trib	3102.46	10 yr	Trib 3 Pr Cond	311.00	133.53	137.55		1.50	0.009589	4.87	74.46	47.30	0.48	0.93	0.83	4.18	4.02	299.74
Tuckahoe CK Trib	3000.61	10 yr	Trib 3 Ex Cond	311.00	131.77	136.75		1.56	0.007550	4.44	103.60	60.93	0.38	0.90	1.35	3.00	4.98	248.56
Tuckahoe CK Trib	3000.61	10 yr	Trib 3 Pr Cond	311.00	131.77	136.75		1.56	0.007550	4.44	103.60	60.93	0.38	0.90	1.35	3.00	4.98	248.56
Tuckahoe CK Trib	2885.24	10 yr	Trib 3 Ex Cond	430.00	132.49	135.49		1.22	0.015633	5.72	143.16	116.36	0.62	1.87	1.85	3.00	3.00	242.20
Tuckahoe CK Trib	2885.24	10 yr	Trib 3 Pr Cond	430.00	132.49	135.49		1.22	0.015633	5.72	143.16	116.36	0.62	1.87	1.85	3.00	3.00	242.20
Tuckahoe CK Trib	2799.51	10 yr	Trib 3 Ex Cond	430.00	130.00	134.16		1.21	0.011336	5.38	163.68	132.31	0.51	1.62	1.47	2.63	4.16	243.27
Tuckahoe CK Trib	2799.51	10 yr	Trib 3 Pr Cond	430.00	130.00	134.16		1.21	0.011336	5.38	163.68	132.31	0.51	1.62	1.47	2.63	4.16	243.27
Tuckahoe CK Trib	2690.12	10 yr	Trib 3 Ex Cond	430.00	129.50	133.42		1.31	0.005738	3.95	234.85	177.36	0.37	1.04	1.32	1.83	3.92	203.14
Tuckahoe CK Trib	2690.12	10 yr	Trib 3 Pr Cond	430.00	129.50	133.42		1.31	0.005738	3.95	234.85	177.36	0.37	1.04	1.32	1.83	3.92	203.14
Tuckahoe CK Trib	2564.96	10 yr	Trib 3 Ex Cond	430.00	128.50	132.22	132.14	0.99	0.014156	6.00	141.35	140.58	0.58	1.56	1.33	3.04	3.72	297.41
Tuckahoe CK Trib	2564.96	10 yr	Trib 3 Pr Cond	430.00	128.50	132.22	132.14	0.99	0.014156	6.00	141.35	140.58	0.58	1.56	1.33	3.04	3.72	297.41
Tuckahoe CK Trib	2413.06	10 yr	Trib 3 Ex Cond	430.00	127.50	131.59		1.50	0.003035	2.90	304.12	200.51	0.28	0.56	1.04	1.41	4.09	187.61
Tuckahoe CK Trib	2413.06	10 yr	Trib 3 Pr Cond	430.00	127.50	131.59		1.50	0.003035	2.90	304.12	200.51	0.28	0.56	1.04	1.41	4.09	187.61
Tuckahoe CK Trib	2246.04	10 yr	Trib 3 Ex Cond	430.00	126.70	131.30		1.59	0.001251	2.03	444.58	277.18	0.18	0.55	0.73	0.97	4.60	166.76
Tuckahoe CK Trib	2246.04	10 yr	Trib 3 Pr Cond	430.00	126.70	131.30		1.59	0.001251	2.03	444.58	277.18	0.18	0.55	0.73	0.97	4.60	166.76
Tuckahoe CK Trib	2126.75	10 yr	Trib 3 Ex Cond	430.00	127.50	131.24		1.42	0.000869	1.24	664.54	466.12	0.15	0.49	0.53	0.65	3.74	136.63

HEC-RAS River: Tuckahoe CK Trib Reach: Tuckahoe CK Trib Profile: 10 yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Hydr Radius (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Vel Left (ft/s)	Vel Right (ft/s)	Vel Total (ft/s)	Max Chl Dpth (ft)	Q Channel (cfs)
Tuckahoe CK Trib	2126.75	10 yr	Trib 3 Pr Cond	430.00	127.50	131.24		1.42	0.000869	1.24	664.55	466.12	0.15	0.49	0.53	0.65	3.74	136.63
Tuckahoe CK Trib	2100.19	10 yr	Trib 3 Ex Cond	430.00	127.50	131.10		0.93	0.004943	3.03	295.89	317.33	0.35	0.33	1.11	1.45	3.60	180.20
Tuckahoe CK Trib	2100.19	10 yr	Trib 3 Pr Cond	430.00	127.50	131.10		0.93	0.004943	3.03	295.89	317.33	0.35	0.33	1.11	1.45	3.60	180.20
Tuckahoe CK Trib	2066.3	10 yr	Trib 3 Ex Cond	430.00	127.25	131.00		1.30	0.001171	1.82	620.15	475.34	0.17	0.59	0.58	0.69	3.75	100.04
Tuckahoe CK Trib	2066.3	10 yr	Trib 3 Pr Cond	430.00	127.25	131.00		1.30	0.001171	1.82	620.16	475.34	0.17	0.59	0.58	0.69	3.75	100.04
Tuckahoe CK Trib	1855.43	10 yr	Trib 3 Ex Cond	430.00	127.10	130.55		0.91	0.002721	2.49	494.46	541.48	0.25	0.72	0.66	0.87	3.45	118.36
Tuckahoe CK Trib	1855.43	10 yr	Trib 3 Pr Cond	430.00	127.10	130.55		0.91	0.002721	2.49	494.48	541.48	0.25	0.72	0.66	0.87	3.45	118.36
Tuckahoe CK Trib	1600.28	10 yr	Trib 3 Ex Cond	430.00	127.00	130.39		1.23	0.000501	1.10	1051.84	857.13	0.11	0.40	0.35	0.41	3.39	53.05
Tuckahoe CK Trib	1600.28	10 yr	Trib 3 Pr Cond	430.00	127.00	130.39		1.23	0.000500	1.10	1051.92	857.13	0.11	0.40	0.35	0.41	3.39	53.05
Tuckahoe CK Trib	1501.43	10 yr	Trib 3 Ex Cond	430.00	126.90	130.29		0.95	0.000727	1.30	993.11	1046.63	0.13	0.46	0.33	0.43	3.39	60.41
Tuckahoe CK Trib	1501.43	10 yr	Trib 3 Pr Cond	430.00	126.90	130.29		0.95	0.000727	1.30	993.25	1046.64	0.13	0.46	0.33	0.43	3.39	60.40
Tuckahoe CK Trib	1406.3	10 yr	Trib 3 Ex Cond	430.00	126.80	130.20		1.09	0.000760	1.34	901.25	825.30	0.14	0.44	0.40	0.48	3.40	69.45
Tuckahoe CK Trib	1406.3	10 yr	Trib 3 Pr Cond	430.00	126.80	130.20		1.09	0.000759	1.34	901.41	825.30	0.14	0.44	0.40	0.48	3.40	69.44
Tuckahoe CK Trib	1201.38	10 yr	Trib 3 Ex Cond	430.00	126.70	129.99		0.94	0.002495	2.35	514.37	542.71	0.24	0.70	0.67	0.84	3.29	108.72
Tuckahoe CK Trib	1201.38	10 yr	Trib 3 Pr Cond	430.00	126.70	129.99		0.95	0.002493	2.35	514.56	542.72	0.24	0.70	0.67	0.84	3.29	108.69
Tuckahoe CK Trib	1099.53	10 yr	Trib 3 Ex Cond	430.00	126.70	129.84		0.83	0.003192	2.58	477.95	573.46	0.28	0.74	0.66	0.90	3.14	125.19
Tuckahoe CK Trib	1099.53	10 yr	Trib 3 Pr Cond	430.00	126.70	129.84		0.83	0.003186	2.58	478.31	573.53	0.28	0.74	0.65	0.90	3.14	125.11
Tuckahoe CK Trib	1013.78	10 yr	Trib 3 Ex Cond	430.00	126.70	129.65	129.40	0.67	0.005000	3.02	424.60	635.07	0.35	0.78	0.70	1.01	2.95	143.34
Tuckahoe CK Trib	1013.78	10 yr	Trib 3 Pr Cond	430.00	126.70	129.65	129.40	0.67	0.005000	3.02	424.60	635.07	0.35	0.78	0.70	1.01	2.95	143.34

