

WALTER P MOORE

WPM Project: H20-18011-01

Date: August 15, 2019

Hydraulic Impact Analysis Audubon Development – Phase 1 Montgomery County, Texas

Submitted To
Manhard Consulting

Submitted By
Kevin T. Vogel, P.E., CFM



K. T. Vogel

8/15/19

Walter P. Moore and Associates, Inc.
(TBPE Firm Registration No. 1856)





Jeff Johnson, P.E.
COUNTY ENGINEER

MEMORANDUM

August 27, 2019

Kevin T. Vogel, P.E.
Walter P. Moore
1780 Hughes Landing Blvd, Suite 450
The Woodlands, TX 77380

Re: Hydraulics Impact Analysis Study
Audubon Development – Phase 1

Dear Mr. Vogel

We are in receipt of the above referenced Hydraulics Impact Analysis study dated August 15, 2019 for the Audubon Development – Phase 1. This study models the impacts to the Base Flood Elevation when area of fill are added in both Mill Creek and Mill Creek Tributary #4 Special Flood Hazard Areas. For Mill Creek Tributary #4, the study proposes two mitigation options. Please note, Montgomery County's mitigation preference is for Mill Creek Tributary 4 is option A because it involved less underbrush removal and hence less ongoing maintenance would be required. However, based on the analysis presented in this study, either option appears to demonstrate compliance with the Montgomery County Flood Plain Management Regulations and shows no adverse impact to the Base Flood Elevation for Mill Creek Tributary #4

In addition, the analysis in this study appears to demonstrate compliance with the Montgomery County Flood Plain Management Regulations of no adverse impact on Mill Creek

We will keep this letter on file.

Please note, the developer will be required to obtain a Floodplain Development Non-Structure Permit through the Montgomery County Permit Office prior to making landscape changes in the floodplain. Also, please include in your permit application, a maintenance plan for either option A or B of the proposed mitigation strategies. You will also need to demonstrate compliance with Section 404 (wetlands) requirements for work in the flood plain. Finally please provide an exhibit that shows the areas and sq. area of



fill coverage for both Mill Creek and Mill Creek Tributary #4 as well as the area and coverage area of excavation for the proposed regrading region in Mill Creek Tributary #4. Finally, please coordinate with the permit office on additional information needed with a permit application.

Please let me know if you have any further questions.

Sincerely-

A handwritten signature in blue ink that reads "Diane F Cooper". The signature is written in a cursive style.

Diane Cooper, CFM
Floodplain Administrator



Cooper, Diane

From: Cooper, Diane
Sent: Tuesday, August 27, 2019 3:42 PM
To: Kevin Vogel
Cc: Ryan Wade; Anna Dudley; Wilds, Dan; Greg Voinis; samyageriii@samyagerinc.com
Subject: Audubon Drainage Analysis Report Hydraulics Impact Analysis Study - Approval
Attachments: Audubon Phase 1 - H&H approval_8_27_19_signed.pdf

Kevin-

Thank you for the copies of the models and additional insight of how the 4/2/19 models changed from the 3/5/19 models to more appropriately represent the impacts of bridge as represented in the FEMA FIS effective model for Mill Creek in the project area – Phase 1.

The items that were a confusion point now makes sense. With the removal of the ineffective flow areas for the bridge constriction and embankment the existing conditions HEC-RAS model on Mill Creek, the HEC-RAS model now more appropriately represents the information the conditions in the FEMA FIS effective model. This more appropriate representation is what lead to the lowering in you're the preexisting conditions HEC-RAS model and aligns with the BFE's determined from the FIS for the project area.

With this additional explanation, It appears that we have finally achieved showing no adverse impact to the BFE for the project area. Please see the attached approval letter. A hard copy will be sent out tomorrow to the new office address.

We do highly advise that for the purpose of the subdivision development determining the elevations for the fill that you consider the impacts of 1488 with the existing FIS flows, but in addition provide a WSEL scenario that takes into account Atlas 14. While Montgomery County has not been prioritized by TWDB or FEMA for a FEMA FIRM remapping project, when that does occur, we anticipate that the transition from TP40 for the precipitation input for the 100 year 24 hr. storm to Atlas 14, a nearly 4 inch increase in rainfall could impact the width or the floodplains as well as the Base Flood Elevations. Thus, we encourage you to build to those elevations, if they are higher than the current effective BFE+1 ft. This will increase the likelihood of compliance for those structures in the future.

As a reminder, a Floodplain Development Non Structure Permit must be obtained through the permit office prior to landscape changes in the floodplain. Also with your permit application, please provide a maintenance plan for either option A or B of the proposed mitigation strategies. You will also need to demonstrate compliance with Section 404 (wetlands) requirements for work in the flood plain.

Please let me know if you have any further questions.

Diane

Diane Cooper, CFM
Floodplain Administrator | Montgomery County Engineering
501 N Thompson Conroe, Texas 77301



Diane.Cooper@mctx.org

936-538-8111 (office)

Questions about floodplain management?



WALTER P MOORE

August 15, 2019

WPM Job No.: H20-18011-00

Mrs. Diane Cooper, CFM
Floodplain Administrator
Montgomery County Engineering
501 N Thompson
Conroe, TX 77301

RE: **Hydraulic Impact Analysis for Audubon Development – Phase 1**

Dear Mrs. Cooper:

Thank you for reviewing the referenced hydraulic impact analysis for the Audubon Development. Walter P Moore's responses to your comments provided in an email dated August 13, 2019 and the associated revisions to the report are summarized below.

1. Could you further explain your comment "**represent the conditions modeled within the effective model**" for the differences between the 3/5/19 model and the 4/2 model/report. As you stated, even in the 12/06/18 report, "**Roughness coefficients for the channel and overbanks were consistent with those values found in the effective model and were double checked using aerial photographs.**" The same verbiage was in the 3/5/19 report. So I am confused what you modified from the first 2 reports to the 3rd report dated 4/2/19, since you stated you already used consistent values and verified with aerial photographs. I also did not find n values in the documentation submitted with any of the reports to be able to evaluate for those changes in the 4/2/19 report.

Roughness coefficients for the channel and overbanks have remained the same for all submittals. What has changed since the first submittal was as follows:

- After the first report, Dan Wilds suggested we truncate our model to the downstream side of FM 1488. We modified the models (3/5/19) accordingly and showed no impact.
- For the third report (dated 4/2/19), we were asked to interpolate FIS WSEL's for the added cross-sections. To make our model more comparable to the effective model, ineffective flow areas due to the bridge contraction and roadway embankment were removed **since the effective models do not contain ineffective flow areas.** Nonetheless, no matter which modeling method used, no adverse impacts have been created due to the placement of the proposed fill.

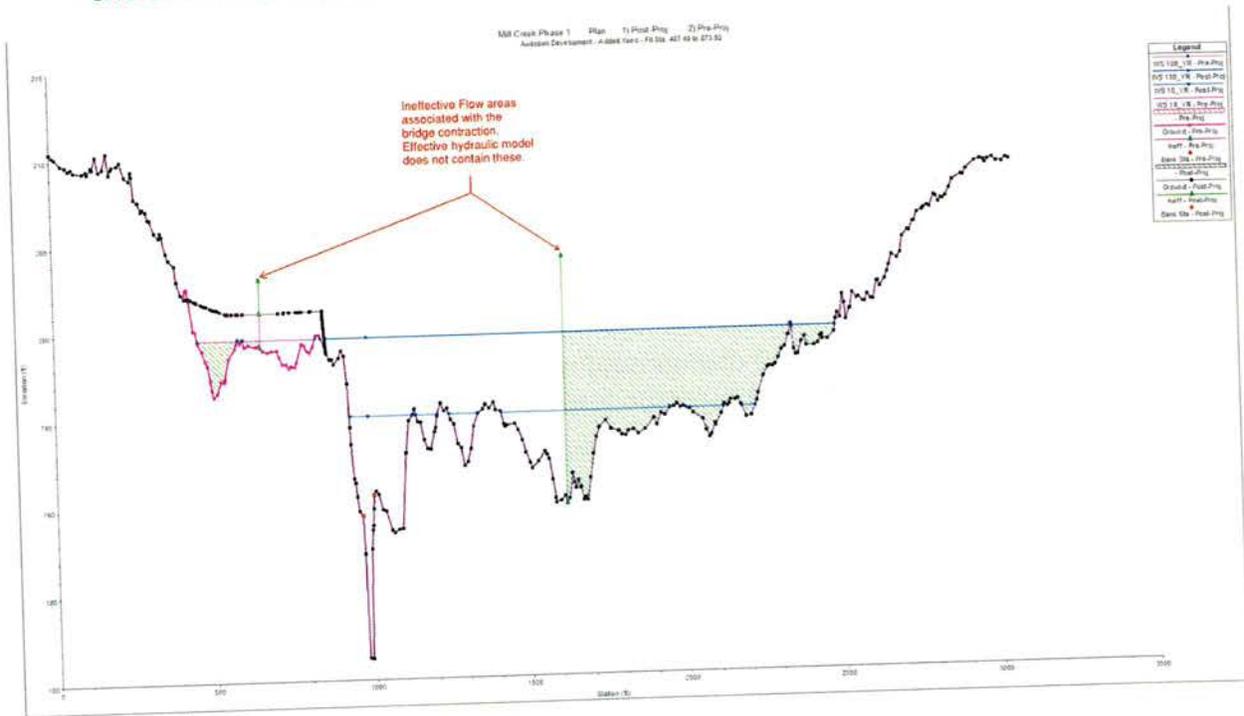
Due to the time lapse since our first submittal (December 2018), the grading plan for the development in the floodplain fringe of Mill Creek has been more refined and modified slightly. To ensure the drainage report matches the plan set, we have incorporated the final design/grading into the hydraulic model of Mill Creek and updated the results in the report text, accordingly.

1301 MCKINNEY, SUITE 1100
HOUSTON, TEXAS 77010
PHONE: 713.630.7300 FAX: 713.630.7396

WWW.WALTERPMOORE.COM

- Can you also further explain your comment "The reason for higher water surface elevations shown in the 3/5/19 study for pre-project conditions is directly related to adding ineffective flow areas to the model representing flow conditions immediately downstream of the FM 1488 bridge." Are you saying that the ineffective flow area has impacts through the full project region on Mill Creek (Note: the WSEL's dropped in the 4/2/19 study from the 3/5/19 from River Station 69267 to 65144.) That is a fairly large impact region and my quick analysis shows River Station 65144 is at least 2500 ft. downstream of the bridge. (see screen capture below). Could you provide the cross sections for this stretch for the 4/2/19 update so I can better understand how you modified the model/cross sections from the 3/5/19 study?

As stated above, the decrease in water surface elevations from the two submittals is directly related to the ineffective flow areas. The effective model does not contain any ineffective flow areas. The figure below illustrates ineffective flow areas associated with the FM 1488 bridge opening. A comparison of all cross-sections may be found at the end of this document.



- Also, while not required for the H&H approval, I was just curious if you had any results for the Atlas14 data. I am wondering the WSEL differences with the added precip volumes.

No, we do not have additional results related to Atlas 14 at this time.

4. Finally, I believe you said the environmental was complete for this area. Have you confirmed that the area of proposed fill is not in a wetlands. I only saw wetlands shown on the zoom for Mill Creek Trib 4. Did I miss an exhibit that showed the fill for Mill Creek overlaid with identified wetlands? While I do not need proof of compliance for the ESA or Section 404 of the Clean Water Act to approve the H&H study, it is advisable to cross reference this information to ensure that you do not have proposed work in areas that may be a challenge. I checked the USFWS wetlands viewer and there are some possible wetlands in the vicinity of proposed work on Mill Creek.

Yes, for further clarification, Owner has engaged professional environmental consultants to review and inspect the Project and are advising the team on such matters during the study, design and construction. The environmental professionals have confirmed the proposed fill is anticipated to be in compliance with Section 404 of the CWA.

Thank you for your time to review this resubmittal. Should you have any questions, please do not hesitate to contact me at 713-394-5882 or kvogel@walterpmoore.com.

Sincerely,

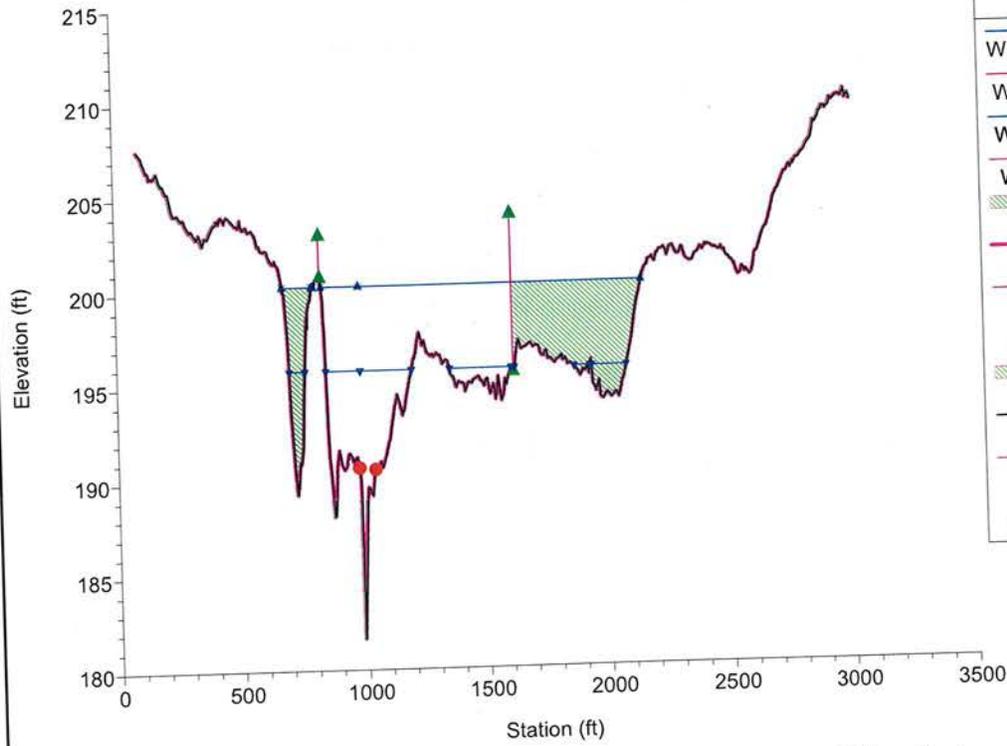


Kevin T. Vogel, P.E., CFM

Principal

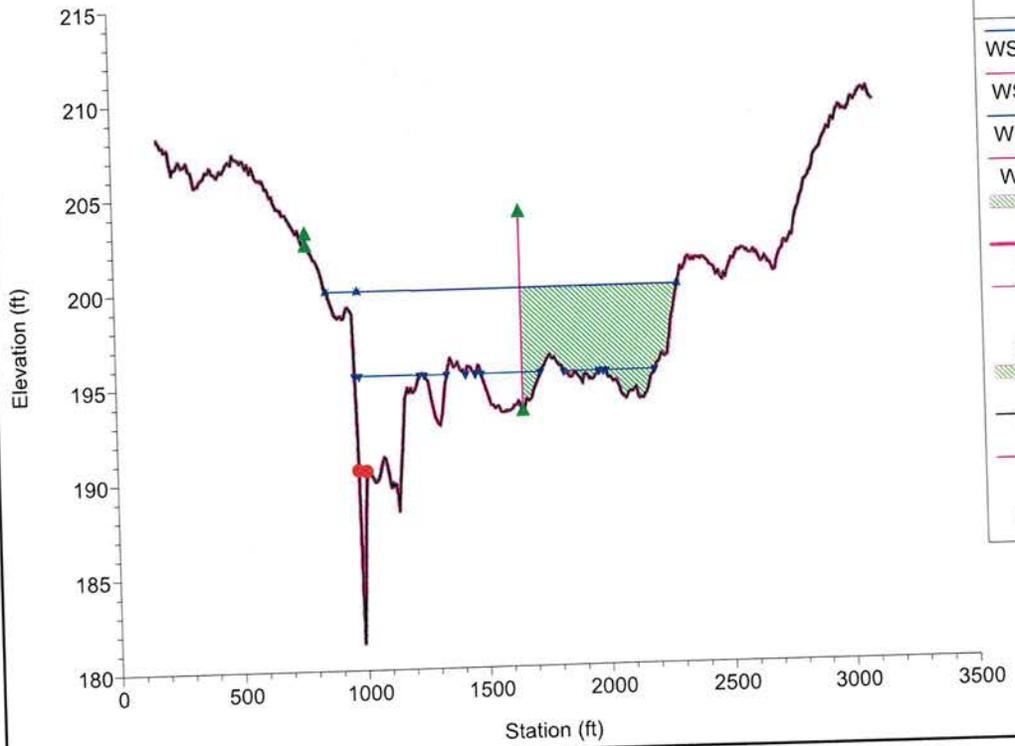
WALTER P MOORE AND ASSOCIATES, INC.

Mill Creek Phase 1 Plan: 1) Post-Proj 2) Pre-Proj
Audobon Development



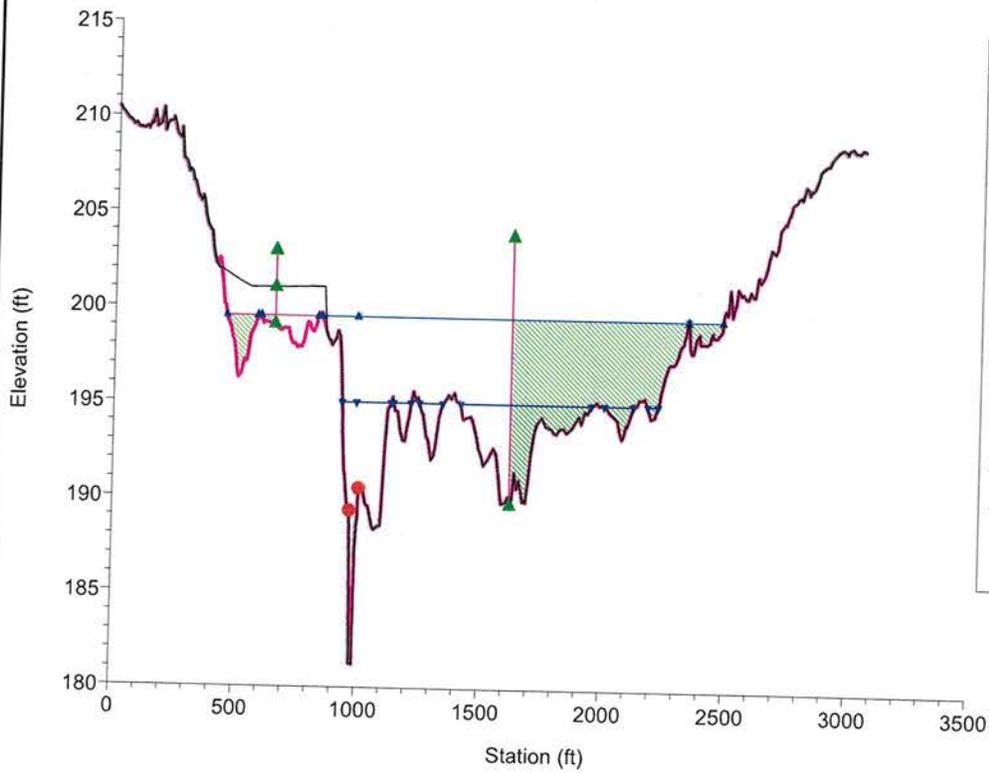
Legend	
WS 100_YR - Post-Proj	Blue line with inverted triangle
WS 100_YR - Pre-Proj	Pink line with inverted triangle
WS 10_YR - Post-Proj	Blue line with inverted triangle
WS 10_YR - Pre-Proj	Pink line with inverted triangle
- Pre-Proj	Green hatched area
Ground - Pre-Proj	Red line
Ineff - Pre-Proj	Green triangle
Bank Sta - Pre-Proj	Red dot
- Post-Proj	Green hatched area
Ground - Post-Proj	Red line
Ineff - Post-Proj	Green triangle
Bank Sta - Post-Proj	Red dot