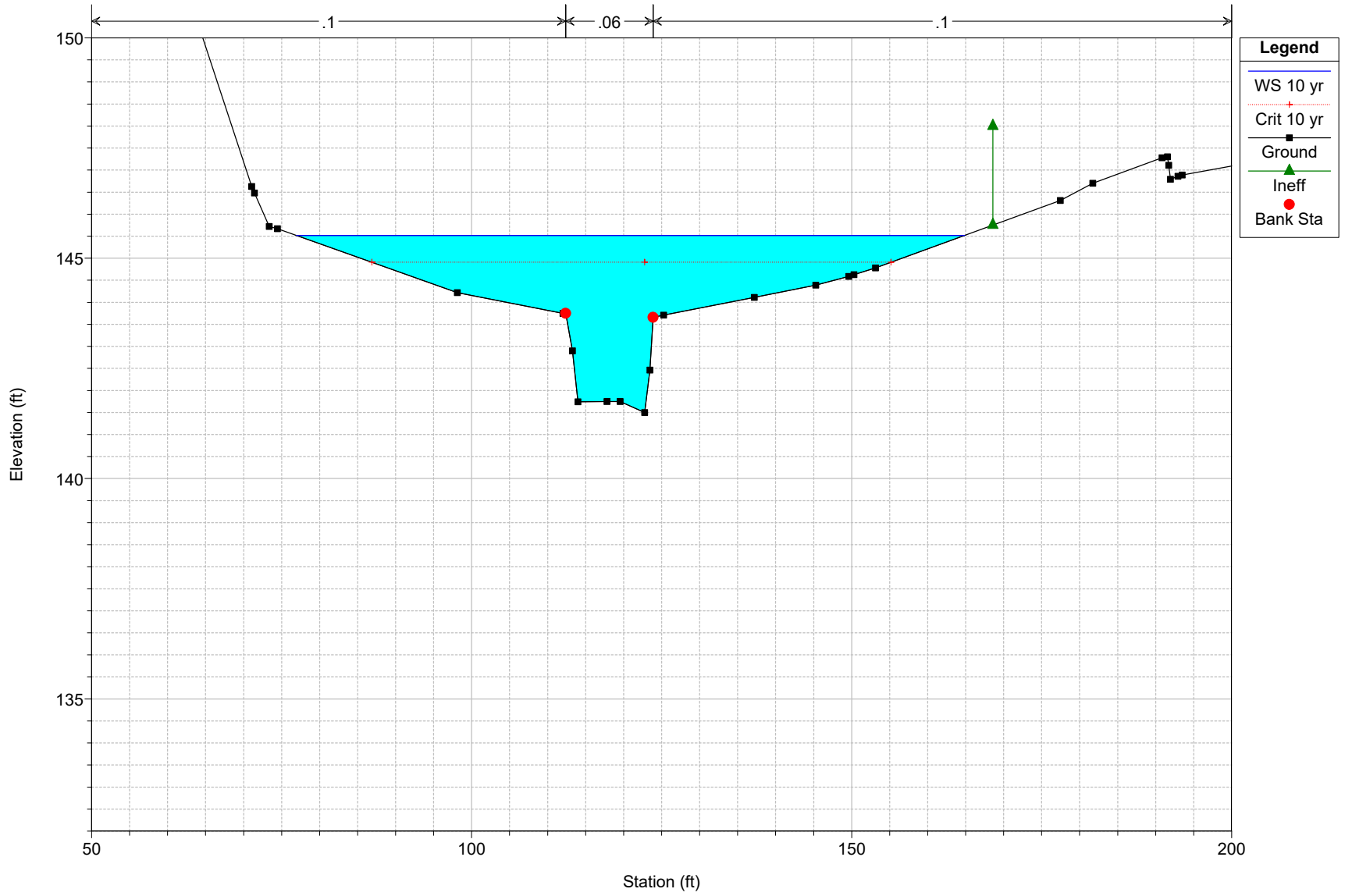
Plan: Trib 3 Pr Cond Tuckahoe CK Trib Tuckahoe CK Trib RS: 3909 Culv Group: Culvert #1 Profile: 10 yr

Q Culv Group (cfs)	311.00	Culv Full Len (ft)	
# Barrels	2	Culv Vel US (ft/s)	3.62
Q Barrel (cfs)	155.50	Culv Vel DS (ft/s)	3.45
E.G. US. (ft)	146.87	Culv Inv El Up (ft)	141.25
W.S. US. (ft)	146.29	Culv Inv El Dn (ft)	141.00
E.G. DS (ft)	146.81	Culv Frctn Ls (ft)	0.02
W.S. DS (ft)	146.33	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.06	Culv Entr Loss (ft)	0.04
Delta WS (ft)	0.04	Q Weir (cfs)	
E.G. IC (ft)	144.85	Weir Sta Lft (ft)	
E.G. OC (ft)	146.87	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	146.63	Weir Max Depth (ft)	
Culv WS Outlet (ft)	146.63	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.06	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.27	Min El Weir Flow (ft)	151.01

Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

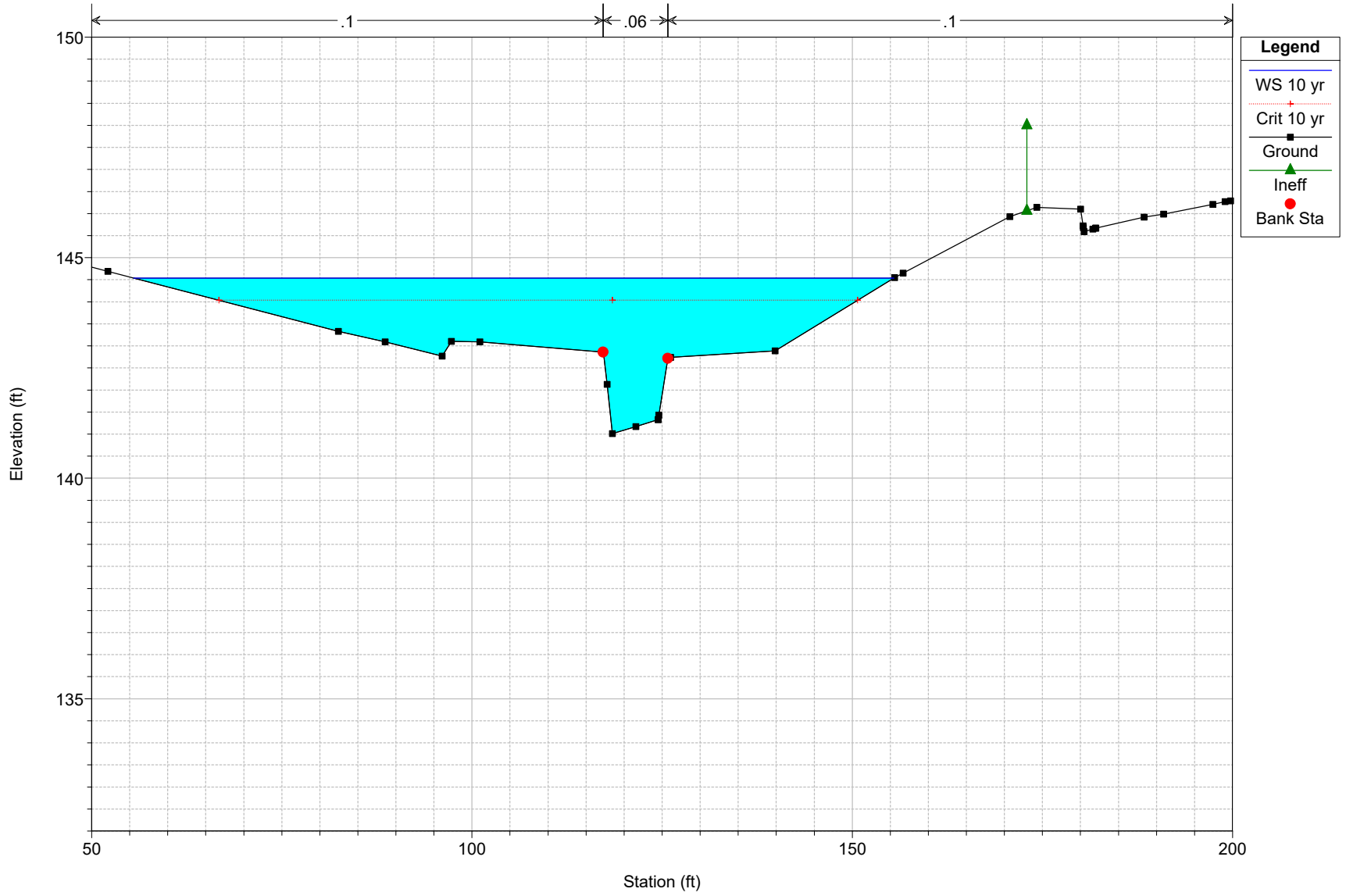
RS = 3733.79



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

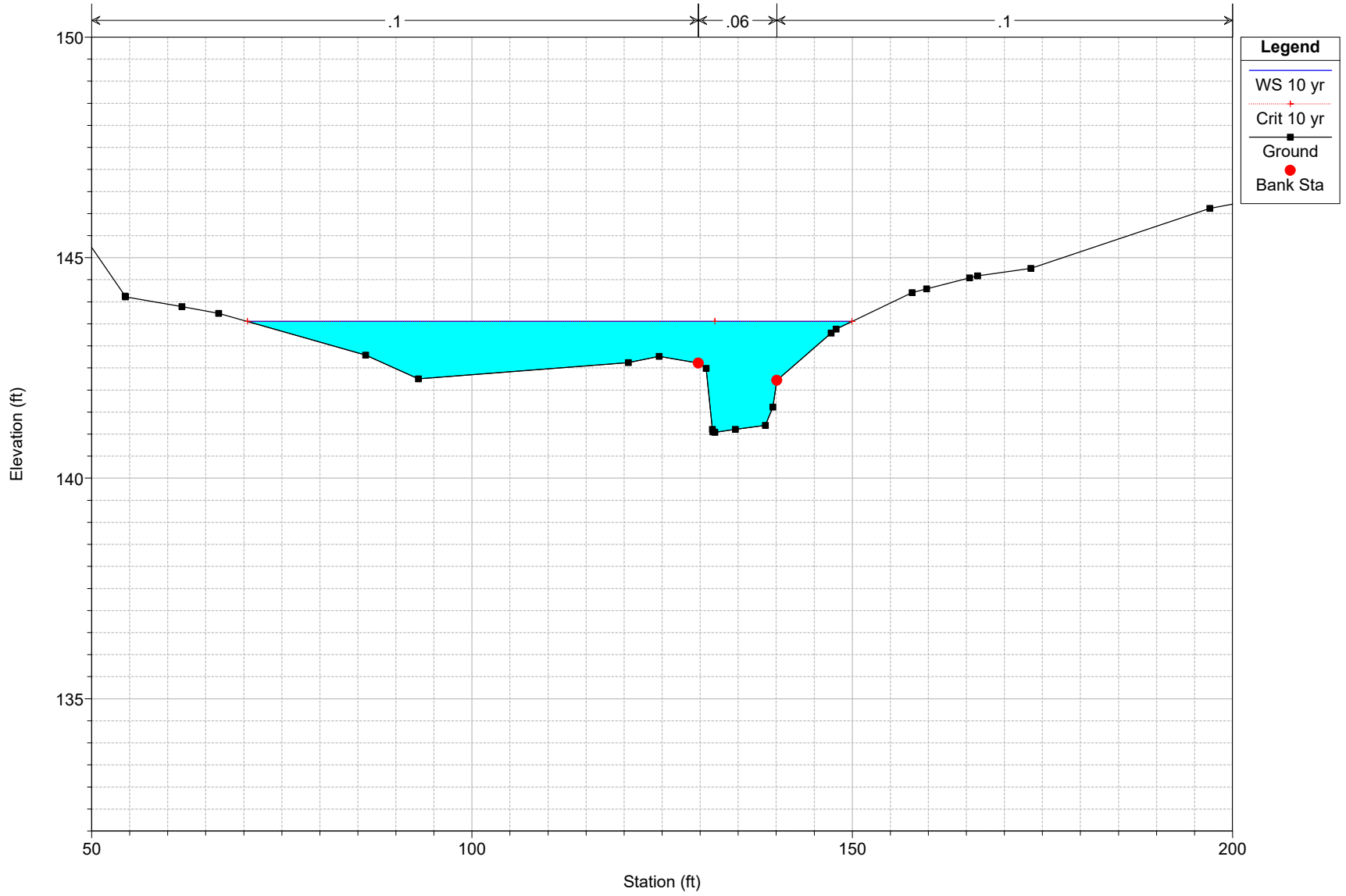
RS = 3628.75



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

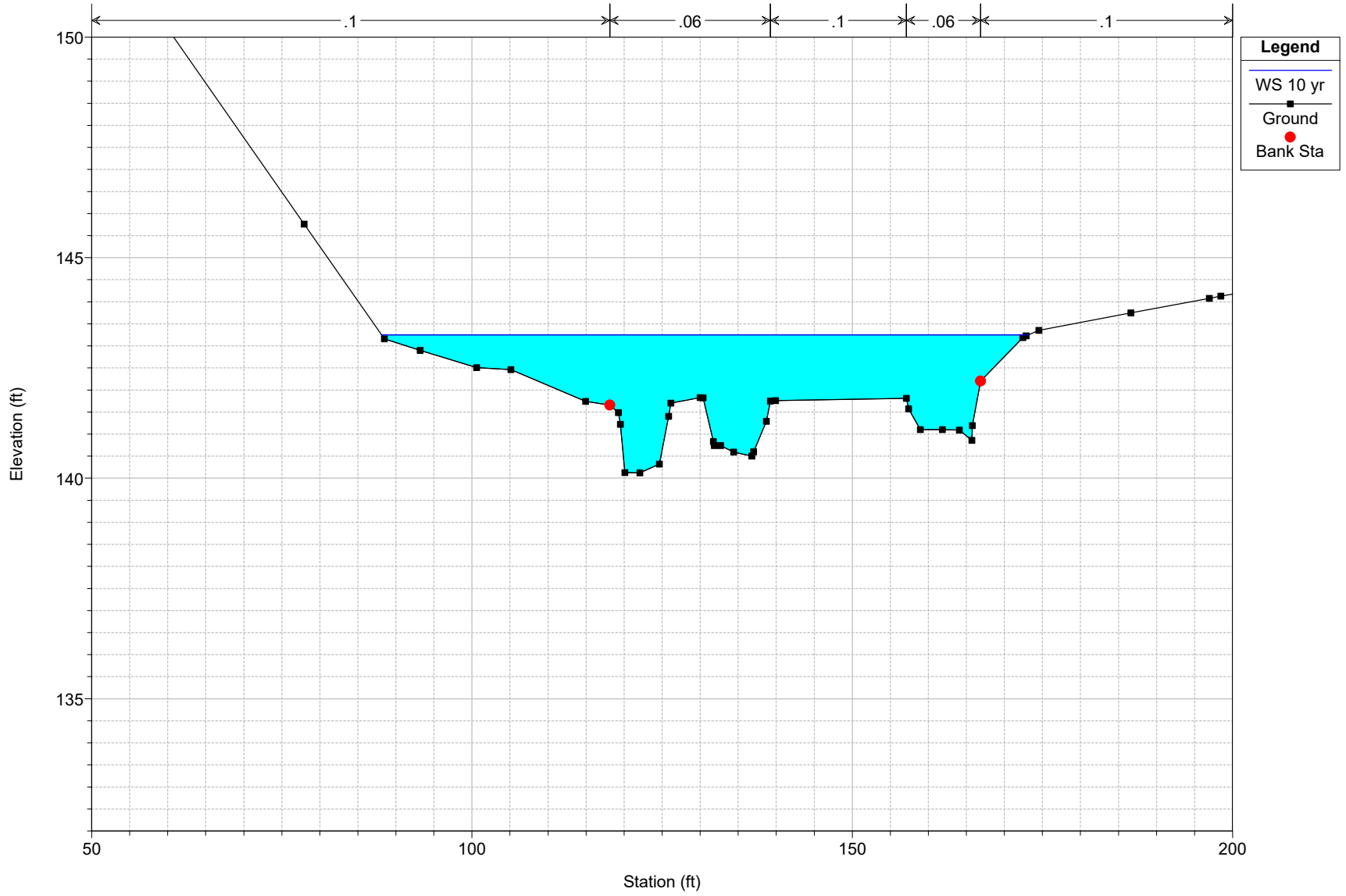
RS = 3590.08



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

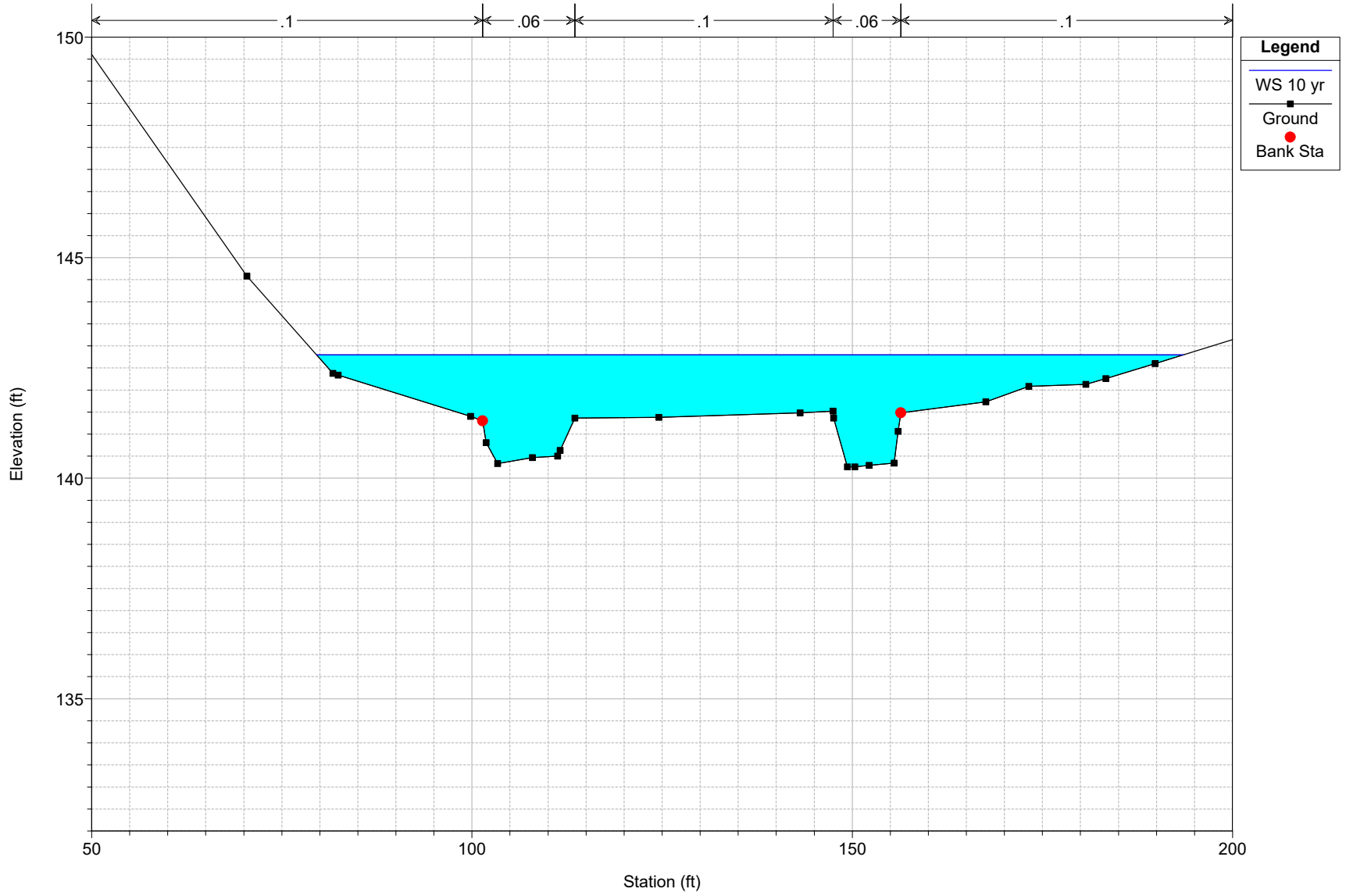
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