Mill Creek Phase 1 Plan: 1) Post-Proj 2) Pre-Proj
Audobon Development

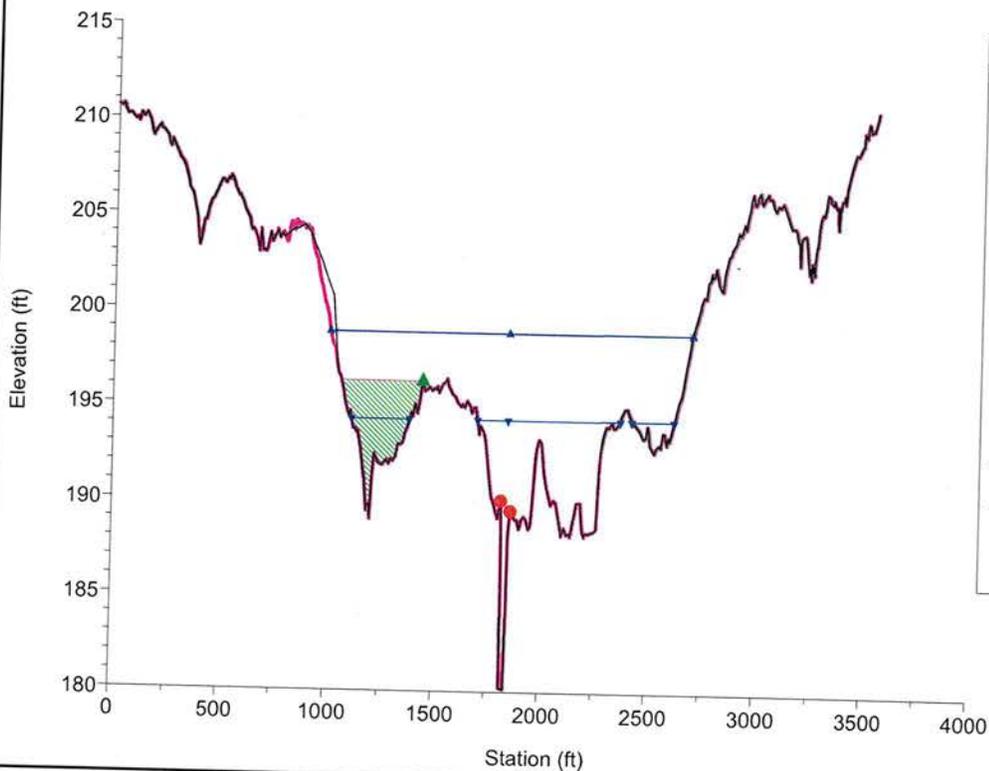


Legend	
WS 100_YR - Post-Proj	Blue line with inverted triangle
WS 100_YR - Pre-Proj	Pink line with inverted triangle
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Ground - Post-Proj	Red line
Ineff - Post-Proj	Green triangle
Bank Sta - Post-Proj	Red dot

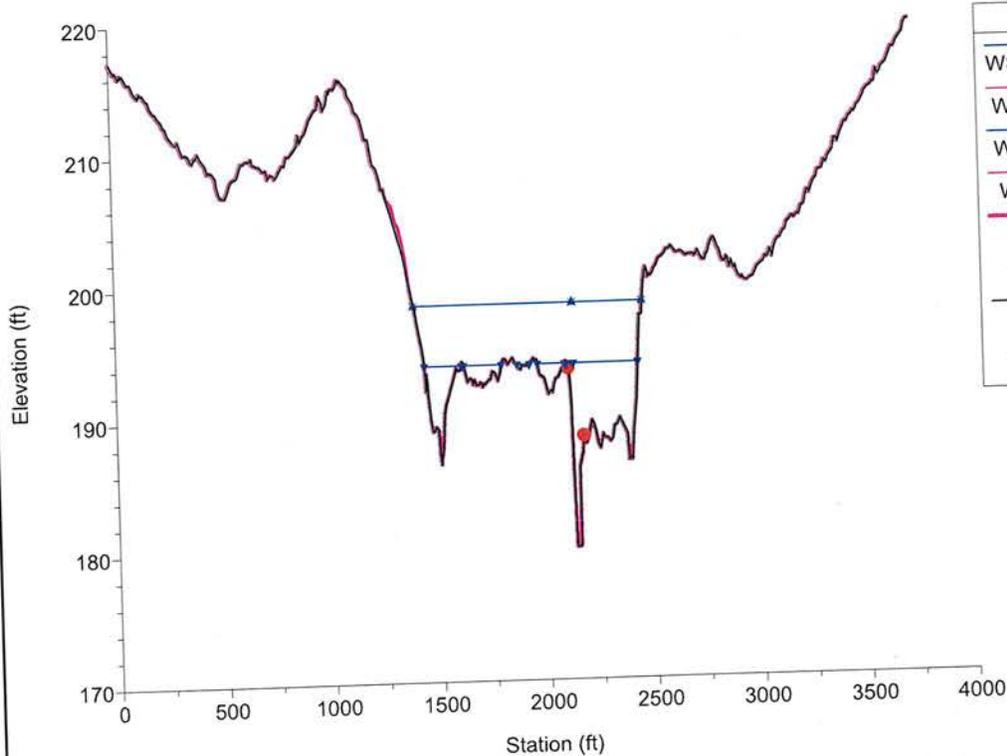
Mill Creek Phase 1 Plan: 1) Post-Proj 2) Pre-Proj
 Audobon Development - Added Xsec - Fill Sta. 407.40 to 873.92



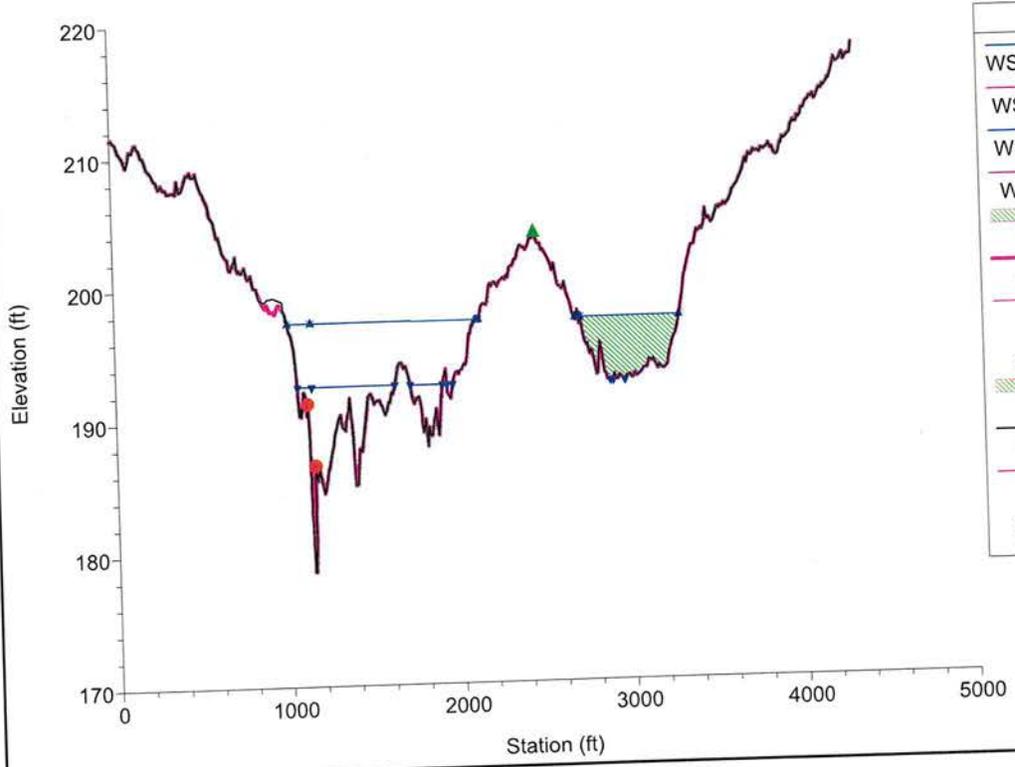
Mill Creek Phase 1 Plan: 1) Post-Proj 2) Pre-Proj
 Audobon Development - Added Xsec - Fill Sta. 774.25 to 1072.37



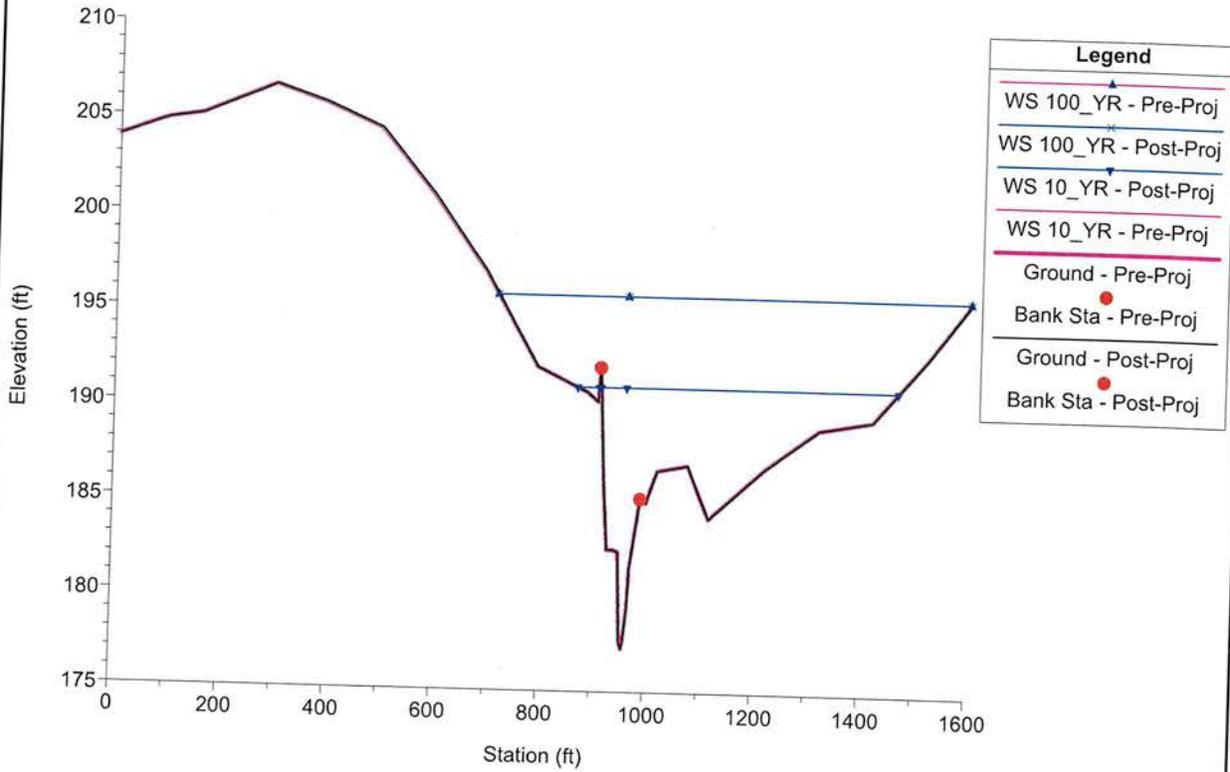
Mill Creek Phase 1 Plan: 1) Post-Proj 2) Pre-Proj
 Audobon Development - Added Xsec - Fill Sta. 1253.56 to 1390.25



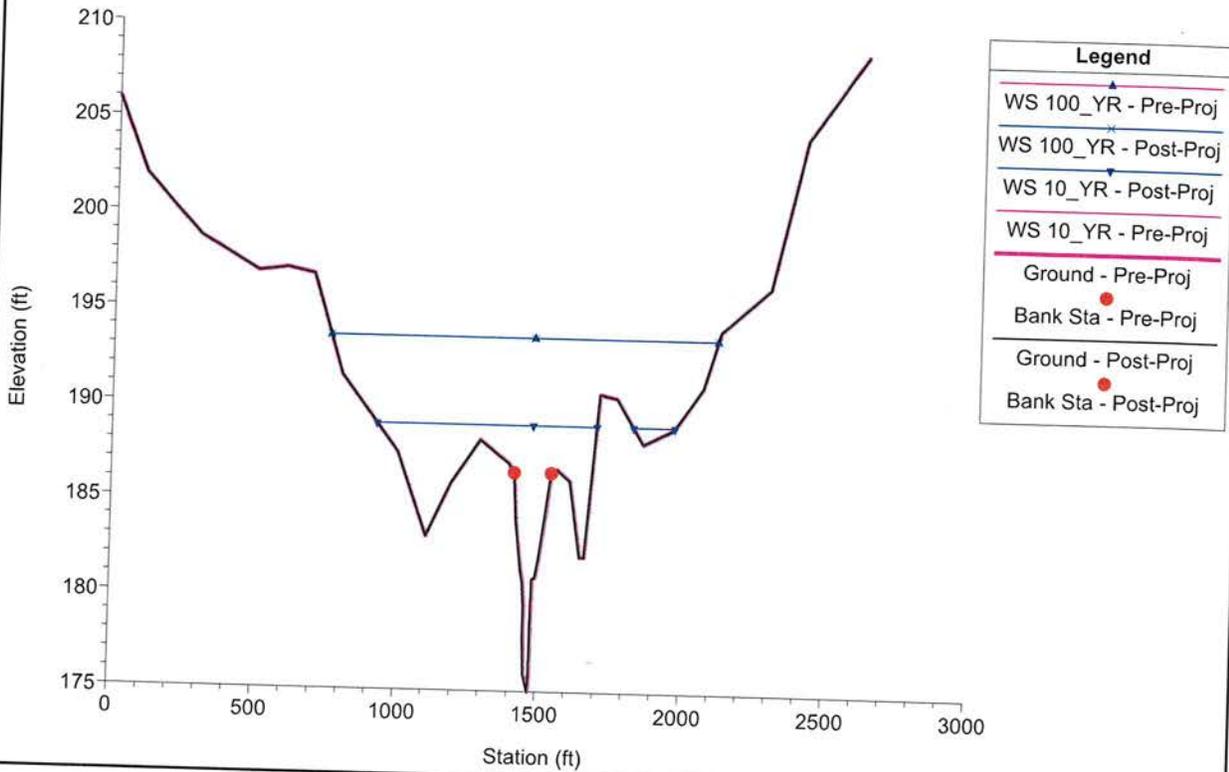
Mill Creek Phase 1 Plan: 1) Post-Proj 2) Pre-Proj
 Audobon Development - Added Xsec - Fill Sta. 829.70 to 1003.80



Mill Creek Phase 1 Plan: 1) Post-Proj 2) Pre-Proj
FEMA XSEC Z



Mill Creek Phase 1 Plan: 1) Post-Proj 2) Pre-Proj
FEMA XSEC Y





WALTER P MOORE

WPM Project: H20-18011-01

Date: August 15, 2019

**Hydraulic Impact Analysis
Audubon Development – Phase 1
Montgomery County, Texas**

Submitted To
Manhard Consulting

Submitted By
Kevin T. Vogel, P.E., CFM



K. T. Vogel

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EXHIBITS

Exhibit 1	Vicinity Map
Exhibit 2	Proposed Land Plan – West
Exhibit 3	Proposed Land Plan – East
Exhibit 4	FIRM Panel
Exhibit 5	Phase 1 Aerial
Exhibit 6	Cross Section Layout and Mitigation Schematic – Mill Creek
Exhibit 7	Drainage Areas
Exhibit 8	Existing Land Use
Exhibit 9	Proposed Land Use
Exhibit 10	Cross Section Layout Map – Mill Creek Tributary No. 4
Exhibit 11	Mitigation A Schematic – Mill Creek Tributary No. 4
Exhibit 12	Mitigation B Schematic – Mill Creek Tributary No. 4

APPENDICES

Appendix A..... Hydrologic Support Data – Tributary No. 4 of Mill Creek
Appendix B..... Hydraulic Support Data – Mill Creek
Appendix C..... Hydraulic Support Data – Tributary No. 4 of Mill Creek
Appendix D..... Hydrologic & Hydraulic Models (See Attached Disk)

EXECUTIVE SUMMARY

The purpose of this analysis was to examine the effects of proposed fill in the floodplain fringes of both Mill Creek and Tributary No. 4 to Mill Creek. The project and study area are located in the southwestern portion of Montgomery County, Texas. The name of the overall project is *Audubon* and will be located on approximately 3,240 acres of unincorporated Montgomery County, Texas. This initial report will analyze Phase 1 of the project. Phase 1 will be comprised of two developed areas. The first is approximately 103.2 acres and is located immediately south of FM 1488, north of Tributary No. 4 to Mill Creek, and west of Mill Creek. The second site consists of 65.6 acres and is located on the east of Mill Creek, also south of FM 1488. *Audubon – Phase 1* will consist of single-family homes, an elementary school site, and a commercial tract.

Detention requirements for the Phase 1 development were not investigated in this study. An approved 2016 drainage report, prepared by Jones & Carter and entitled "Impact Analysis for 3240-Acre Development by 1488 Corporation" produced a timing analysis illustrating the new development could be constructed without detention and will not increase peak runoff rates along Mill Creek.

The effective hydrologic support data associated with the Flood Insurance Study of Mill Creek and Tributary No. 4 to Mill Creek was requested and received from FEMA. A review of the information revealed that the hydrologic parameters and peak flow computations were completed in 1979. It was decided to use the FEMA data for peak flow conditions along Mill Creek; however, for Tributary No. 4 to Mill Creek, it was decided to create new models using updated software and methodologies for this study. A hydrologic model was created in HEC-HMS 4.2.1 and hydrologic parameters were determined using procedures outlined within the Montgomery County Drainage Criteria Manual to create unit hydrographs for sub-watersheds of Tributary No. 4 to Mill Creek and peak runoff rates along the stream. Coincidentally enough, the analysis demonstrated that the proposed improvements along Tributary No. 4 to Mill Creek will slightly decrease peak runoff rates as a result of the anticipated development due to increased velocities and thus timing of routed upstream hydrographs. The results of the hydrologic analysis are shown in the table below.

Audubon– Phase 1 Tributary No. 4 to Mill Creek		Units	Quantity	
Project Drainage Area		acres	103.2	
Mouth of Tributary		acres	1790	
			4%	1%
			(25-Yr)	(100-Yr)
Allowable Outflow at Mouth (Existing Conditions)		cfs	2477	3276
Provided Outflow at Mouth (Proposed Conditions)		cfs	2315	3054

A hydraulic impact analysis of Mill Creek was completed using the effective hydraulic model obtained from FEMA and augmenting it with current topographic Lidar. The hydraulic model for Tributary No. 4 was not obtained; therefore, a new hydraulic model was created from Lidar. The

models were modified to reflect the proposed Phase 1 improvements. The models demonstrated that although Phase 1 features fill in the floodplain, no impacts are apparent on Mill Creek, and along Tributary No. 4 to Mill Creek, benefits gained by clearing and other vegetation modifications offset the conveyance losses associated with the planned fill project and yield no impact to the 25- or 100-year water surface elevations when compared to existing. In many areas, the water surface elevations are slightly lowered.

SECTION 1 INTRODUCTION

1.1 Project Name and Purpose

The name of this project is *Audubon – Phase 1*. The purpose of this study is to assess the hydraulic impacts associated with the anticipated development on both Mill Creek and Tributary No. 4 to Mill Creek. The criteria used for this study included the *Drainage Criteria Manual for Montgomery County, Texas*.

1.2 Project Limits

The project and study area are located in the southwestern portion of unincorporated Montgomery County, Texas. Phase 1 will consist of two separate development areas, one east of Mill Creek and the other west of Mill Creek. The eastern tract is located south of FM 1488 and bounded on the west side by Mill Creek. The eastern tract will consist of 65.6 acres of single family residential lots and a commercial tract. The western tract is also located south of FM 1488 and bounded by Tributary No. 4 to Mill Creek to the south and Mill Creek to the east. The western tract consists of approximately 103.2 acres and will include single family lots and a school site. A location map with the project limits associated with Phase 1 of the development is provided in **Exhibit 1**. The following sections describe the approach and methodology used for this analysis.

1.3 Project Objectives

The objective of this study was to:

- Coordinate with the client regarding the land plan and required mitigation measures,
- Establish drainage boundaries to isolate the project site and understand any off-site drainage area currently draining through the project site,
- Quantify hydrologic impacts associated with new development and drainage improvements,
- Confirm compliance with Montgomery County drainage criteria and guidelines, and
- Submit a report to the Montgomery County Engineering Department for their review and approval.

1.4 Assumptions

Below are the assumptions that were made in conjunction with the analysis performed for this study.

- All elevations stated in this report are on the North American Vertical Datum 88 (NAVD 88).
- HEC-HMS, Version 4.2.1, was used for the hydrologic modeling of the drainage areas.
- HEC-RAS, Version 5.0.3, was used to develop the hydraulic modeling.

1.5 Project Outfall

Runoff from the east tract will outfall directly to Mill Creek, and the west tract will ultimately outfall to Mill Creek at the downstream end of the site via Tributary No. 4 to Mill Creek. Exhibits 2 and 3 are annotated versions of the proposed land plan for the development, provided by Manhard Consulting, showing the development as it relates to both Mill Creek and Tributary No. 4 to Mill Creek.

According to the effective Flood Insurance Rate Map (FIRM) shown in Exhibit 4, portions of the Phase 1 development areas are located in the 1% annual exceedance probability floodplain fringes associated with both Mill Creek and Tributary No. 4 of Mill Creek. However, all of the Phase 1 development is proposed to be located outside of the floodways associated with both of these streams.

1.6 Land Use

Currently, the Phase 1 project site consists of undeveloped land, predominantly heavy stands of timber with significant undergrowth. The surrounding area is also largely undeveloped, but the limited development in the area consists of residential lots to the south. The areas to the east, west, and north are undeveloped. An aerial overview of the site and adjacent areas is provided in Exhibit 5.

SECTION 2 MILL CREEK HYDRAULIC IMPACT STUDY

The hydraulic impact analysis for the planned improvements along Mill Creek was completed using the effective hydraulic model of this stream as a base condition. Storm frequencies analyzed for this study included the 10% (10-year) and 1% (100-year) AEP storm events, as the Flood Insurance Study did not contain a 4% (25-year) AEP storm event.

2.1 Methodology

Base modeling data was taken from the WSP2 model output obtained from FEMA. Flowrates used in this analysis match those found within the effective model. No changes were made to stream flows to represent post-project conditions as the 2016 watershed wide study produced by Jones & Carter did not show increases to stream peak runoff rates as a result of the proposed improvements.

2.2 Pre-Project Conditions

No digital models were obtained from FEMA, only a pdf containing a copy of the stream geometry, hydraulic structure geometry, and results. Using this information, a pre-project model was created. The pre-project model is a truncated version of the entire river reach. The project reach extends approximately 4,500 stream feet downstream of the project site (FEMA XSEC Y) to just downstream of FM 1488. In order to capture the Phase 1 improvements, six additional cross-sections were added to the model downstream of FM 1488 as well as to take into consideration a large area of ineffective flow. The cross-section layout of the effective model and added cross-sections is shown in **Exhibit 6**. These cross-sections were created using 2005 topographic Lidar. Roughness coefficients for the channel and overbanks were consistent with those values found in the effective model and were double checked using aerial photographs.

Table 1 below illustrates 1% (100-yr) AEP computed water surface elevations for pre-project conditions as compared to the base flood elevations shown on the effective FIRM panel and Flood Insurance Study for Montgomery County, Texas. As shown, computed water surface elevations for pre-project conditions vary slightly. The differences are attributed to better topographic data which capture more flow conveyance and storage volume as well as updated modeling software.

Table 1: Mill Creek 1% AEP WSEL Comparison					
River Sta.	FEMA XSEC	Flow	FIS WSEL	Pre-Project	Difference
		(cfs)	(ft)	(ft)	(ft)
69267		9036	199.40*	199.37	-0.03
69108		9036	199.33*	199.18	-0.15
68869		9036	199.18*	198.97	-0.21
67922		9036	198.64*	198.5	-0.14
67285		9036	198.32*	198.13	-0.19
65144		9036	197.29*	197.1	-0.19
63400	Z	9197	196.40	195.86	-0.54
60640	Y	9203	193.60	193.6	0.00

* This is a best guess of the BFE at each of the identified cross-sections added to the model since the stream centerlines have different alignments and thus different reach lengths.

2.3 Post-Project Conditions

Using the pre-project model as a base, a post-project model was created by revising the geometry data to represent anticipated fill within the floodplain fringes of Mill Creek. Stream flow rates remain the same for the post-project conditions. The proposed development along Mill Creek and Tributary No. 4 to Mill Creek has been shown to slightly decrease peak flows within Mill Creek (see figures below).

Figure 1: 2016 Jones Carter Impact Study for Mill Creek (Represents fully developed conditions along Tributary No. 4)

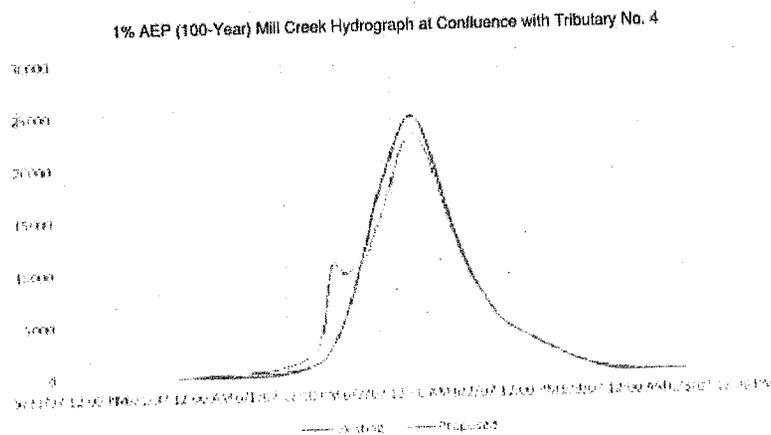


Figure 2: 2018 Drainage Study for Phase 1 of Audubon – Hydrograph at Mouth of Tributary No. 4

Trib. No. 4 Hydrograph
2018 Phase 1 - Hydraulic Impact Study

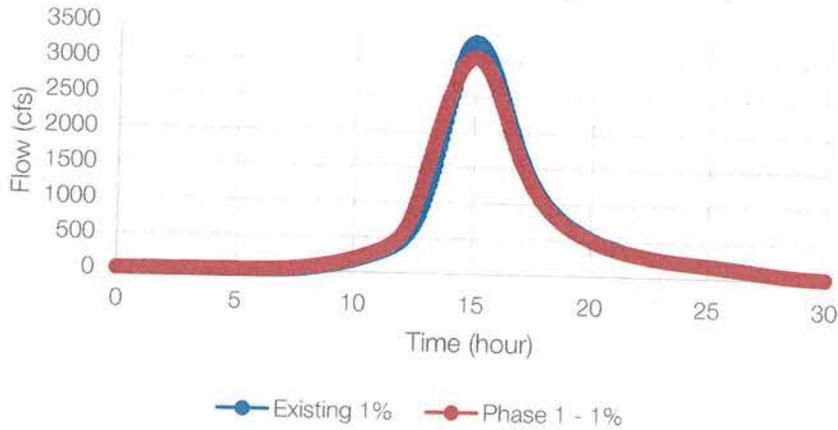


Table 2 provides a comparison of computed pre- and post-project conditions water surface elevations. As shown, no hydraulic impacts are anticipated for storm events up to the 100-year event with the proposed minor fill in the floodplain fringes of Mill Creek. Cross-section comparisons may be found in Appendix B - Hydraulic Support Data – Mill Creek.

Table 2: Mill Creek WSEL Comparison								
River Sta.	10-Year			100-Year				
	Pre-Project	Post-Project	Difference	Pre-Project	Post-Project	Post-Pre	FIS WSEL	Post-FIS
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
69267	195.38	195.38	0	199.37	199.37	0	199.40*	-0.03
69108	195.1	195.1	0	199.18	199.18	0	199.33*	-0.15
68869	194.76	194.76	0	198.97	198.97	0	199.18*	-0.21
67922	194.12	194.12	0	198.5	198.5	0	198.64*	-0.14
67285	193.76	193.76	0	198.13	198.13	0	198.32*	-0.19
65144	192.44	192.44	0	197.1	197.1	0	197.29*	-0.19
63400	191.05	191.05	0	195.86	195.86	0	196.40	-0.54
60640	189	189	0	193.6	193.6	0	193.60	0.00

* This is a best guess of the BFE at each of the identified cross-sections added to the model since the stream centerlines have different alignments and thus different reach lengths.

SECTION 3 TRIBUTARY NO. 4 TO MILL CREEK HYDRAULIC IMPACT STUDY

3.1 HYDROLOGY

The hydrology for this analysis was based upon methods outlined within the *Montgomery County Drainage Criteria Manual*. Storm frequencies analyzed for this study included the 4% (25-year) and 1% (100-year) AEP storm events. Based on the size of the drainage areas, hydrologic models that isolate the proposed *Audubon – Phase 1* development were created using HEC-HMS, Version 4.2.1 to produce unit hydrographs and perform streamflow routing of upstream hydrographs. Please note that portions of the *Audubon – Phase 1* development are located outside of the drainage areas associated with Tributary No. 4 to Mill Creek. The focus of this hydrologic assessment was to determine the hydrologic impacts associated with the placement fill within the fringes of Tributary No. 4 to Mill Creek.

3.1.1 Drainage Areas

Exhibit 5 illustrates the drainage boundaries delineated from recent topographic Lidar augmented with 2005 Lidar obtained from the Texas Natural Resources Information System (TNRIS) with the Phase 1 development area. The total drainage area for Tributary No. 4 to Mill Creek is about 1,790.7 acres, or 2.8 square miles. This area is consistent with the Flood Insurance Study which notes a 2.89 square mile drainage area. Exhibit 7 shows the site drainage areas for Tributary No.4 to Mill Creek.

3.1.2 Methodology

Clark Unit Hydrograph Parameters, time of concentration, and storage coefficient for each sub-area was found using equations 2.10, 2.11, 2.12, and 2.13 in the *Montgomery County Drainage Criteria Manual*. These equations were developed using historical rainfall and runoff data from selected watersheds in Harris, Fort Bend, and Montgomery Counties, and are dependent upon the length, slope, and roughness of each basin's longest watercourse, the average overland slope of the basin, and the imperviousness of the basin. Exhibits 8 and 9 show the impervious cover for the existing and proposed conditions, respectively. For proposed conditions, the portion of the Phase 1 development located within the Tributary No. 4 to Mill Creek watershed (located in sub-watersheds 473 & 475) was assumed to be fully developed. This is a conservative estimate since some of this area will not be developed until future phases.

Tables 3 and 4 below summarize the hydrologic parameters used for the existing and proposed conditions, respectively. Detailed hydrologic parameters and computation for existing and proposed conditions are provided in Appendix A – Hydrologic Support Data – Tributary No. 4 of Mill Creek. In order to accurately model discharge from the existing lake at the upstream end of Mill Run, both Elevation-Storage and Elevation-Discharge functions were developed based upon the available detailed Lidar.

Table 3: Existing Conditions Hydrologic Parameters

Sub-area	Area (acres)	Length (miles)	Channel Slope (ft/mile)	Manning's Weighted "n"	Average Basin Slope (ft/mile)	Effective Impervious Ratio	TC+R (hr)	TC (hr)	R (hr)
471	620.375	2.14	40.1	0.078	149.1	0.1122	3.99	3.30	0.69
472	607.108	2.06	44.4	0.078	137.2	0.0440	4.48	3.64	0.84
473	166.004	0.98	39.6	0.080	153.2	0.0007	3.38	2.80	0.57
474	270.147	1.78	35.9	0.084	132.7	0.0174	4.96	4.00	0.96
475	127.129	0.93	30.1	0.082	167.0	0.0000	3.58	3.03	0.56

Table 4: Proposed Conditions Hydrologic Parameters

Sub-area	Area (acres)	Length (miles)	Channel Slope (ft/mile)	Manning's Weighted "n"	Average Basin Slope (ft/mile)	Effective Impervious Ratio	TC+R (hr)	TC (hr)	R (hr)
471	620.375	2.14	40.1	0.078	149.1	0.1122	3.99	3.30	0.69
472	607.108	2.06	44.4	0.078	137.2	0.0440	4.48	3.64	0.84
473	166.004	0.98	39.6	0.074	153.2	0.1042	2.50	2.07	0.42
474	270.147	1.78	35.9	0.084	132.7	0.0174	4.96	4.00	0.96
475	127.129	0.93	30.1	0.067	167.0	0.1641	2.11	1.78	0.33

3.1.3 Hydrographs & Routing

Runoff hydrographs were created for each of the sub-areas using the Clark Unit Hydrograph Method. Rainfall depths of 9.43 inches and 12.17 inches for the respective 25- and 100-year, 24-hour storm events were input into the HEC-HMS model. Precipitation losses were modeled using the empirical Exponential Loss Rate Function in HEC-HMS as outlined in the *Montgomery County Drainage Criteria Manual*.

Routing of upstream hydrographs was completed using the Modified Puls method for both existing and proposed conditions. Routing data was created from Existing and Proposed HEC-RAS models and routed through three segments of Tributary No. 4: RS 8636 to RS 7544, RS 7544 to RS 5389, and RS 5389 to RS 1502. Percentages of the 1% (100-yr) AEP peak flow were used to create the modeling data. The segments can be seen below in **Figure 4**, and the resulting routing data can be seen below in **Tables 5 & 6** below. The proposed conditions stream routing takes into consideration the anticipated fill in the floodplain fringes.

Table 5: Existing Routing Data					
8636 to 7544		7544 to 5389		5389 to 1502	
Volume	Discharge	Volume	Discharge	Volume	Discharge
0	0	0	0	0	0
2.55	238	7.56	313	16.25	328
5.33	475	15.27	625	31.81	655
7.96	713	22.23	938	45.46	983
10.35	951	29.35	1250	58.41	1311
12.6	1188	35.76	1563	69.86	1638
14.78	1426	41.84	1875	80.54	1966
16.73	1663	47.6	2188	91.42	2293
18.69	1901	53.39	2501	101.28	2621
20.53	2139	58.67	2813	110.85	2949
22.32	2376	63.87	3126	120.12	3276
24.08	2614	68.84	3438	129.18	3604
25.82	2852	73.81	3751	138.06	3932
27.5	3089	78.59	4063	146.74	4259
29.12	3327	83.25	4376	155.29	4587
30.67	3565	87.91	4689	163.71	4914
32.19	3802	92.56	5001	172.42	5242
Subreaches=2		Subreaches=4		Subreaches=2	

Table 6: Proposed Routing Data					
8636 to 7544		7544 to 5389		5389 to 1502	
Volume	Discharge	Volume	Discharge	Volume	Discharge
0	0	0	0	0	0
2.54	238	7.2	301	15.18	304
5.21	475	14.11	602	28.89	609
7.66	713	20.2	902	40.42	913
9.84	951	26.4	1203	51.18	1218
11.9	1189	31.99	1504	61.33	1522
13.82	1426	37.24	1805	70.29	1827
15.64	1664	42.05	2105	78.67	2131
17.36	1902	46.96	2406	87.31	2436
19.06	2139	51.27	2707	95.13	2740
20.65	2377	55.51	3008	102.86	3045
22.24	2615	59.65	3308	110.27	3349
23.79	2853	63.54	3609	117.32	3654
25.32	3090	67.36	3910	124.29	3958
26.81	3328	71.2	4211	131.03	4262
28.23	3566	75.01	4512	137.63	4567
29.65	3803	78.69	4812	144.1	4871
Subreaches=2		Subreaches=3		Subreaches=2	

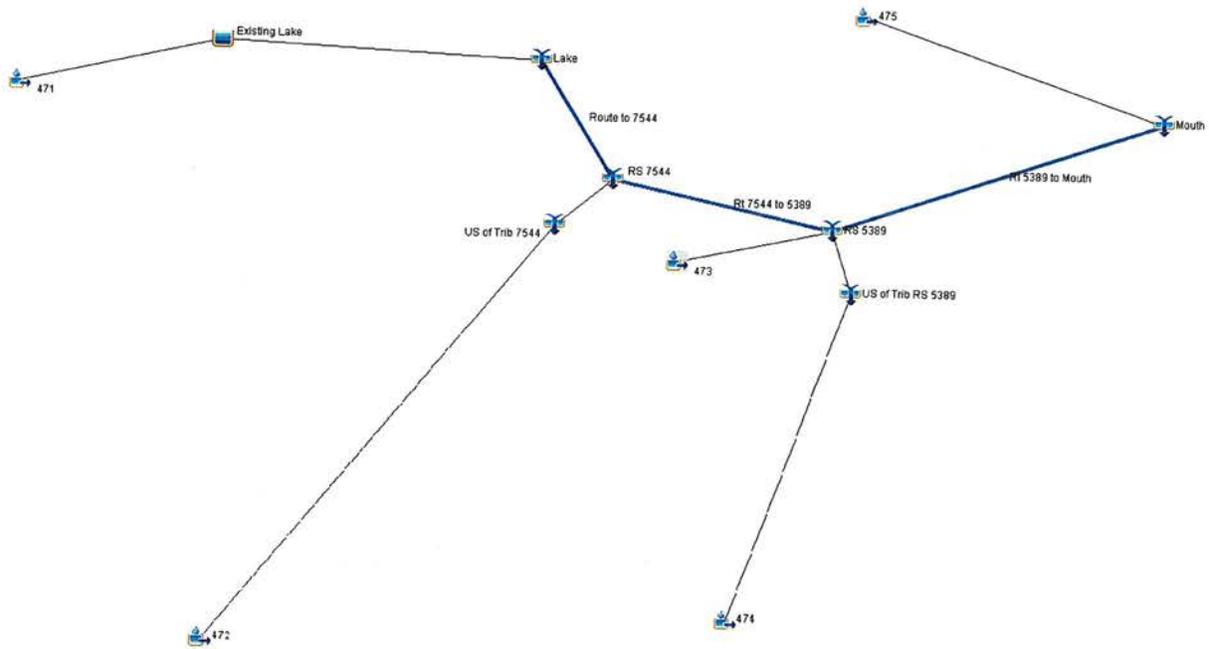


Figure 4: HEC-HMS Model Geometry

3.1.4 Hydrologic Results

Table 7 summarizes existing and proposed flowrates for the 25- and 100-year discharges associated with each sub-area, as well as the total flow leaving Tributary No. 4 to Mill Creek and entering Mill Creek. A detailed summary of the flows for each sub-area is provided in Appendix A. A screenshot of the model geometry is shown in Figure 4.

Based on the conditions and parameters discussed above, peak outflow rates at the mouth for the existing conditions were determined to be 2477 and 3276 cfs for the 25- and 100-year, 24-hour storm events, respectively. Proposed conditions flows at the same location were determined to be 2315 and 3054 cfs for the 25- and 100-year, 24-hour storm events, respectively. In general, these values are lower than the flow values for the existing conditions, despite the increased flows from the drainage areas affected by the development. This is due to the fact that the development is at the downstream end of Tributary No. 4. Therefore, the increased flows are able to exit into Mill Creek before the flow from the bulk of the upper drainage basin arrives at the mouth of the stream. At computation node RS 7544, there is a 1 cfs and 2 cfs peak runoff increase for the 25- and 100-year storm events, respectively. These peak flow increases do not translate into increased water surface elevations as shown in Section 3.2. Because the existing conditions flows are more conservative, they were used in the hydraulic analysis of the development impacts discussed in Section 3. At RS 7544, the higher proposed results were used.