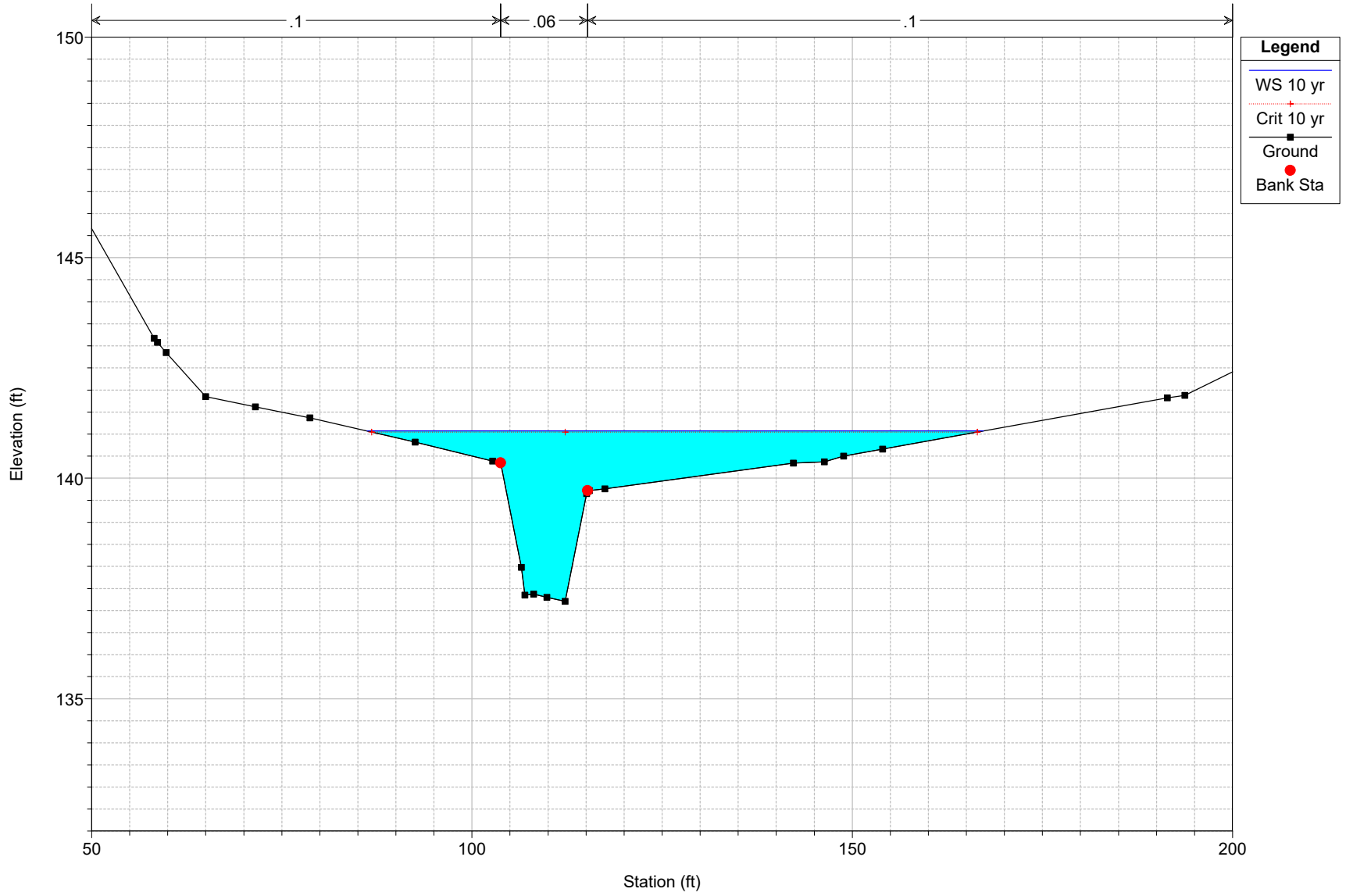
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

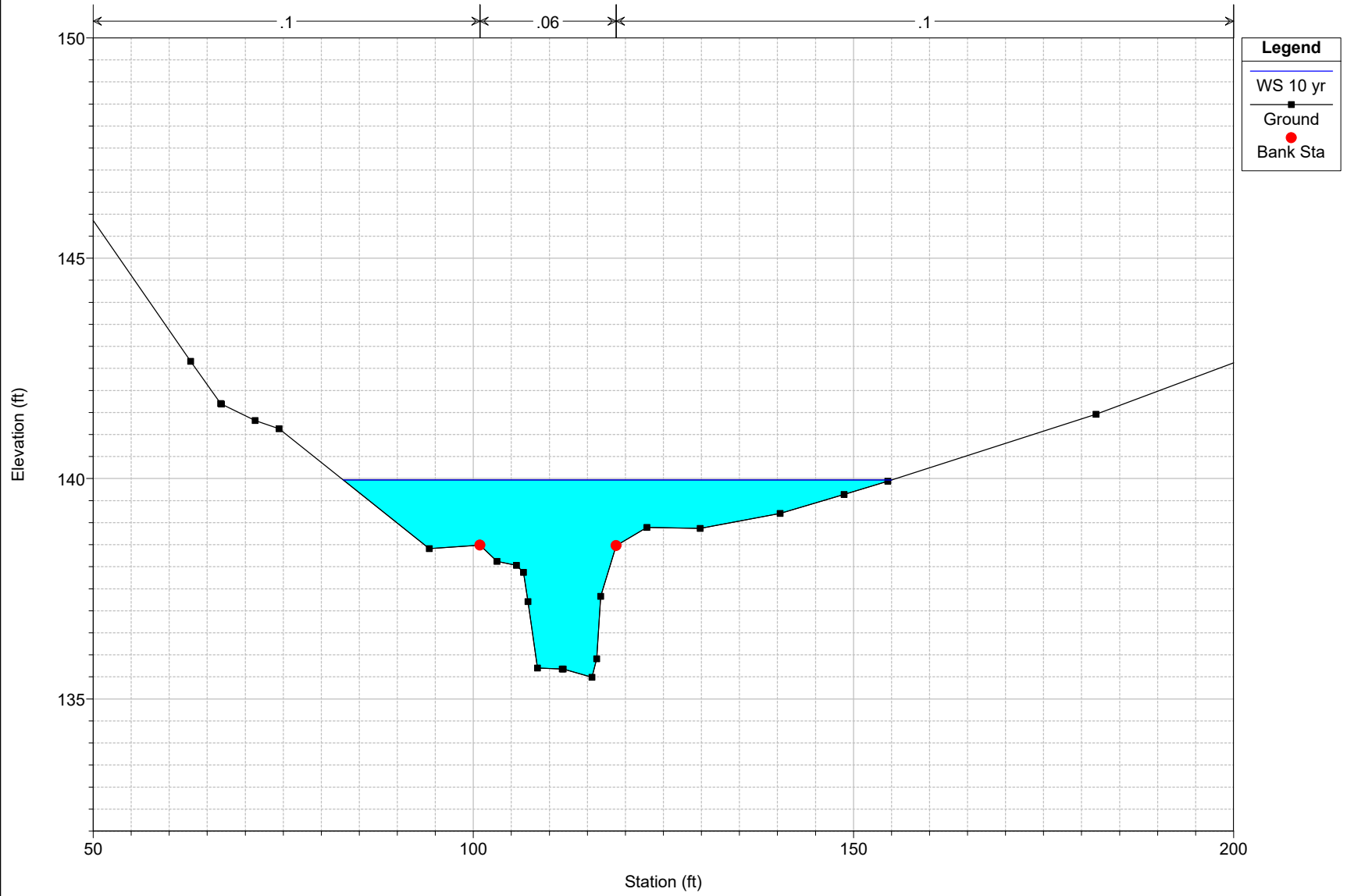
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

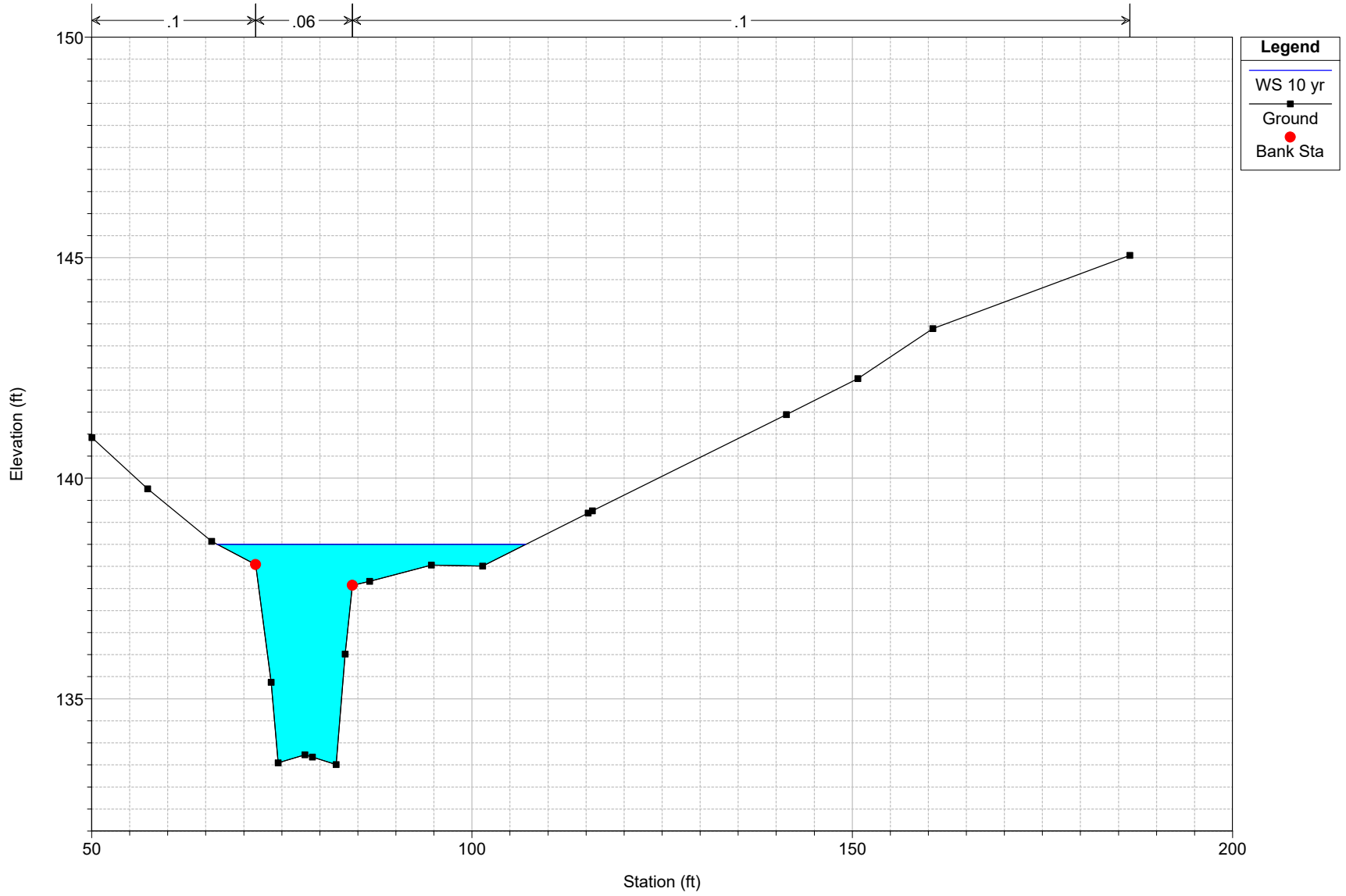
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