Table 7: Hydrologic Results – Sub-Watersheds					
Sub-area	Existing 25-Year (cfs)	Existing 100-Year (cfs)	Proposed 25-Year (cfs)	Proposed 100-Year (cfs)	
471	1016	1299	1016	1299	
472	898	1156	898	1156	
473	302	386	379	478	
474	369	477	369	477	
475	222	284	327	410	
Hydrologic Results – Computation Points					
Computation Point	Existing 25-Year (cfs)	Existing 100-Year (cfs)	Proposed 25-Year (cfs)	Proposed 100-Year (cfs)	FIS 100-Year (cfs)
Lake	943	1233	943	1233	641 (C)
RS 7544	1823	2376	1824	2378	N/A
RS 5389	2384	3125	2292	3006	1327 (B)
Mouth	2477	3276	2315	3054	1531 (A)

3.2 HYDRAULICS

The purpose of the hydraulic analysis was twofold:

- Model the proposed improvements in the left overbank of Tributary No. 4 to Mill Creek, and
- To determine what mitigation efforts would be required in order to prevent impacts to water surface elevations in Tributary No. 4 by the development.

The following sections describe the method of analysis and the results obtained.

3.2.1 Existing Conditions Model of Tributary No. 4

A steady state model was created in HEC-RAS 5.0.3 to evaluate the existing and proposed conditions for the *Audubon – Phase 1* development. The location of the cross sections were spaced on average less than 200-ft apart and the geometry was based on recent Lidar flow for this project augmented with the 2005 Lidar obtained from the Texas Natural Resources Information System (TNRIS). Exhibit 10 shows the cross-section layout along Tributary No. 4 to Mill Creek.

Using the results of the hydrologic analysis, stream flows were determined using a log-normal distribution between computation points and applied to the stream geometry. Channel and overbank roughness coefficients were determined from field visit observations and photographs, as well as recent aerial photographs. Channel roughness coefficients ranged from 0.05 to 0.055 and represent a natural winding channel with some brush and weeds. Overbank roughness coefficients ranged from 0.07 to 0.11, with 0.11 predominantly used to represent a heavy stand of timber, a few downed trees, and some under-brush.

3.2.2 Proposed Conditions Model of Tributary No. 4

The areas of fill for Phase 1 of the development will be elevated above the base flood elevation, and may vary slightly from our model when constructed. The filled areas were modeled in two ways. At the school site, the fill was modeled by altering the elevations of the cross sections to reflect the proposed grading plan. Grading from the top of fill to existing grade was assumed to be 1V:4H. Downstream of the school site, where single family homes will be constructed in a future phase, the fill was modeled as obstructed areas for flexibility in determining the acceptable fill extents for this phase. An example of existing and proposed cross-sections can be seen in Figure 5 below.

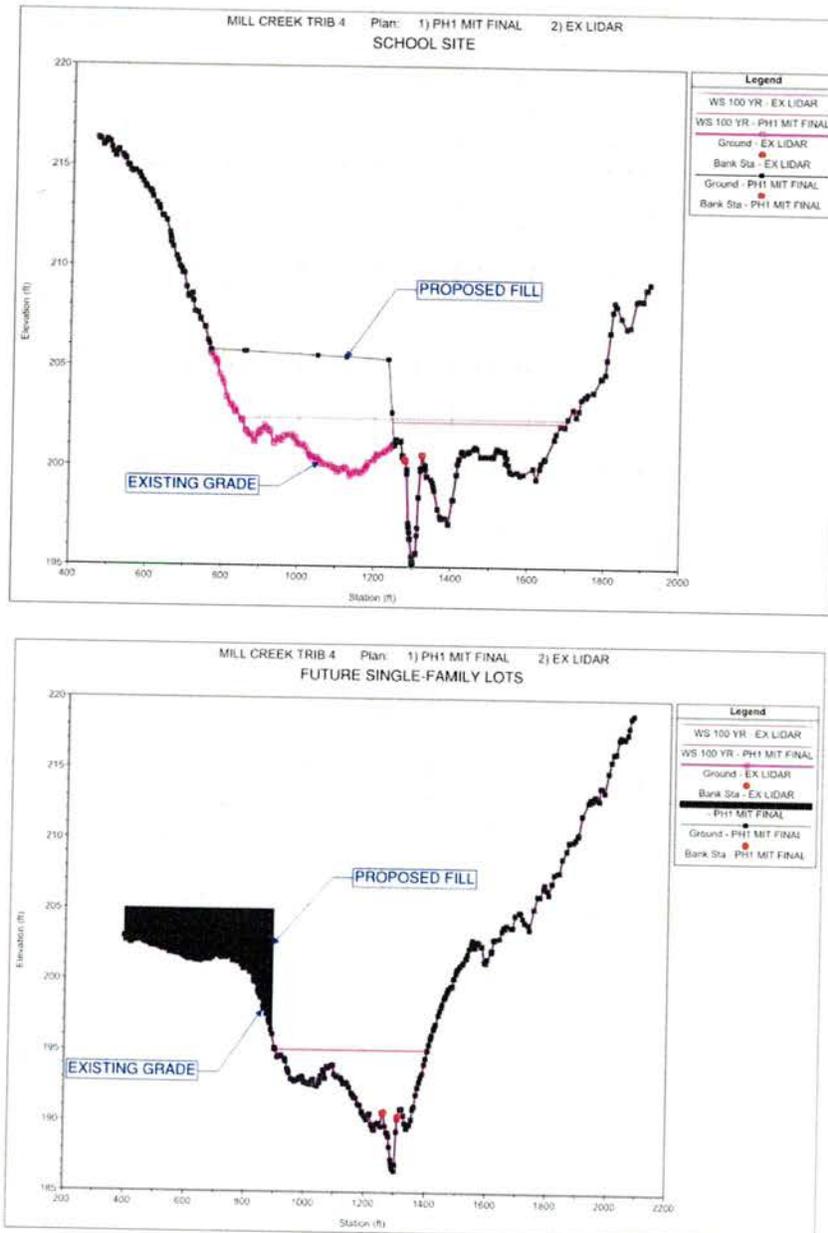


Figure 5: Example comparison between Existing and Proposed HEC-RAS cross-sections.

Table 8 below illustrates a comparison of the computed 100-year water surface elevations for both the existing and proposed conditions without any mitigation efforts. For the proposed conditions, the geometry associated with Mitigation Plan B, discussed below, was used. This option proposes the largest amount of fill, and is therefore the worst case scenario when no mitigation efforts are made. As shown, water surface increase by as much as 0.22 feet as a result of the anticipated fill. Comparisons of additional storm events may be found in Appendix B.

Table 8: Existing vs. Proposed- 100-Yr WSEL

HEC-RAS Station	FIS Cross Section	FIS*	Existing	EX-FIS	Proposed	Existing vs. Proposed
		(ft)	(ft)	(ft)	(ft)	(ft)
	7084	208.6		---		
8636		207.31	206.42	-0.89	206.56	0.14
8610		207.29	206.42	-0.87	206.56	0.14
8560		207.23	206.39	-0.84	206.53	0.14
8468		206.98	206.27	-0.71	206.43	0.16
8410		206.85	206.13	-0.72	206.3	0.17
8257		206.39	206	-0.39	206.2	0.2
8104		205.93	205.83	-0.10	206.03	0.2
7964		205.84	205.62	-0.22	205.75	0.13
7840		205.73	205.48	-0.25	205.53	0.05
7766		205.40	205.39	-0.01	205.45	0.06
7674		205.35	205.33	-0.02	205.4	0.07
7544		205.02	204.94	-0.08	205.05	0.11
7412		204.64	204.33	-0.31	204.45	0.12
7325		204.35	203.76	-0.59	203.85	0.09
7162		203.85	202.77	-1.08	202.99	0.22
6997		203.43	202.39	-1.04	202.4	0.01
6830		202.96	202.02	-0.94	202.02	0
6509		202.38	201.46	-0.92	201.46	0
6026		201.40	200.75	-0.65	200.75	0
5815		200.93	200.34	-0.59	200.34	0
5718		200.79	200.2	-0.59	200.2	0
	4318	200.6		---		
5506		200.51	199.82	-0.69	199.82	0
5389		200.31	199.63	-0.68	199.64	0.01
5010		200.13	199.1	-1.03	199.11	0.01
4892		200.09	198.98	-1.11	198.99	0.01
4634		199.99	198.7	-1.29	198.71	0.01
4422		199.92	198.32	-1.60	198.33	0.01
4218		199.80	197.46	-2.34	197.49	0.03
4108		199.72	197.39	-2.33	197.42	0.03
4062		199.69	197.37	-2.32	197.41	0.04
3891		199.68	197.29	-2.39	197.33	0.04
3642		199.51	197.13	-2.38	197.17	0.04
3511		199.43	196.99	-2.44	197.04	0.05
3074		199.20	195.88	-3.32	196.03	0.15
2907		199.08	195.77	-3.31	195.87	0.1
2787		198.99	195.64	-3.35	195.72	0.08
2659		198.90	195.42	-3.48	195.48	0.06
2528		198.80	195.01	-3.79	194.99	-0.02
2324		198.69	194.34	-4.35	194.33	-0.01
2178		198.57	194.09	-4.48	194.08	-0.01
2053		198.50	193.98	-4.52	193.97	-0.01
	1460	198.4		---		
1951		197.86	193.77	-4.09	193.76	-0.01
1666		197.77	193.31	-4.46	193.29	-0.02
1502		197	193	-4	192.98	-0.02

* This is a best guess of the BFE at each of the identified cross-sections added to the model since the stream centerlines have different alignments and thus different reach lengths.

3.2.3 Mitigated Model of Tributary No. 4

Two mitigation plans were developed for Tributary No. 4 of Mill Creek, Mitigation Plan A and Mitigation Plan B, which differ in their treatment of the area downstream of the future park. Mitigation Plan A is shown in Exhibit 11 and Mitigation Plan B is shown in Exhibit 12. In Plan A, the model was adjusted to find a maximum possible fill line without resorting to vegetation modifications in the flood plain. In Plan B, the desired line of fill was set at the back of the future lot lines, and the model was adjusted to find the appropriate level and location of under-brushing needed in order to prevent increases in water surface elevations. For areas proposed to be under-brushed, the roughness coefficient was decreased from the existing value of 0.11 to a value of 0.08. The areas in which under-brushing were needed can be seen in Exhibits 11 & 12.

For both mitigations plans, the areas at and upstream of the future park are treated identically. In cross sections 4892 through 5506, an area of deposition on the inside of an oxbow bend was reduced in height in order to add conveyance. The n value for the regraded area is also 0.08 as it is anticipated that the developer will allow this area to return to a natural state with under-brushing. Figure 6 below shows an example of one of these regraded cross sections. Table 9 shows the difference in water surface elevations for Mitigation Plan A once appropriate mitigation efforts are in place, and Table 10 shows the same results for Mitigation Plan B. For both plans, surface elevations for all cross-sections are less than or equal to those of the existing conditions model.

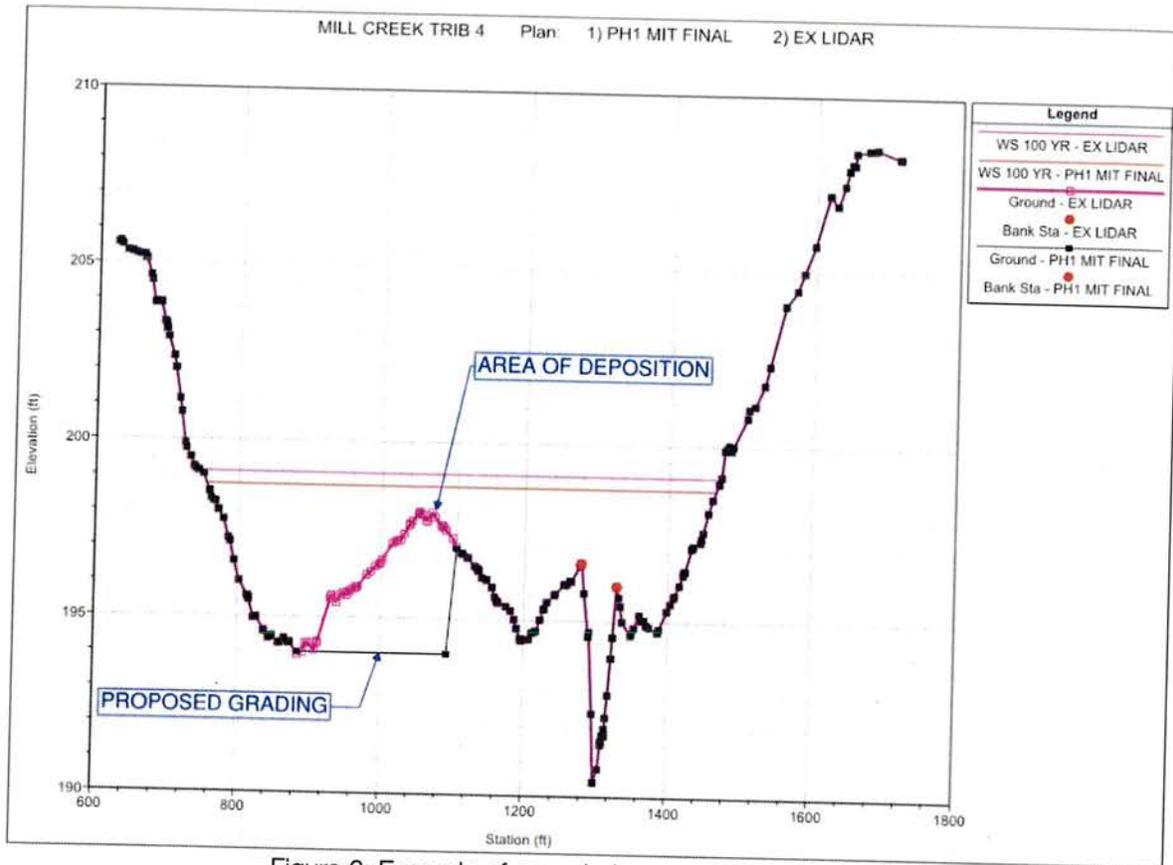


Figure 6: Example of regraded cross section in oxbow.

Table 9: Proposed vs. Mitigated A – 100-Yr						
HEC-RAS Station	FIS Cross Section	FIS (ft)*	Existing	EX - FIS	Mitigated A	Existing vs. Mitigated
			(ft)	(ft)	(ft)	(ft)
	7084	208.6	---	---	---	---
8636		207.31	206.42	-0.89	206.39	-0.03
8610		207.29	206.42	-0.87	206.39	-0.03
8560		207.23	206.39	-0.84	206.35	-0.04
8468		206.98	206.27	-0.71	206.21	-0.06
8410		206.85	206.13	-0.72	206.1	-0.03
8257		206.39	206	-0.39	205.98	-0.02
8104		205.93	205.83	-0.10	205.81	-0.02
7964		205.84	205.62	-0.22	205.57	-0.05
7840		205.73	205.48	-0.25	205.34	-0.14
7766		205.40	205.39	-0.01	205.26	-0.13
7674		205.35	205.33	-0.02	205.19	-0.14
7544		205.02	204.94	-0.08	204.8	-0.14
7412		204.64	204.33	-0.31	204.14	-0.19
7325		204.35	203.76	-0.59	203.64	-0.12
7162		203.85	202.77	-1.08	202.76	-0.01
6997		203.43	202.39	-1.04	202.21	-0.18
6830		202.96	202.02	-0.94	201.85	-0.17
6509		202.38	201.46	-0.92	201.25	-0.21
6026		201.40	200.75	-0.65	200.28	-0.47
5815		200.93	200.34	-0.59	199.61	-0.73
5718		200.79	200.2	-0.59	199.32	-0.88
	4318	200.6	---	---	---	---
5506		200.51	199.82	-0.69	199.04	-0.78
5389		200.31	199.63	-0.68	198.96	-0.67
5010		200.13	199.1	-1.03	198.75	-0.35
4892		200.09	198.98	-1.11	198.69	-0.29
4634		199.99	198.7	-1.29	198.52	-0.18
4422		199.92	198.32	-1.60	198.26	-0.06
4218		199.80	197.46	-2.34	197.45	-0.01
4108		199.72	197.39	-2.33	197.39	0
4062		199.69	197.37	-2.32	197.37	0
3891		199.68	197.29	-2.39	197.29	0
3642		199.51	197.13	-2.38	197.13	0
3511		199.43	196.99	-2.44	196.99	0
3074		199.20	195.88	-3.32	195.88	0
2907		199.08	195.77	-3.31	195.77	0
2787		198.99	195.64	-3.35	195.64	0
2659		198.90	195.42	-3.48	195.42	0
2528		198.80	195.01	-3.79	195.01	0
2324		198.69	194.34	-4.35	194.34	0
2178		198.57	194.09	-4.48	194.09	0
2053		198.50	193.98	-4.52	193.98	0
	1460	198.4	---	---	---	---
1951		197.86	193.77	-4.09	193.77	0
1666		197.77	193.31	-4.46	193.31	0
1502		197	193	-4	193	0

* This is a best guess of the BFE at each of the identified cross-sections added to the model since the stream centerlines have different alignments and thus different reach lengths.