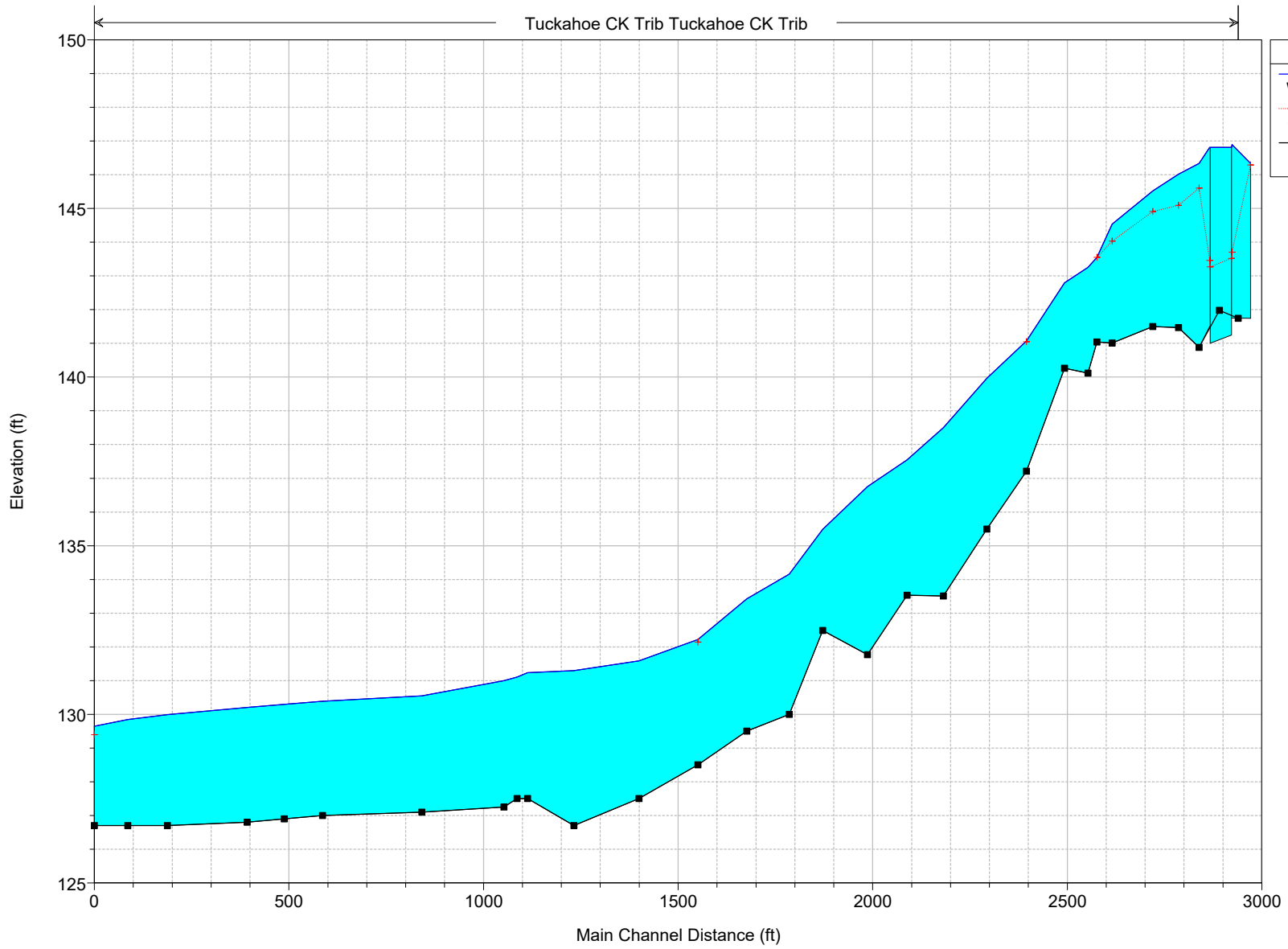
RS = 3195.49



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Pr Cond 12/18/2020

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

Tuckahoe CK Trib Tuckahoe CK Trib



Legend

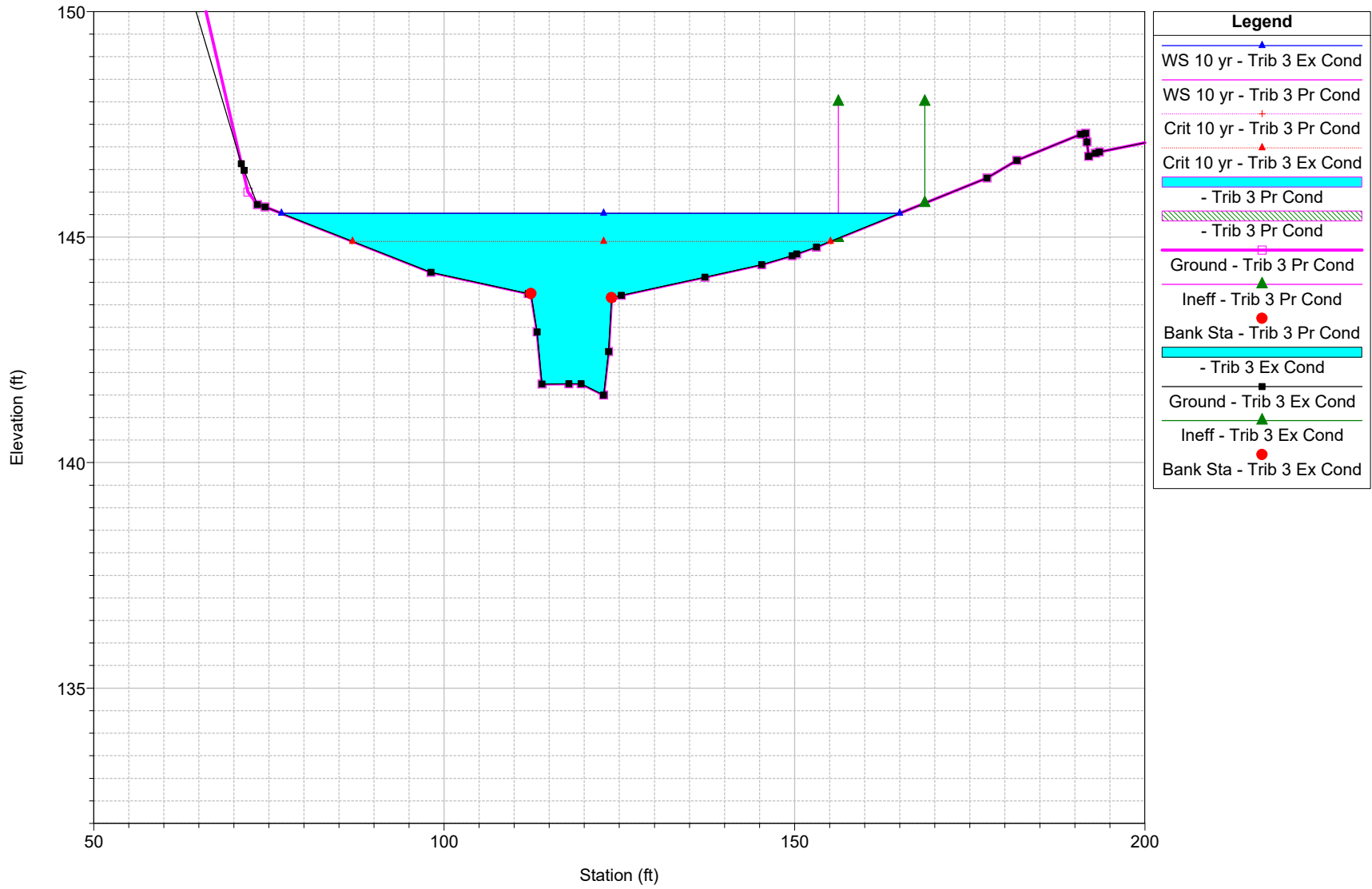
- WS 10 yr
- Crit 10 yr
- Ground

**EXISTING VS PROPOSED GEOMETRY CROSS
SECTIONS WITH 10YR WSE**

Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

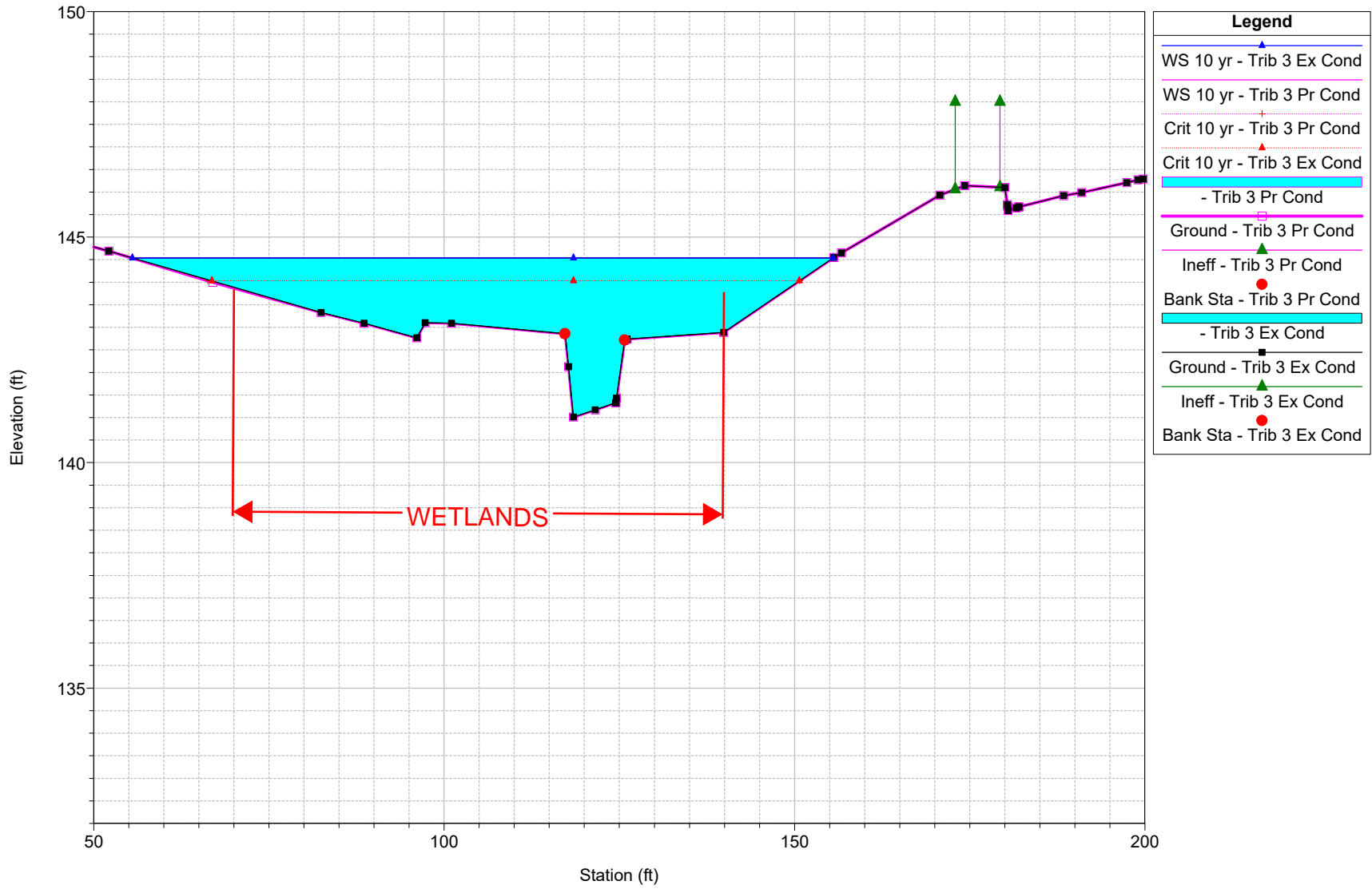
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