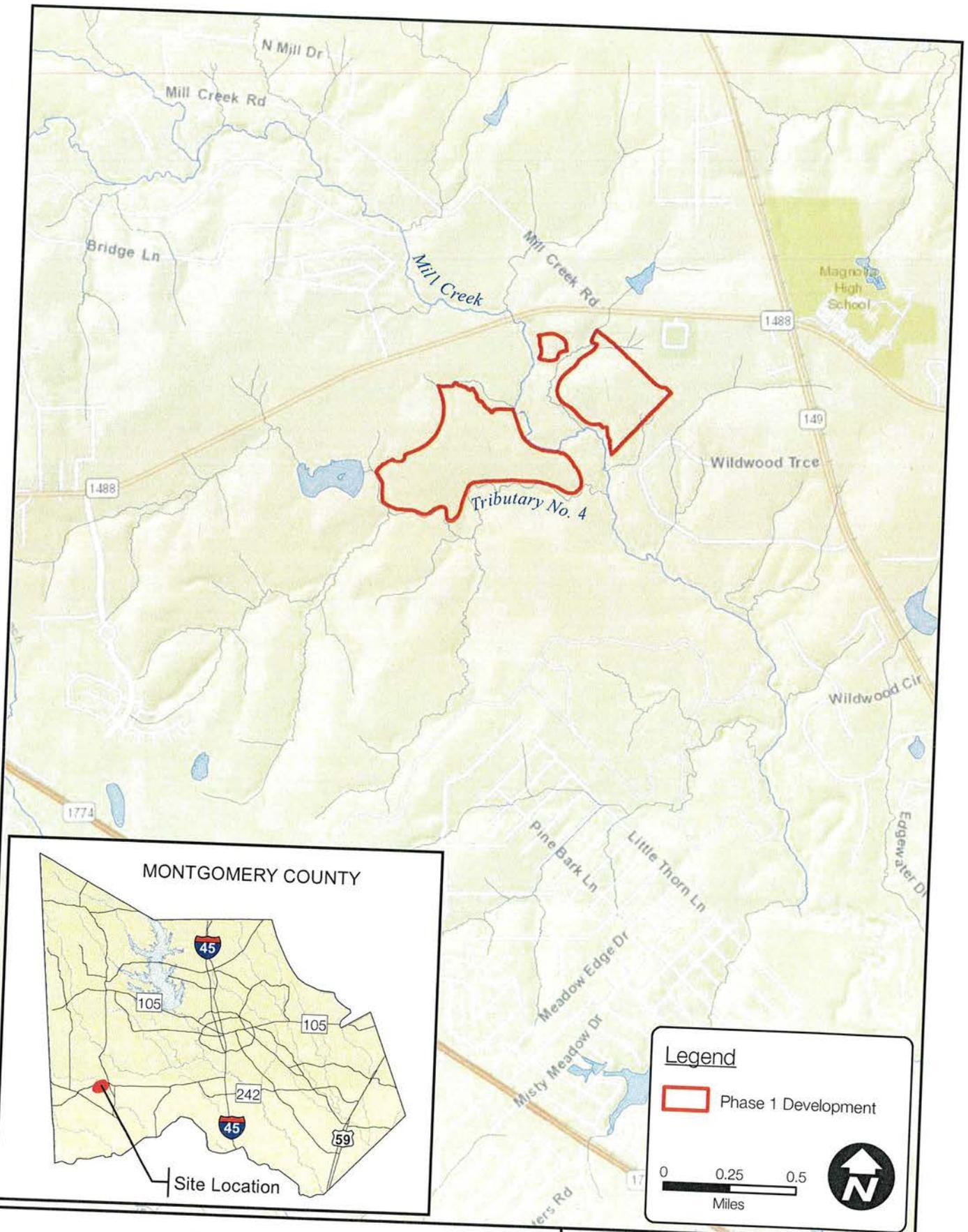
Table 10: Proposed vs. Mitigated B – 100-Yr

HEC-RAS Station	FIS Cross Section	FIS (ft)*	Existing	EX - FIS	Mitigated B	Existing vs. Mitigated (ft)
			(ft)	(ft)	(ft)	
	7084	208.6	---	---	---	---
8636		207.31	206.42	-0.89	206.39	-0.03
8610		207.29	206.42	-0.87	206.39	-0.03
8560		207.23	206.39	-0.84	206.35	-0.04
8468		206.98	206.27	-0.71	206.21	-0.06
8410		206.85	206.13	-0.72	206.1	-0.03
8257		206.39	206	-0.39	205.98	-0.02
8104		205.93	205.83	-0.10	205.81	-0.02
7964		205.84	205.62	-0.22	205.57	-0.05
7840		205.73	205.48	-0.25	205.34	-0.14
7766		205.40	205.39	-0.01	205.26	-0.13
7674		205.35	205.33	-0.02	205.19	-0.14
7544		205.02	204.94	-0.08	204.8	-0.14
7412		204.64	204.33	-0.31	204.14	-0.19
7325		204.35	203.76	-0.59	203.64	-0.12
7162		203.85	202.77	-1.08	202.76	-0.01
6997		203.43	202.39	-1.04	202.21	-0.18
6830		202.96	202.02	-0.94	201.85	-0.17
6509		202.38	201.46	-0.92	201.25	-0.21
6026		201.40	200.75	-0.65	200.28	-0.47
5815		200.93	200.34	-0.59	199.6	-0.74
5718		200.79	200.2	-0.59	199.3	-0.90
	4318	200.6	---	---	---	---
5506		200.51	199.82	-0.69	199.02	-0.80
5389		200.31	199.63	-0.68	198.94	-0.69
5010		200.13	199.1	-1.03	198.72	-0.38
4892		200.09	198.98	-1.11	198.67	-0.31
4634		199.99	198.7	-1.29	198.49	-0.21
4422		199.92	198.32	-1.60	198.21	-0.11
4218		199.80	197.46	-2.34	197.34	-0.12
4108		199.72	197.39	-2.33	197.28	-0.11
4062		199.69	197.37	-2.32	197.26	-0.11
3891		199.68	197.29	-2.39	197.17	-0.12
3642		199.51	197.13	-2.38	197	-0.13
3511		199.43	196.99	-2.44	196.85	-0.14
3074		199.20	195.88	-3.32	195.88	0.00
2907		199.08	195.77	-3.31	195.71	-0.06
2787		198.99	195.64	-3.35	195.55	-0.09
2659		198.90	195.42	-3.48	195.32	-0.10
2528		198.80	195.01	-3.79	194.91	-0.10
2324		198.69	194.34	-4.35	194.2	-0.14
2178		198.57	194.09	-4.48	193.9	-0.19
2053		198.50	193.98	-4.52	193.76	-0.22
	1460	198.4	---	---	---	---
1951		197.86	193.77	-4.09	193.52	-0.25
1666		197.77	193.31	-4.46	193.05	-0.26
1502		197	193	-4	192.74	-0.26

* This is a best guess of the BFE at each of the identified cross-sections added to the model since the stream centerlines have different alignments and thus different reach lengths.

SECTION 4 CONCLUSIONS

The purpose of this analysis was to examine the effects of proposed fill in the floodplain fringes of both Mill Creek and Tributary No. 4 to Mill Creek. No hydraulic impacts were noted for the proposed improvements along Mill Creek, and only slight impacts to water surface elevations were identified on Tributary No. 4 to Mill Creek. Appropriate mitigation measures in the form of underbrushing and regrading were identified to offset the impacts along Tributary No. 4 to Mill Creek. It is our opinion that if the site improvements are constructed as identified, the project will cause no adverse impacts for storm events up to and including the 1% (100-year) AEP storm event. In other words, the planned develop of *Audubon – Phase 1* and associated mitigation measures will have no adverse impact to the drainage on, from, or through adjacent properties.



Legend

Phase 1 Development

0 0.25 0.5
Miles

Drainage Analysis
Audubon Magnolia Development Phase 1
Vicinity Map

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HOUSTON, TX 77010

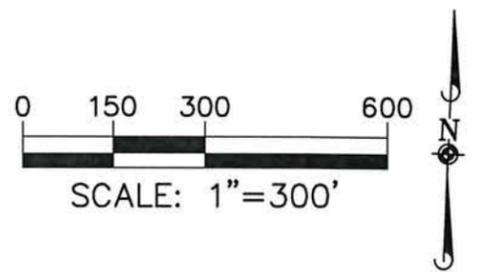
PHONE: 713.630.7300 FAX: 713.630.7396

Job Number: H20-18002-00	Date: 9/25/2018	Prepared By: mwh	Exhibit: 1
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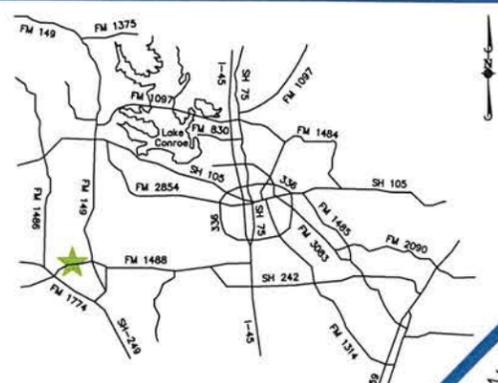
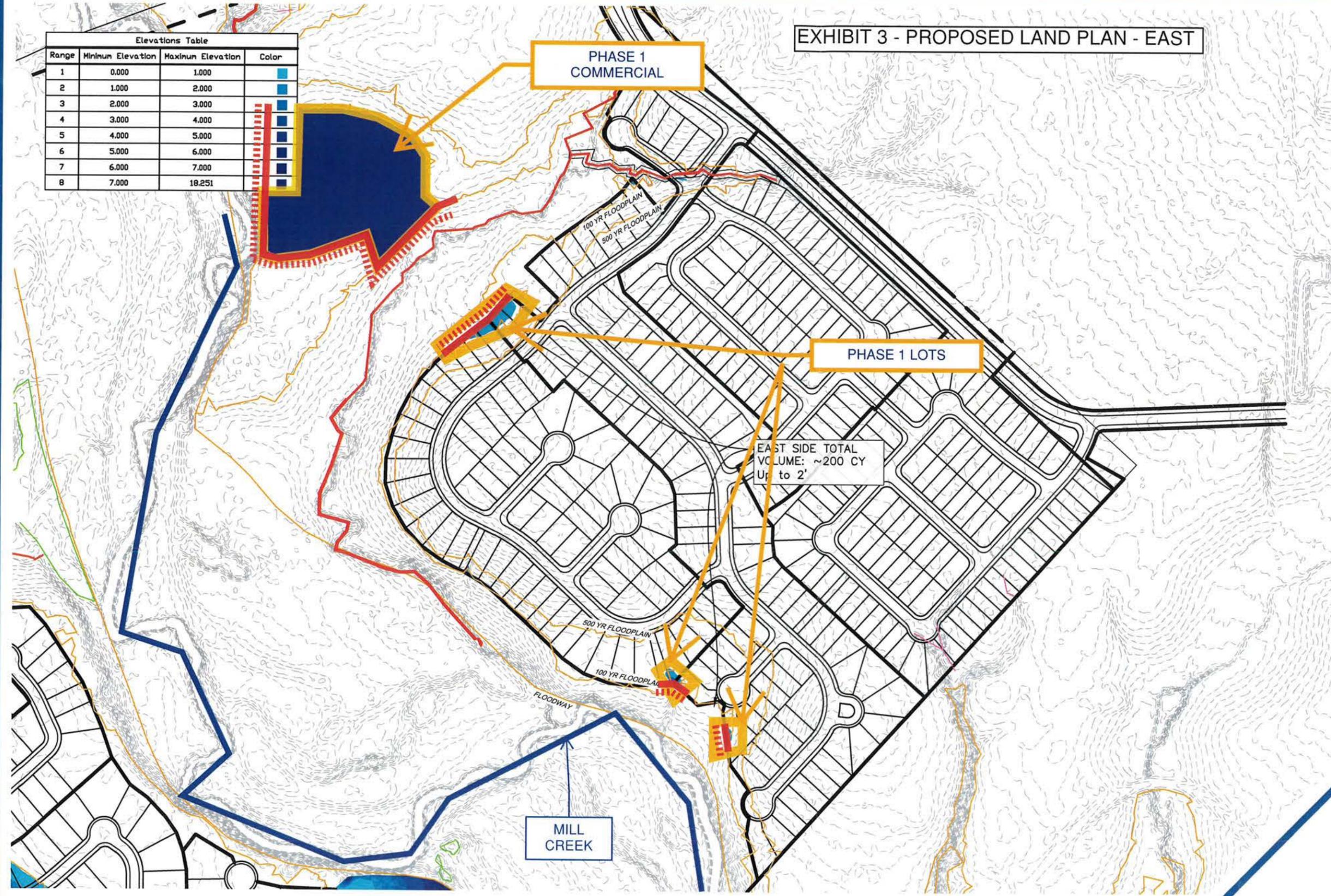
EXHIBIT 3 - PROPOSED LAND PLAN - EAST

Elevations Table			
Range	Minimum Elevation	Maximum Elevation	Color
1	0.000	1.000	Light Blue
2	1.000	2.000	Medium Blue
3	2.000	3.000	Dark Blue
4	3.000	4.000	Very Dark Blue
5	4.000	5.000	Black
6	5.000	6.000	Dark Grey
7	6.000	7.000	Medium Grey
8	7.000	18.251	Light Grey



LEGEND

- Tributary
- Wetland
- Section Boundary



DEPTH IN FLOODPLAIN
AUDUBON DEVELOPMENT
 Montgomery County, Texas

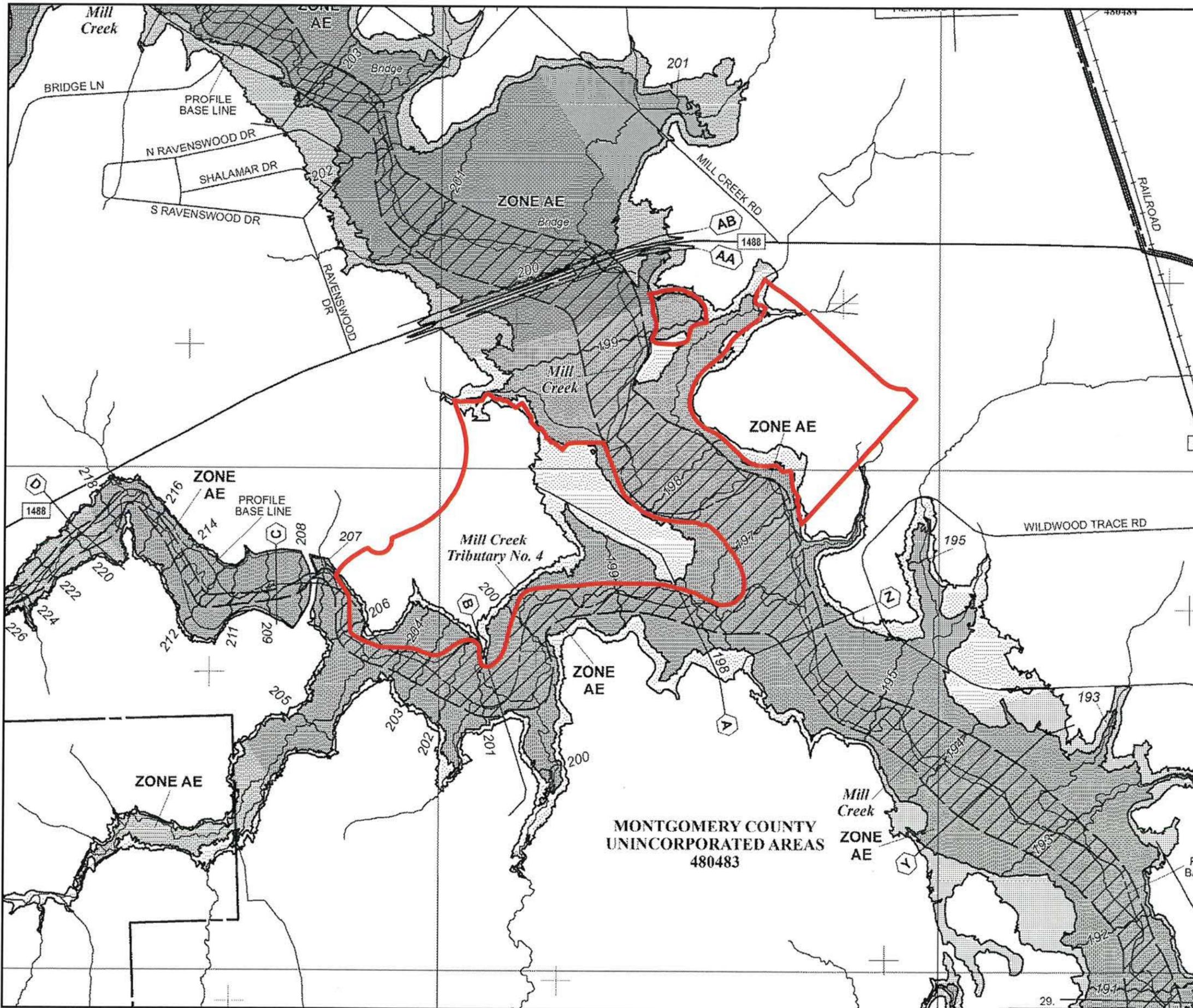
ISSUED: 2/7/2018

VICINITY MAP - N.T.S.

VERSION 1

P:\010 Audubon\001 General Consult\Engineering\Exhibits\Grading\EXHIBIT Depth Area Grid 2.7.18.dwg

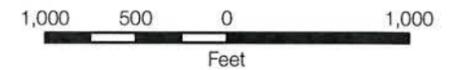




Legend

Phase 1 Development

Data Sources
FIRM Panel: FEMA, 2014



Coordinate System
Projection: State Plane NAD83 (Grid)
Zone: Texas Central
Units: Feet

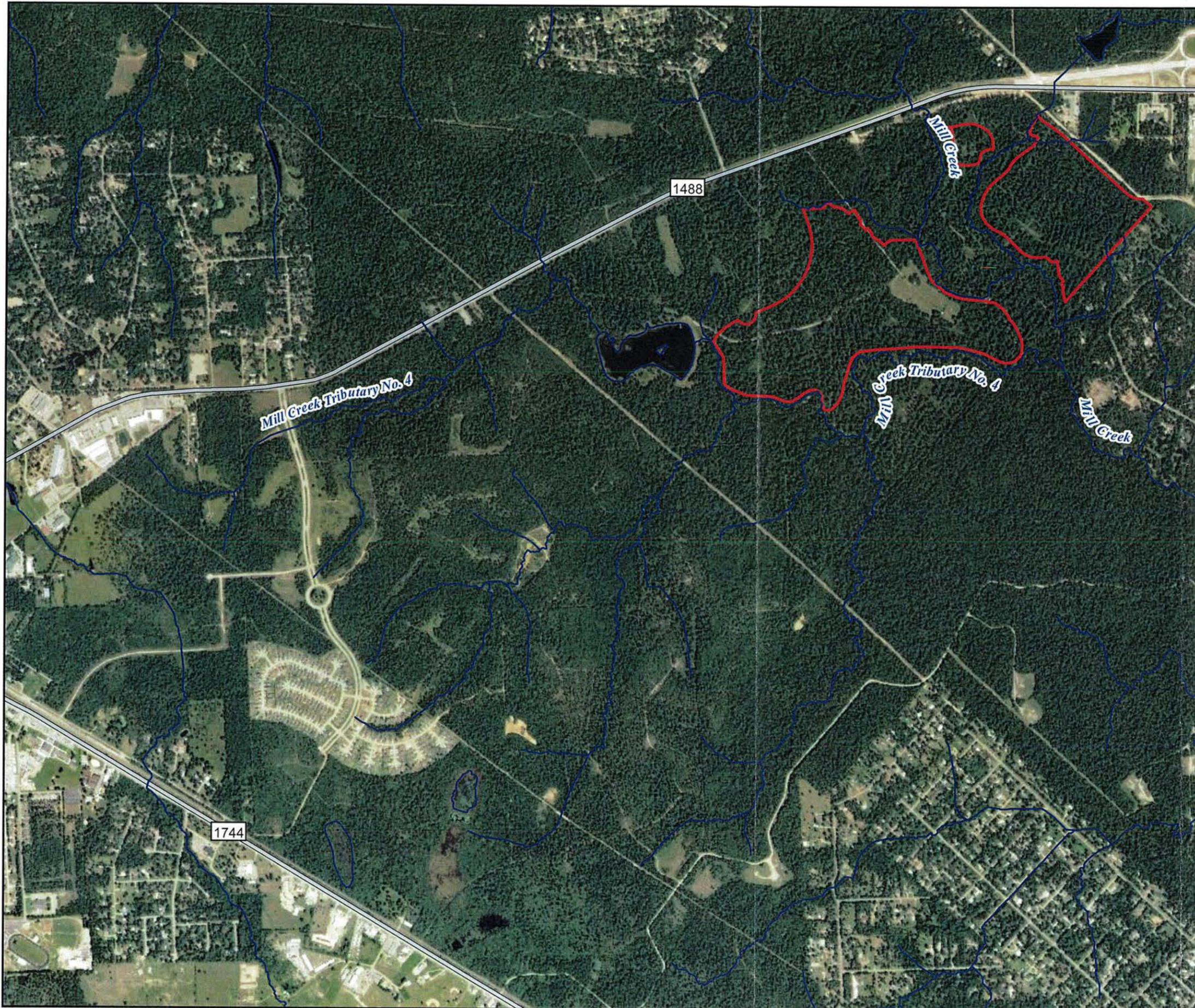
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Drainage Analysis
Audubon Magnolia Development Phase 1

FIRM Panel 48339C0480G
Effective August 18, 2014

Job Number: H20-16026-00	Date: 9/18/2018	Prepared By: mwh	Exhibit: 4
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Legend