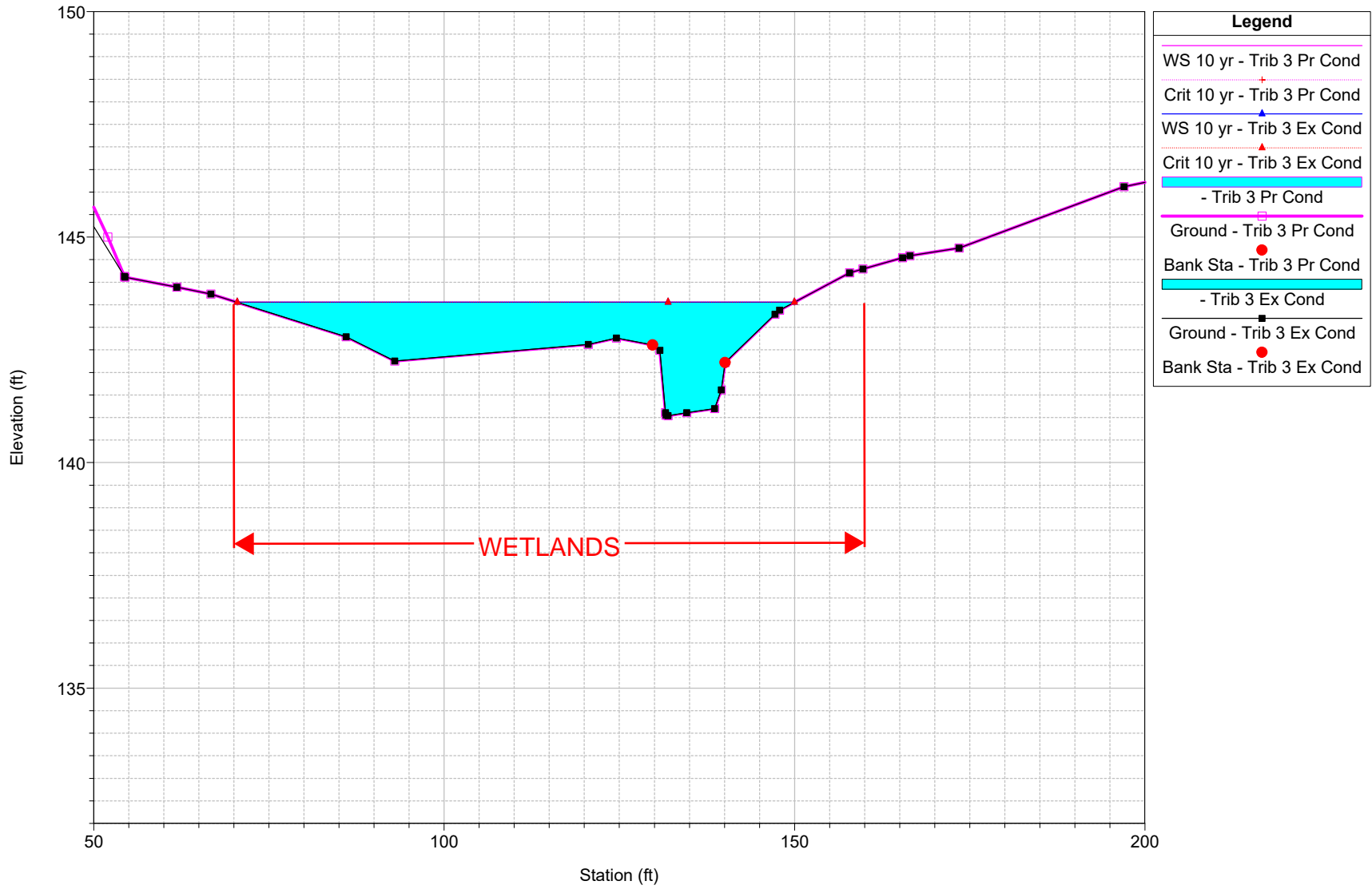
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

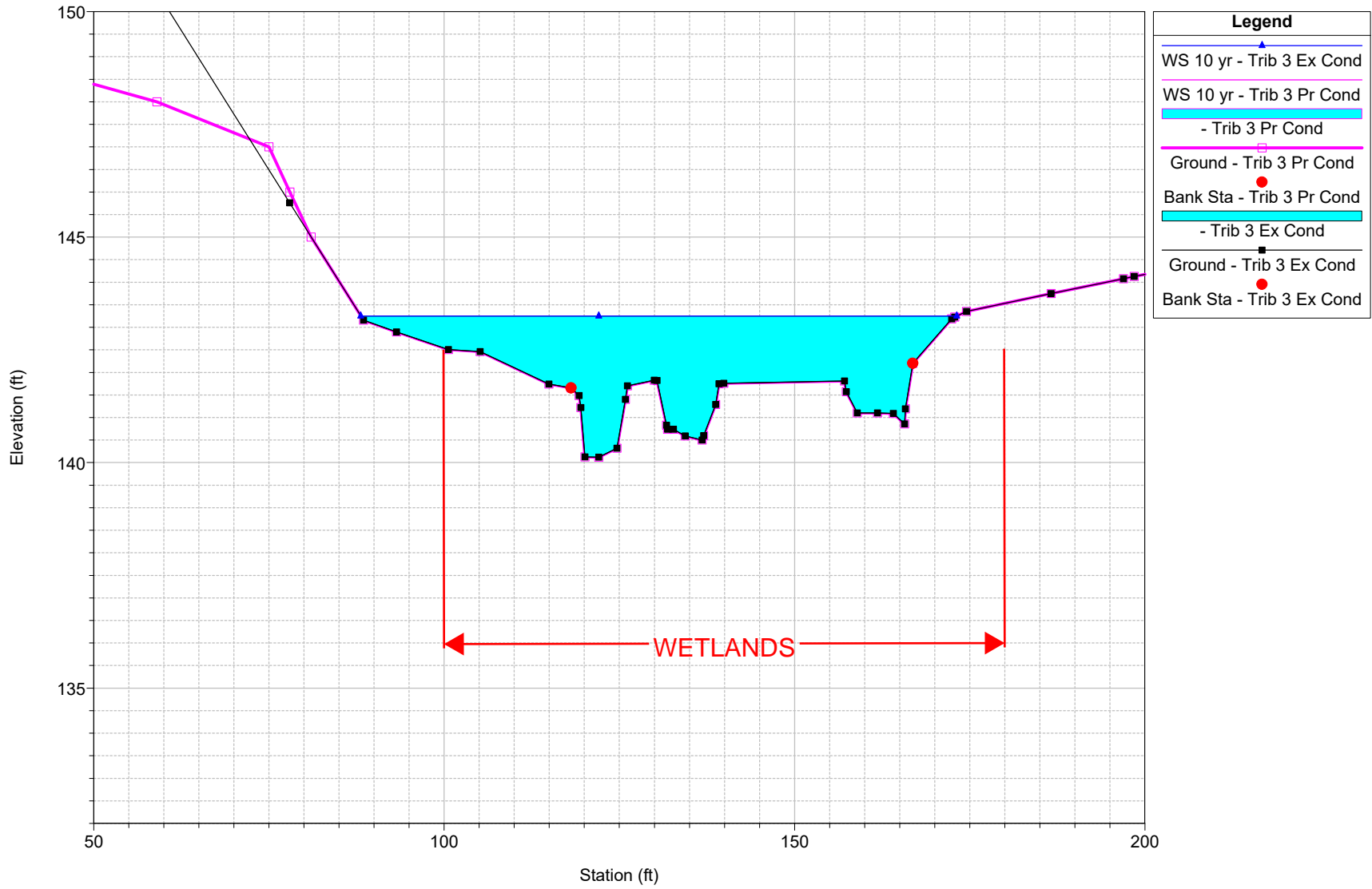
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

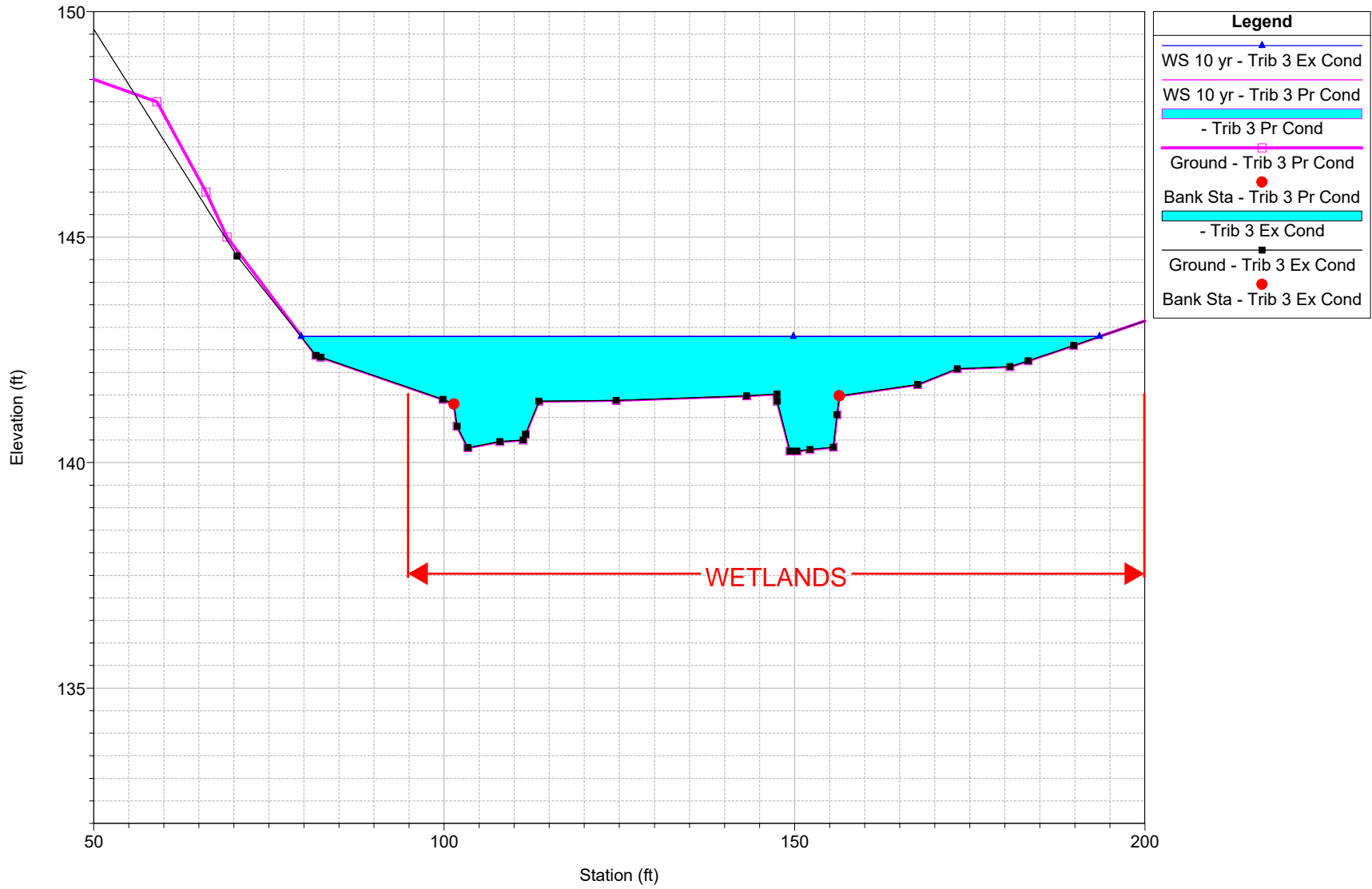
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