- Phase 1 Development
- Stream Centerline
- Road

Data Sources

Stream Centerline: FEMA DFIRM, 2014
 Aerial Photo: ESRI Online Data, 2018



Coordinate System

Projection: State Plane NAD83 (Grid)
 Zone: Texas Central
 Units: Feet

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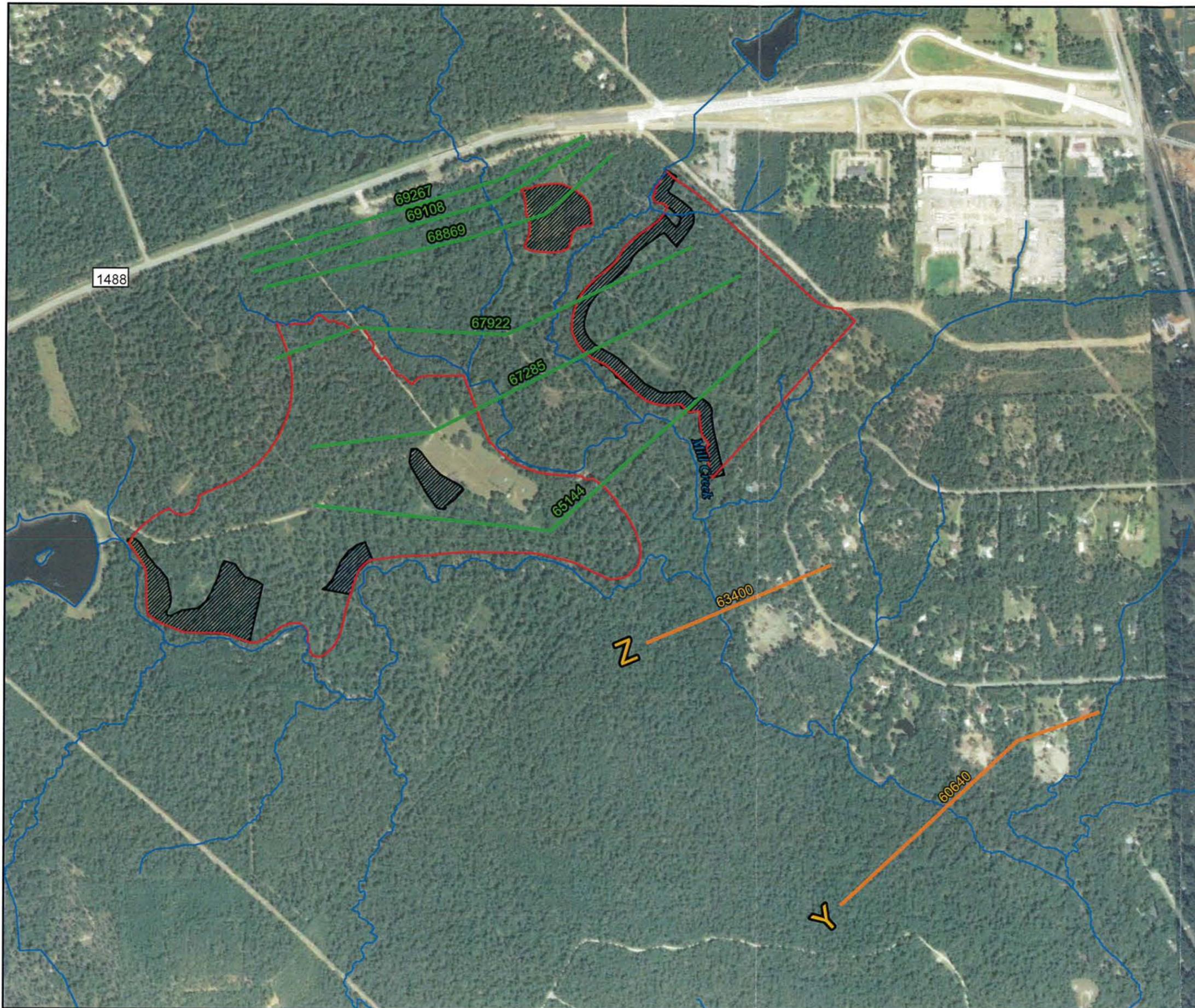
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 HOUSTON, TX 77010

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Drainage Analysis
 Audubon Magnolia Development Phase 1

Phase 1 Aerial Photo
 Mill Creek & Mill Creek Tributary No. 4

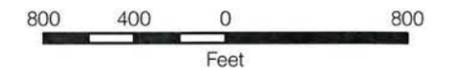
Job Number: H20-16026-00	Date: 9/26/2018	Prepared By: mwh	Exhibit: 5
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Legend

- Effective HEC-RAS Cross Section
- Added HEC-RAS Cross Section
- Phase 1 Development
- Phase 1 Fill Area
- Stream Centerline

Data Sources
Stream Centerline: FEMA DFIRM, 2014



Coordinate System
Projection: State Plane NAD83 (Grid)
Zone: Texas Central
Units: Feet

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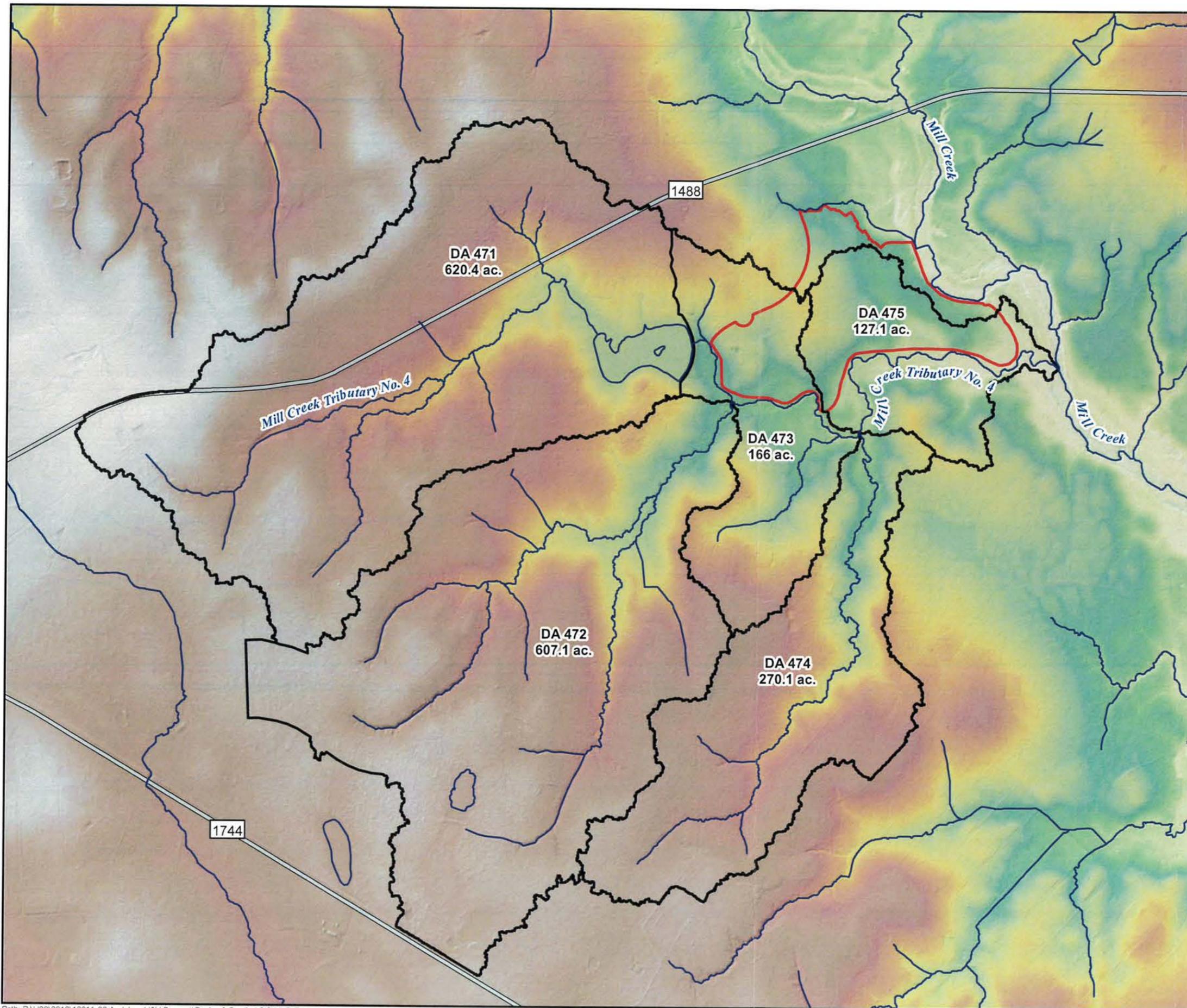
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HOUSTON, TX 77010

PHONE: 713.630.7300 FAX: 713.630.7396

Drainage Analysis
Audubon Magnolia Development Phase 1

Cross Section Layout & Mitigation
Mill Creek

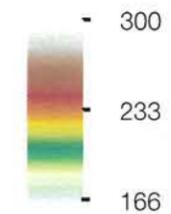
Job Number: H20-18011-00	Date: 2/1/2019	Prepared By: mwh	Exhibit: 6
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Legend

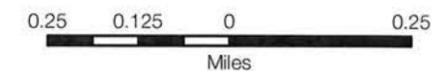
- Drainage Area Boundary
- Phase 1 Development
- Stream Centerline
- Road

Elevation (feet)



Data Sources

Stream Centerline: FEMA DFIRM, 2014
 Elevation Data: Montgomery County Lidar Data, 2005



Coordinate System

Projection: State Plane NAD83 (Grid)
 Zone: Texas Central
 Units: Feet

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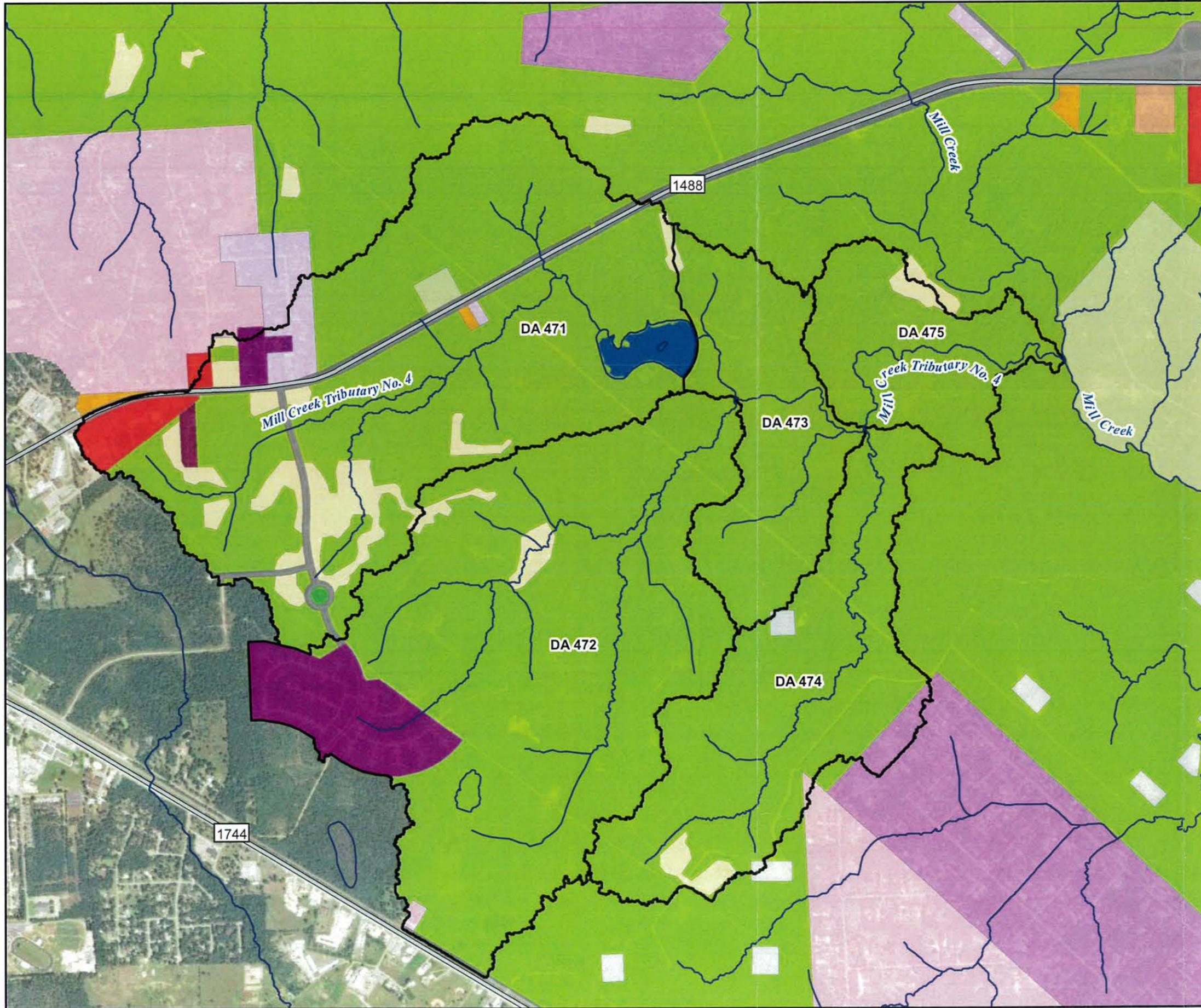
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Drainage Analysis
 Audubon Magnolia Development Phase 1

Drainage Areas
 Mill Creek Tributary No. 4

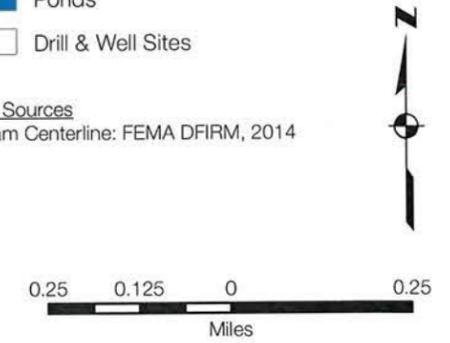
Job Number: H20-16026-00	Date: 9/26/2018	Prepared By: mwh	Exhibit: 7
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Legend

- Drainage Area Boundary
- Road
- Stream Centerline
- Land Use**
- Developed - Major Thoroughfare
- Developed - Commercial
- Developed - Light Industrial
- Developed - Church
- Developed - Single Family Residential 1/8 acre
- Developed - Single Family Residential 1/4 acre
- Developed - Single Family Residential 1/2 acre
- Developed - Single Family Residential 1 acre
- Developed - Single Family Residential 2 acres
- Developed - Rural Residential
- Developed - Open Space
- Pasture
- Woods
- Ponds
- Drill & Well Sites

Data Sources
 Stream Centerline: FEMA DFIRM, 2014



Coordinate System
 Projection: State Plane NAD83 (Grid)
 Zone: Texas Central
 Units: Feet

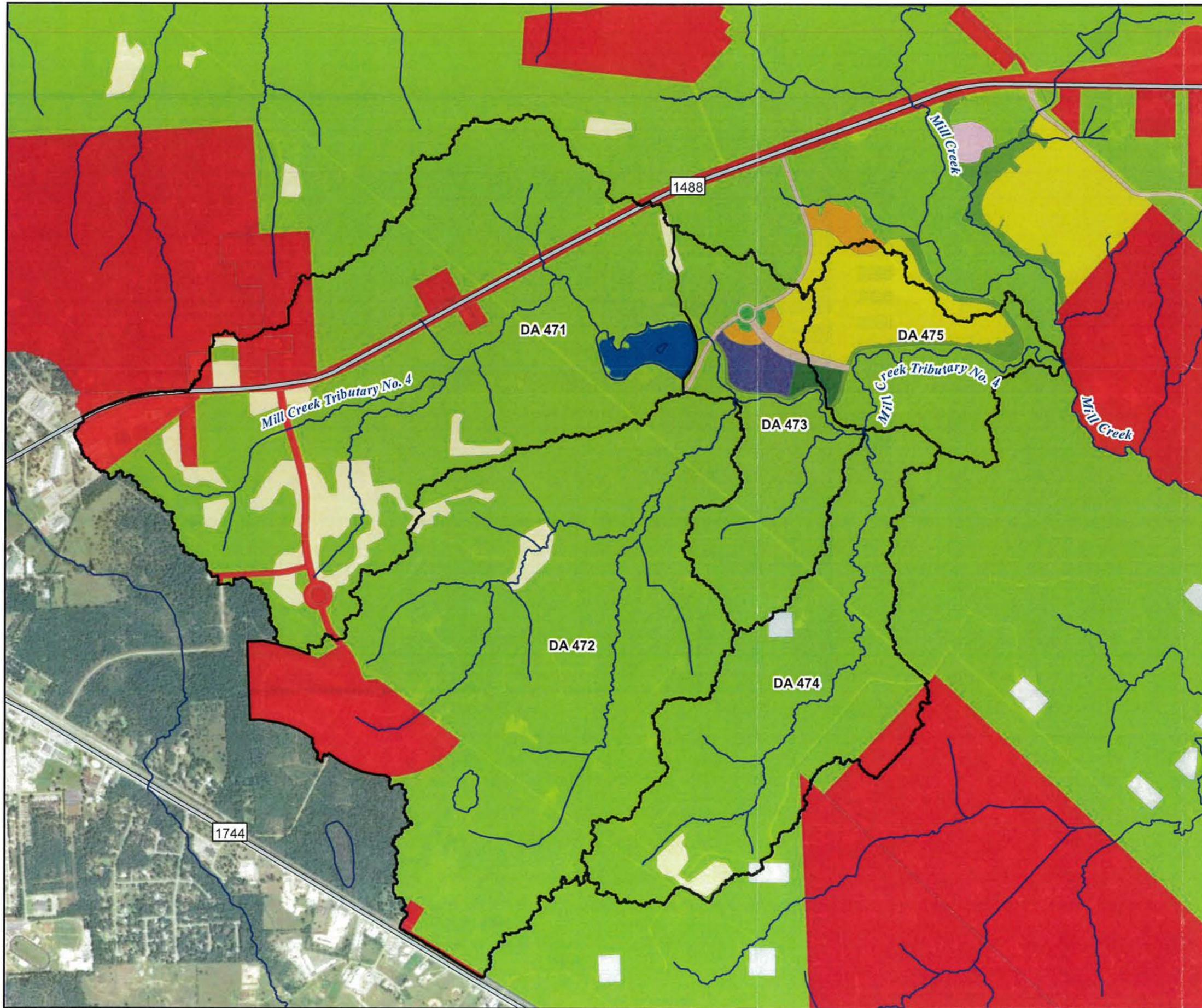
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Drainage Analysis
 Audubon Magnolia Development Phase 1

Existing Land Use
 Mill Creek Tributary No. 4

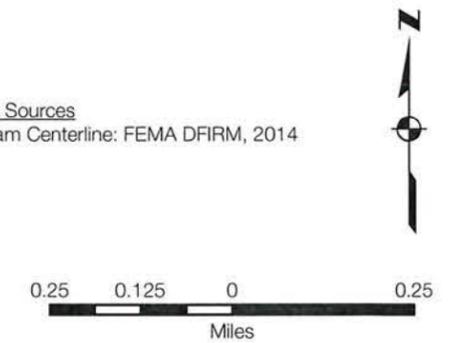
Job Number: H20-16026-00	Date: 9/18/2018	Prepared By: mwh	Exhibit: 8
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Legend

- Drainage Area Boundary
- Stream Centerline
- Road
- Land Use**
- Phase 1 - Single Family Residential
- Phase 1 - Special Residential
- Phase 1 - Elementary School
- Phase 1 - Neighborhood Retail
- Phase 1 - Park
- Phase 1 - Open Space
- Phase 1 - Reserved Floodplain
- Phase 1 - Road
- Existing Development
- Pasture
- Woods
- Ponds
- Drill & Well Sites

Data Sources
Stream Centerline: FEMA DFIRM, 2014



Coordinate System
Projection: State Plane NAD83 (Grid)
Zone: Texas Central
Units: Feet