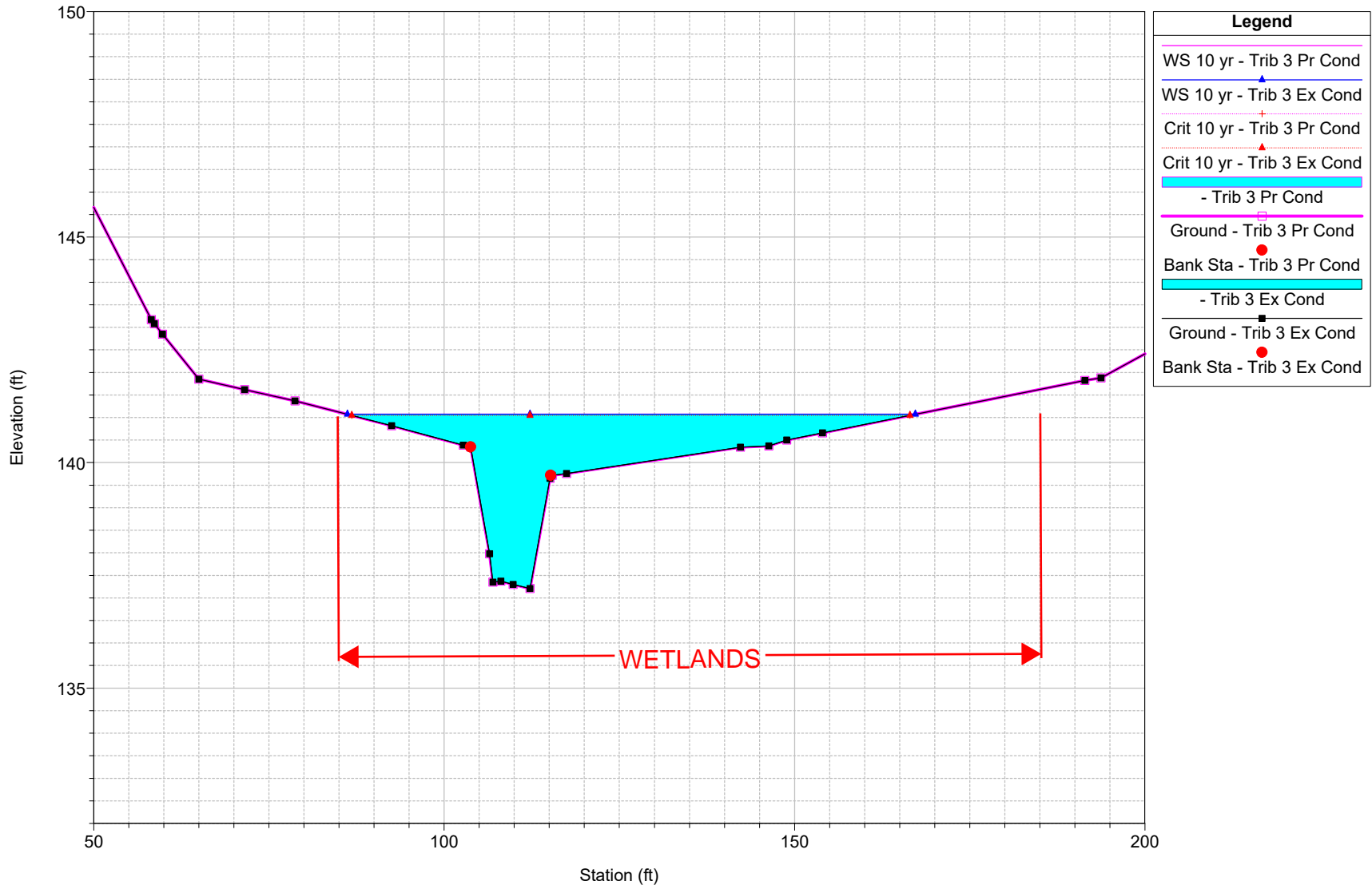
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

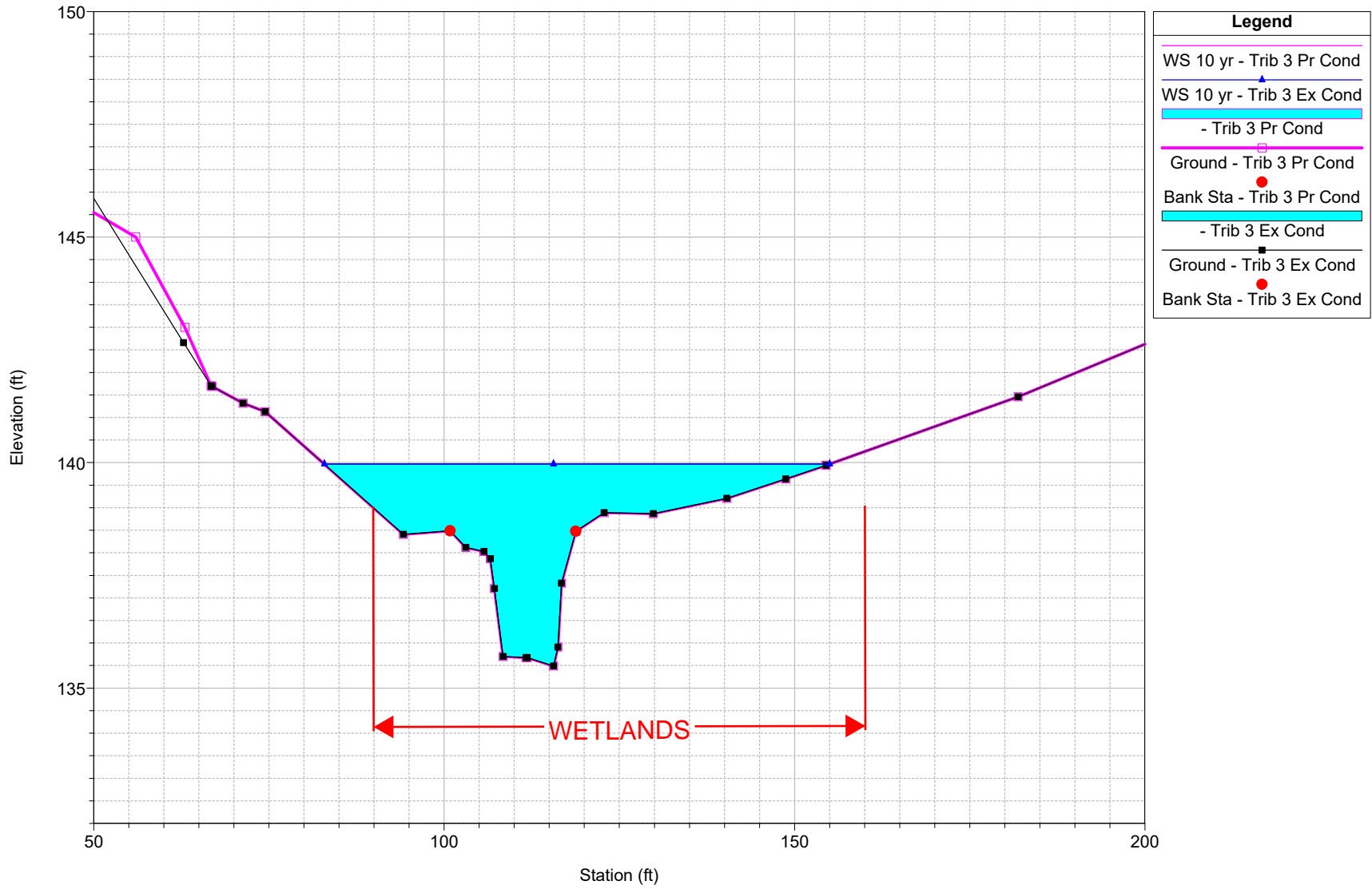
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Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 3306.96



Tuckahoe CK Trib 3 Plan: 1) Trib 3 Ex Cond 2) Trib 3 Pr Cond

Geom: Ex Condition Flow: Tuckahoe CK Trib 3

RS = 3195.49