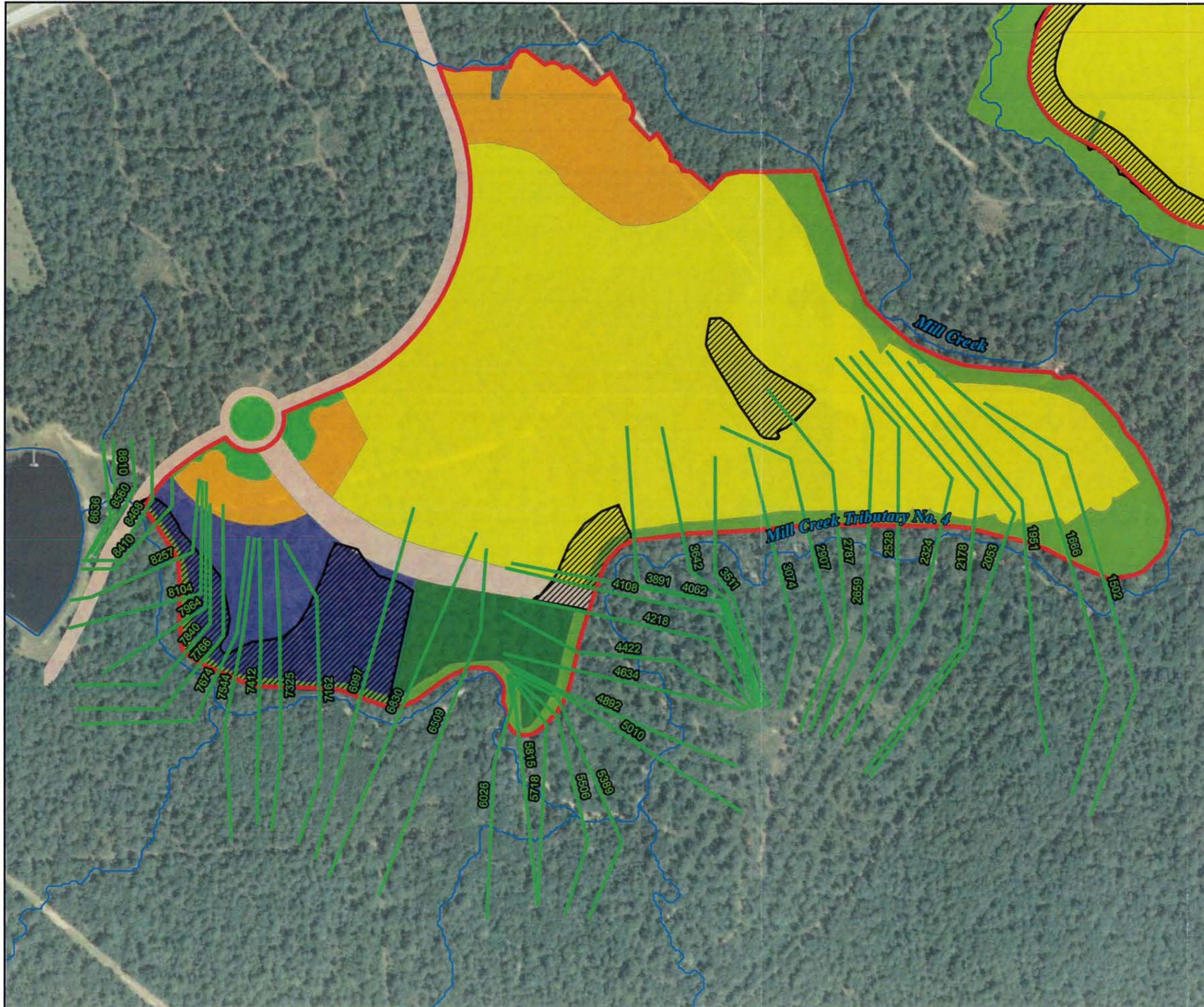
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Drainage Analysis
Audubon Magnolia Development Phase 1

Proposed Land Use
Mill Creek Tributary No. 4

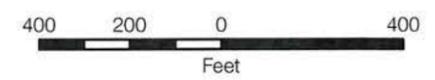
Job Number: H20-16026-00	Date: 9/18/2018	Prepared By: mwh	Exhibit: 9
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Legend

- HEC-RAS Cross Section
 - Phase 1 Development
 - Phase 1 Fill Area
 - Stream Centerline
- Land Use**
- Phase 1 - Single Family Residential
 - Phase 1 - Special Residential
 - Phase 1 - Elementary School
 - Phase 1 - Neighborhood Retail
 - Phase 1 - Park
 - Phase 1 - Open Space
 - Phase 1 - Reserved Floodplain
 - Phase 1 - Road

Data Sources
Stream Centerline: FEMA DFIRM, 2014



Coordinate System
Projection: State Plane NAD83 (Grid)
Zone: Texas Central
Units: Feet

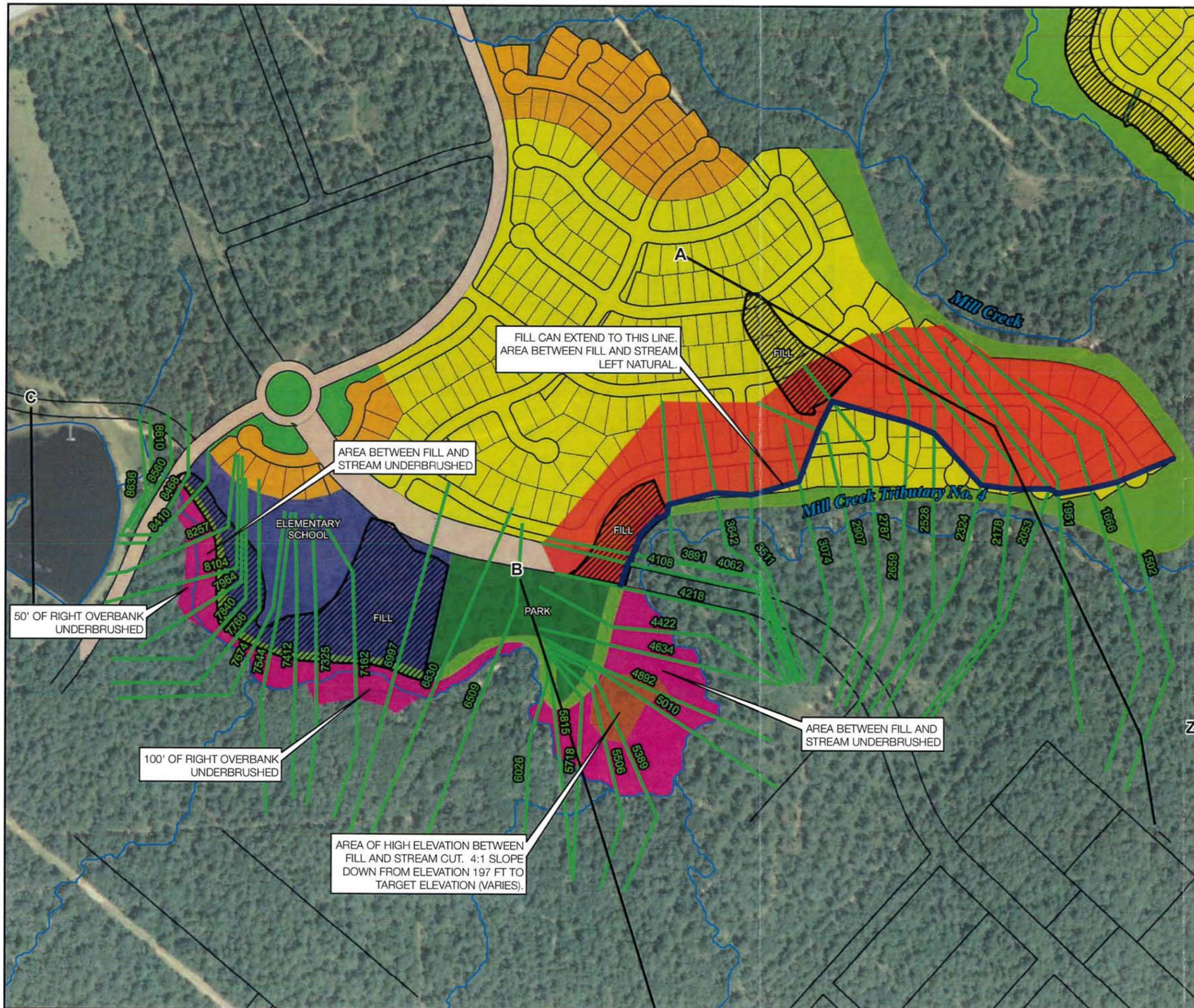
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Drainage Analysis
Audubon Magnolia Development Phase 1

Cross Section Layout
Mill Creek Tributary No. 4

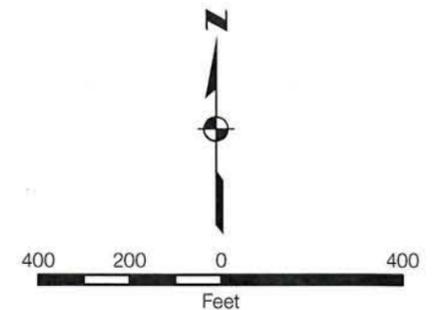
Job Number: H20-16026-00	Date: 9/18/2018	Prepared By: mwh	Exhibit: 10
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Legend

- HEC-RAS Cross Section
- FIS Lettered Cross Section
- Stream Centerline
- Phase 1 Fill Area
- Mitigation**
- Filled and Cleared
- Ground Cut
- Underbrushing
- Land Use**
- Phase 1 - Single Family Residential
- Phase 1 - Special Residential
- Phase 1 - Elementary School
- Phase 1 - Neighborhood Retail
- Phase 1 - Park
- Phase 1 - Open Space
- Phase 1 - Reserved Floodplain
- Phase 1 - Road

Data Sources
Stream Centerline & FIS Cross Section: FEMA DFIRM, 2014



Coordinate System
Projection: State Plane NAD83 (Grid)
Zone: Texas Central
Units: Feet

WALTER P MOORE

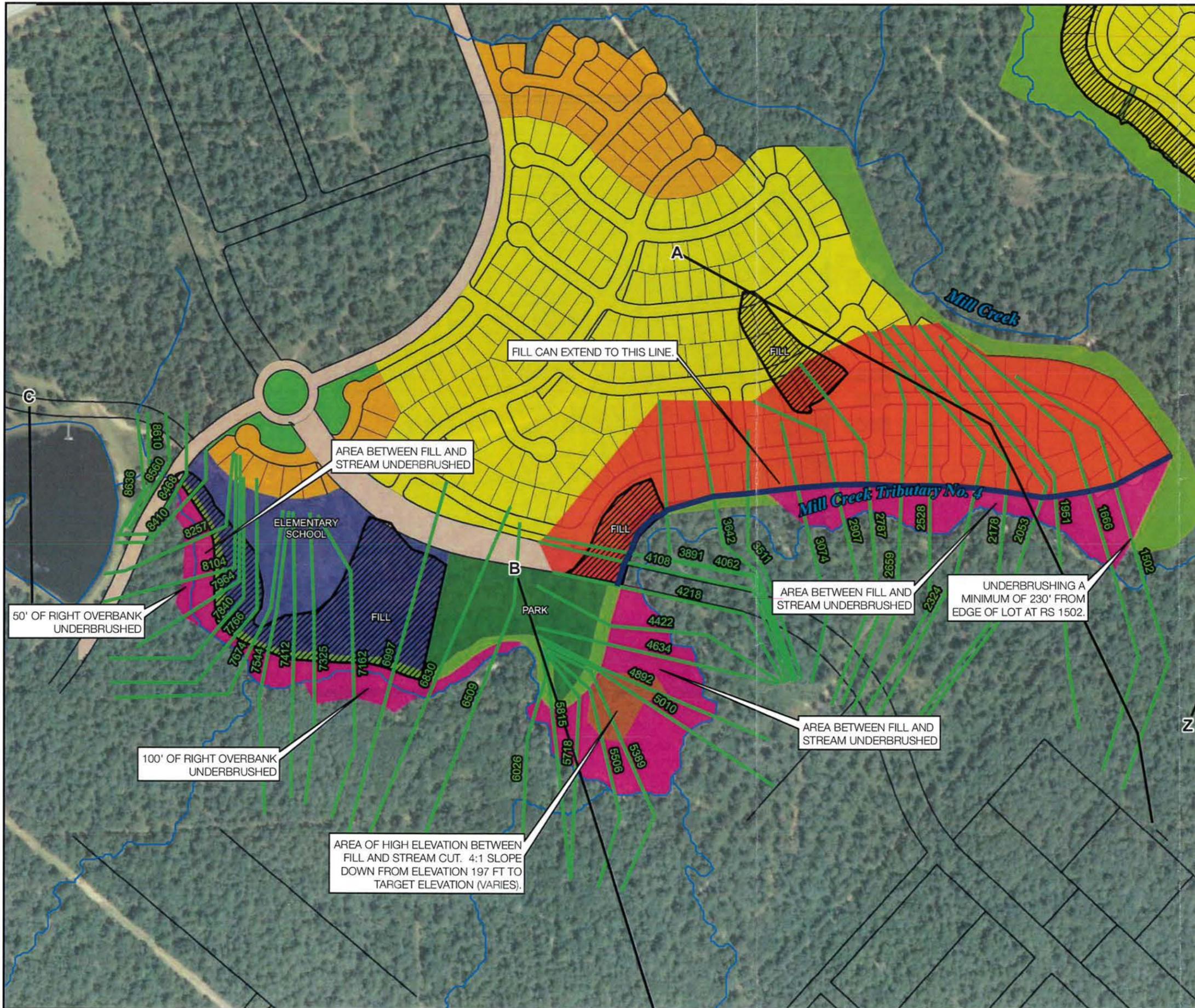
WALTER P. MOORE AND ASSOCIATES, INC.
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HOUSTON, TX 77010

PHONE: 713.630.7300 FAX: 713.630.7396

Drainage Analysis
Audubon Magnolia Development Phase 1

Mitigation Plan A Schematic
Mill Creek Tributary No. 4

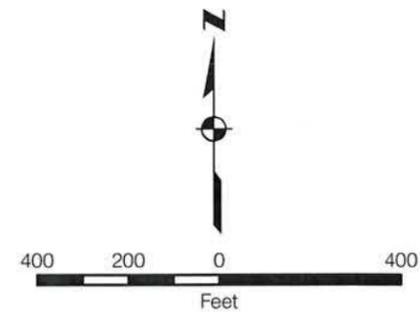
Job Number: H20-16026-00	Date: 11/9/2018	Prepared By: mwh	Exhibit: 11
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Legend

- HEC-RAS Cross Section
 - FIS Lettered Cross Section
 - Stream Centerline
 - Phase 1 Fill Area
- Mitigation
- Filled and Cleared
 - Ground Cut
 - Underbrushing
- Land Use
- Phase 1 - Single Family Residential
 - Phase 1 - Special Residential
 - Phase 1 - Elementary School
 - Phase 1 - Neighborhood Retail
 - Phase 1 - Park
 - Phase 1 - Open Space
 - Phase 1 - Reserved Floodplain
 - Phase 1 - Road

Data Sources
Stream Centerline & FIS Cross Section: FEMA DFIRM, 2014



Coordinate System
Projection: State Plane NAD83 (Grid)
Zone: Texas Central
Units: Feet

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HOUSTON, TX 77010
PHONE: 713.630.7300 FAX: 713.630.7396

Drainage Analysis
Audubon Magnolia Development Phase 1

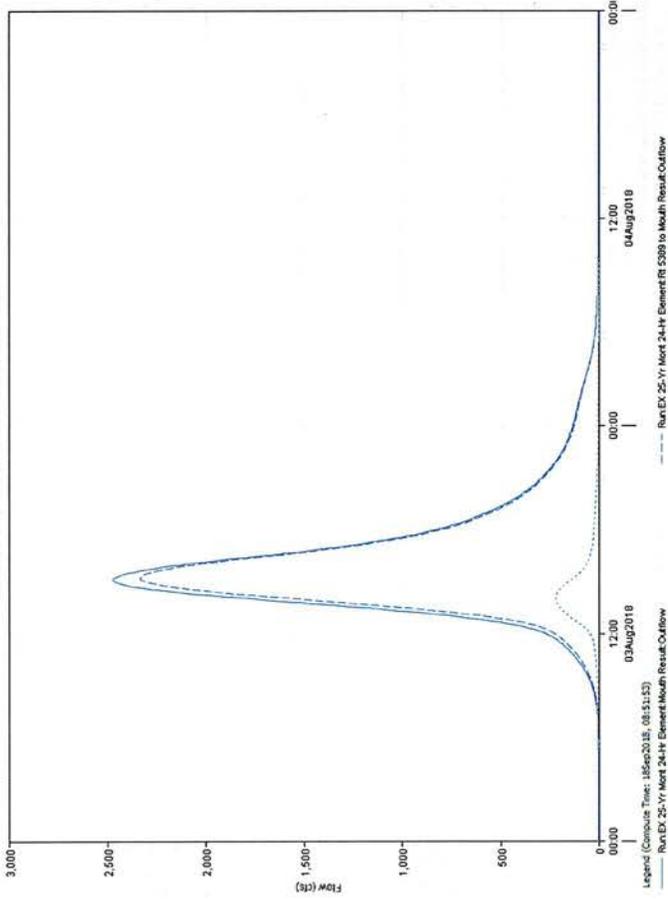
Mitigation Plan B Schematic
Mill Creek Tributary No. 4

Job Number: H20-16026-00	Date: 11/9/2018	Prepared By: mwh	Exhibit: 12
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Appendix A – Hydrologic Support Data

EXISTING CONDITIONS RESULTS

Junction 'Mouth' Results for Run 'EX 25-Yr Mont 24-Hr'



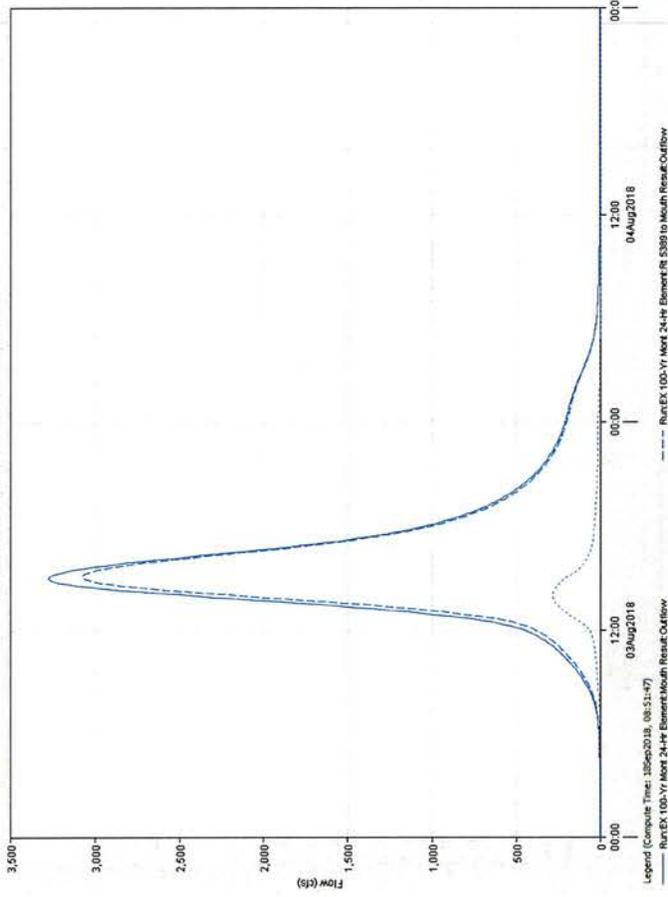
Project: Mill Run Simulation Run: EX 25-Yr Mont 24-Hr

Start of Run: 03Aug2018, 00:00 Basin Model: Existing Mill Run 25-YR
 End of Run: 05Aug2018, 00:00 Meteorologic Model: 25-Yr Mont 24-Hr
 Compute Time: 18Sep2018, 08:51:53 Control Specifications: 5-min Interval

Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
471	0.9693	1015.7	03Aug2018, 14:15	351.9
Existing Lake	0.9693	942.8	03Aug2018, 14:50	351.8
Lake	0.9693	942.8	03Aug2018, 14:50	351.8
Route to 7544	0.9693	941.0	03Aug2018, 14:55	351.8
472	0.9486	898.4	03Aug2018, 14:35	334.3
US of Trib 7544	0.9486	898.4	03Aug2018, 14:35	334.3
RS 7544	1.9179	1822.7	03Aug2018, 14:45	686.1
Rt 7544 to 5389	1.9179	1815.9	03Aug2018, 15:00	686.1
474	0.4221	369.1	03Aug2018, 14:50	147.2
US of Trib RS 5389	0.4221	369.1	03Aug2018, 14:50	147.2
473	0.2594	302.4	03Aug2018, 13:55	89.8
RS 5389	2.5994	2384.3	03Aug2018, 14:50	923.0
Rt 5389 to Mouth	2.5994	2339.9	03Aug2018, 15:15	923.0
475	0.1986	222.2	03Aug2018, 14:00	68.7
Mouth	2.7980	2477.0	03Aug2018, 15:10	991.7

Junction 'Mouth' Results for Run 'EX 100-Yr Mont 24-Hr'



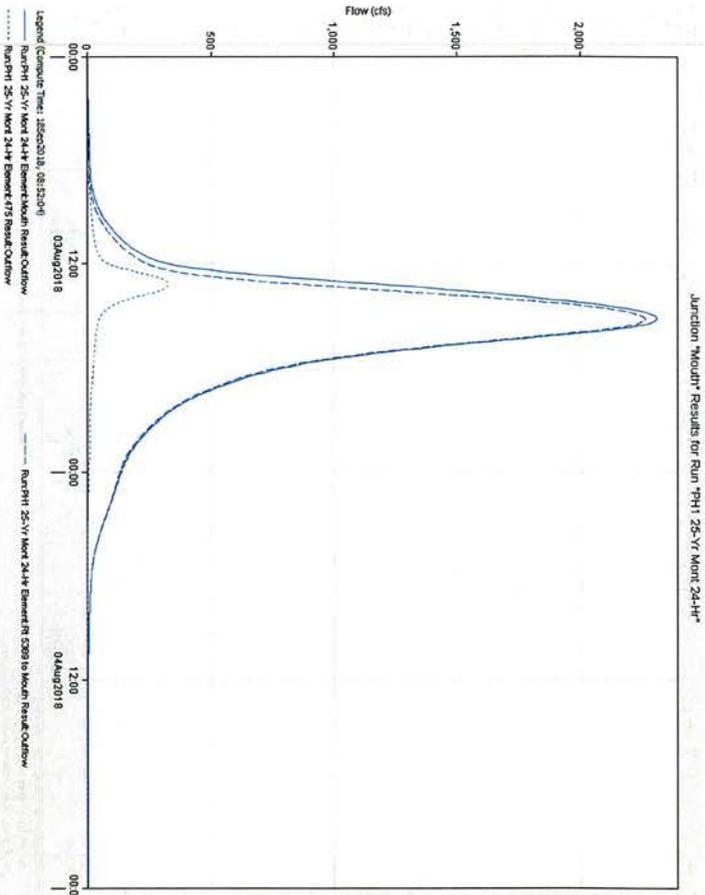
Project: Mill Run Simulation Run: EX 100-Yr Mont 24-Hr

Start of Run: 03Aug2018, 00:00 Basin Model: Existing Mill Run 100-YR
 End of Run: 05Aug2018, 00:00 Meteorologic Model: 100-Yr Mont 24-Hr
 Compute Time: 18Sep2018, 08:51:47 Control Specifications: 5-min Interval

Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
471	0.9693	1299.3	03Aug2018, 14:15	476.6
Existing Lake	0.9693	1233.3	03Aug2018, 14:40	476.4
Lake	0.9693	1233.3	03Aug2018, 14:40	476.4
Route to 7544	0.9693	1231.7	03Aug2018, 14:50	476.4
472	0.9486	1156.1	03Aug2018, 14:30	455.0
US of Trib 7544	0.9486	1156.1	03Aug2018, 14:30	455.0
RS 7544	1.9179	2376.4	03Aug2018, 14:40	931.4
Rt 7544 to 5389	1.9179	2369.8	03Aug2018, 14:55	931.4
474	0.4221	476.8	03Aug2018, 14:50	200.7
US of Trib RS 5389	0.4221	476.8	03Aug2018, 14:50	200.7
473	0.2594	386.2	03Aug2018, 13:55	122.6
RS 5389	2.5994	3125.5	03Aug2018, 14:45	1254.6
Rt 5389 to Mouth	2.5994	3077.6	03Aug2018, 15:05	1254.6
475	0.1986	284.4	03Aug2018, 14:00	93.9
Mouth	2.7980	3276.0	03Aug2018, 15:00	1348.5

PROPOSED CONDITIONS RESULTS



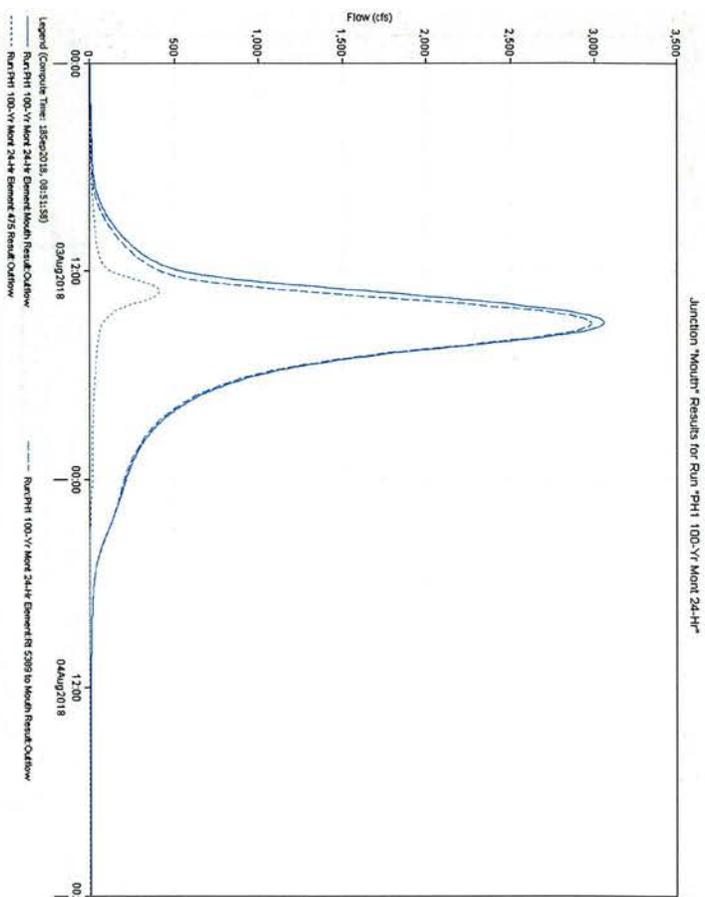
Project: Mill Run Simulation Run: PH1 25-Yr Mont 24-Hr
 Start of Run: 03Aug2018, 00:00 Basin Model: Phase 1 Mill Run 25-Yr
 End of Run: 05Aug2018, 00:00 Meteorologic Model: 25-Yr Mont 24-Hr
 Compute Time: 18Sep2018, 08:52:04 Control Specifications: 5-min Interval

Show Elements: All Elements

Volume Units: IN AC-FT

Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
471	0.9693	1015.8	03Aug2018, 14:15	352.0
Existing Lake	0.9693	942.9	03Aug2018, 14:50	351.8
Lake	0.9693	942.9	03Aug2018, 14:50	351.8
Route to 7544	0.9693	941.4	03Aug2018, 14:55	351.8
472	0.9486	898.4	03Aug2018, 14:35	334.3
US of Trib 7544	0.9486	898.4	03Aug2018, 14:35	334.3
RS 7544	1.9179	1824.3	03Aug2018, 15:00	686.1
RT 7544 to 5389	1.9179	1817.5	03Aug2018, 15:00	686.1
474	0.4221	369.1	03Aug2018, 14:50	147.2
US of Trib RS 5389	0.4221	369.1	03Aug2018, 14:50	147.2
473	0.2594	378.7	03Aug2018, 13:25	94.0
RS 5389	2.5994	2292.3	03Aug2018, 14:55	927.3
RT 5389 to Mouth	2.5994	2265.7	03Aug2018, 15:10	927.2
475	0.1986	327.1	03Aug2018, 13:10	73.8
Mouth	2.7980	2314.8	03Aug2018, 15:10	1001.1



Project: Mill Run Simulation Run: PH1 100-Yr Mont 24-Hr
 Start of Run: 03Aug2018, 00:00 Basin Model: Phase 1 Mill Run 100-Yr
 End of Run: 05Aug2018, 00:00 Meteorologic Model: 100-Yr Mont 24-Hr
 Compute Time: 18Sep2018, 08:51:58 Control Specifications: 5-min Interval

Show Elements: All Elements

Volume Units: IN AC-FT

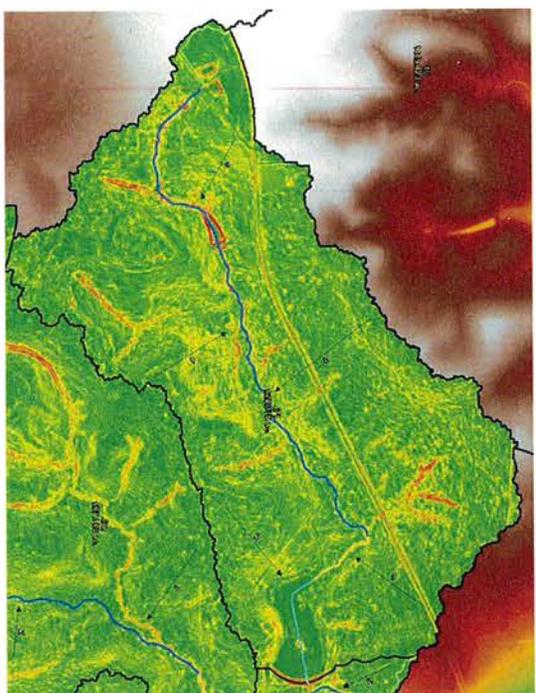
Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
471	0.9693	1299.3	03Aug2018, 14:15	476.6
Existing Lake	0.9693	1233.3	03Aug2018, 14:40	476.4
Lake	0.9693	1233.3	03Aug2018, 14:40	476.4
Route to 7544	0.9693	1232.0	03Aug2018, 14:50	476.4
472	0.9486	1156.1	03Aug2018, 14:30	455.0
US of Trib 7544	0.9486	1156.1	03Aug2018, 14:30	455.0
RS 7544	1.9179	2378.1	03Aug2018, 14:40	931.4
RT 7544 to 5389	1.9179	2370.7	03Aug2018, 14:55	931.4
474	0.4221	476.8	03Aug2018, 14:50	200.7
US of Trib RS 5389	0.4221	476.8	03Aug2018, 14:50	200.7
473	0.2594	477.8	03Aug2018, 13:25	127.3
RS 5389	2.5994	3006.5	03Aug2018, 14:45	1259.4
RT 5389 to Mouth	2.5994	2980.3	03Aug2018, 15:05	1259.4
475	0.1986	410.3	03Aug2018, 13:10	99.6
Mouth	2.7980	3054.1	03Aug2018, 15:00	1359.0

Drainage Area	Ac	SqMl	0.97
471	620.375	0.97	

DA Slope	Length (ft)	Slope (ft/ft)	Slope (ft/m)
1	1,121	0.0208	109.8
2	1,138	0.0240	126.7
3	1,580	0.0210	110.9
4	1,106	0.0309	163.2
5	1,127	0.0445	235.0
AVG		0.0282	149.1

RASTER SLOPE ANALYSIS	0.04467 ft/ft	235.9 ft/m
79.9000554	237.8890525	79.8872588
89.2009624	237.4731688	89.8731615
99.2250693	237.0164035	99.3869735
109.1480576	236.6625584	109.8448809
118.6706083	236.9666325	118.8308883
128.930150	236.4124214	128.8167956
138.9157097	236.3848144	138.8027079
148.8382604	236.0370269	148.7986103
158.7608111	235.9494181	158.7664225
168.6836318	235.8014399	168.7462425
178.6059125	235.6903389	178.7322397
188.5284632	235.6622629	188.7205632
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317.5216222	233.914158	317.5216222
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515.972636	231.0823133	515.972636
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535.8177374	231.2409246	535.8177374
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734.2687513 226.2262885 739.9574339 232.3876411 735.5369551 247.1348153 737.034762 247.9389817 736.8665932 261.250361
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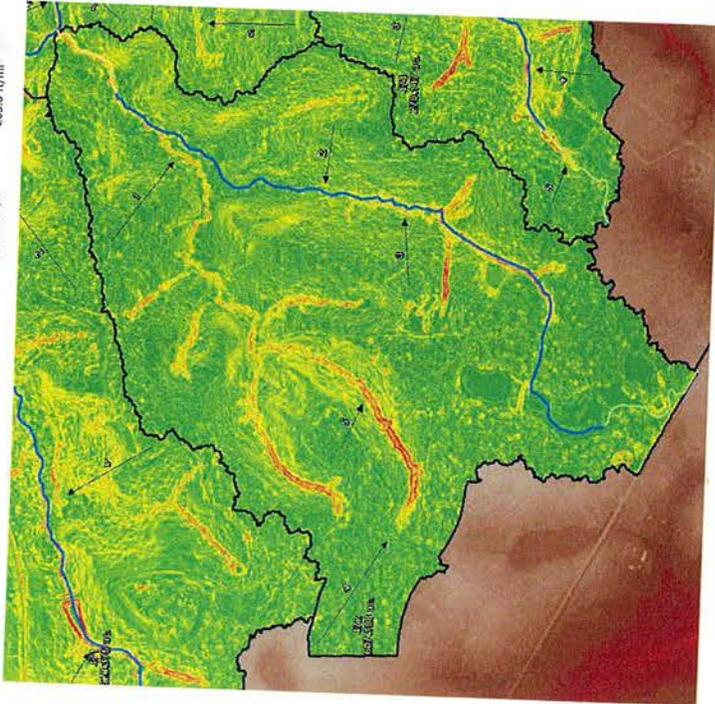
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1341.856317	238.3560922
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1361.73567	237.262909
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1381.615023	237.0460458
1391.554699	235.2979204
1401.494375	235.5717982
1411.434052	235.2691802
1421.373728	235.2223313
1431.313405	235.338585
1441.253081	234.8464553
1451.192757	233.9272746
1461.132434	234.1623161
1471.07211	233.8992843
1481.011787	233.861978
1490.951463	233.2924201
1500.89114	232.5886788
1510.830816	231.6160586
1520.770492	231.1923236
1530.710169	230.810227
1540.649845	230.139531
1550.589522	229.139258
1560.529198	227.8608445
1570.468875	227.7183591
1580.408551	227.7181751

Drainage Area
472

Ac 607.108

SqM 0.95

DA Slope
1 1.100 0.0210 110.9
2 620 0.0375 198.0
3 749 0.0349 184.3
4 1.329 0.0030 15.8
5 526 0.0335 176.9
AVG 0.0260 137.2
RASTER SLOPE ANALYSIS 0.04981 ft/ft 4.981 %



X	1	2	3	4	5
79.3033617	233.1247434	78.75674886	79.93400126	261.1203185	79.9466253
89.21628191	233.0821221	88.00134247	89.92575142	260.7358906	89.94220334
99.12920123	233.270815	98.44593607	99.91750157	260.08265	99.93937816
109.0421223	233.1678483	108.2985397	109.90921408	260.08265	109.92929338
118.9550425	233.0030275	118.13521333	119.9010019	259.9971408	119.92929338
128.8679628	233.6945333	127.9797169	129.892752	259.9971408	129.90078
138.780883	232.3208779	137.9243105	139.8845022	259.9971408	139.9100894
148.6918032	232.5625059	147.6689041	149.876324	259.9971408	149.9036672
158.6067334	232.2201584	157.5134977	159.8690025	259.9971408	159.8972451
168.5196436	232.3996493	167.3580913	169.8597527	258.9149344	169.8908229
178.4325638	232.2514167	177.2026849	179.8515028	258.9149344	179.8844007
188.34464	231.9793356	187.0477785	189.843353	258.9149344	189.8779785
198.2580402	232.2047285	196.8918721	199.8350031	258.9149344	199.8715663
208.1711245	232.114718	206.7364658	209.8267533	258.9149344	209.8651141
218.0844447	232.2129115	216.5810594	219.818305	257.9568556	219.8527119
227.9971649	231.7213386	226.425653	229.8102536	257.1374677	229.8528298
237.9100851	232.2939938	236.2703466	239.8020303	257.0332261	239.8488676
247.8230053	233.1743027	246.1148402	249.7937539	257.010134	249.8496454
257.7359255	232.7563086	255.9594338	259.7855041	256.9313073	259.8390432
267.6488457	232.8017356	265.8040274	269.7775543	256.9313073	269.8300232
277.5617659	232.9057819	280.040274	279.7690944	255.5560217	279.8201788
287.4746861	232.8514635	285.4932146	289.7609054	255.5560217	289.8073345
297.3876964	232.6171792	295.3780802	299.8913438	254.3862906	299.8013345
307.3005366	232.6171792	305.3824018	309.7425047	254.3862906	309.8009123
317.2194468	231.9373441	315.0269954	319.7442549	253.4348809	319.7949001
327.1263867	231.8591615	324.871589	329.727552	253.1282296	329.7880679
337.0392872	231.8274777	334.7161826	339.7195054	253.1282296	339.7880679
346.9522074	231.4747119	344.5607763	349.7102555	252.9265236	349.7752326
356.8652176	231.200422	354.4053699	359.7030057	252.3862925	359.7688014
366.7780478	230.836479	364.249365	369.6947558	252.1108148	369.7623792
376.6909681	231.3310244	374.0945571	379.686506	251.7490405	379.7559597
386.6038883	231.3988065	383.9391507	389.6782561	251.5331116	389.7495348
396.5168085	231.2679321	393.7827403	399.6700063	251.0217993	399.7431126
406.4297287	231.5065327	403.6283379	409.6617665	250.7666907	409.7302683
416.3426489	232.3378678	413.4729315	419.653066	250.0616924	419.7302683
426.2555691	232.210067	423.3175251	429.6452368	249.9919946	429.7238461
436.1684892	232.1003815	433.1621187	439.6370069	249.9919946	439.7174239
446.0814095	231.8103821	443.0067123	449.6287571	249.28707	449.7110017
455.9942998	231.3706767	452.8513059	459.6205072	248.4197871	459.7045795
465.907225	231.6891358	462.6958995	469.6125274	248.2177315	469.6981573
475.8201702	231.2208484	472.5404931	479.604076	248.1068815	479.6917262
485.7330904	230.8322994	482.3850868	489.5957577	247.4330248	489.685313
495.6460106	231.0564746	492.2296804	499.5875079	247.3389179	499.6789808
505.5589308	231.1681367	502.074274	509.5792528	247.3181752	509.6724866
515.471851	230.9579319	511.9188676	519.5700082	246.6669795	519.6660464
525.3847712	230.8135662	521.7634612	529.5723294	246.2125214	529.6596242
535.2976914	230.4884441	531.6080548	539.5627583	246.2125214	539.6596242
545.2106517	230.5041846	541.4526484	549.5454085	245.8046651	549.6467999
555.1235319	230.0772425	551.2972425	559.5300888	245.3274235	559.6352021
565.0364521	229.4056093	561.1418356	569.529759	245.1298283	569.6209264
574.9493723	228.6457268	570.9864492	579.519091	244.7778029	579.6108209
584.8622925	228.1713865	580.8310228	589.513593	244.9802393	589.6033935
594.7752127	228.364245	590.6756164	599.505094	243.3833442	599.5963577
604.6881329	228.0626257	600.52021	609.4967996	243.0861105	609.5898022
614.600531	228.0450724	610.3648037	619.4885098	242.4062999	619.582246
624.5139734	227.8179513	620.2093973	629.4802599	241.7886628	629.575024
634.4268936	227.2405741	630.07867	639.4720101	240.9851044	639.5688982
644.3398138	227.007867	640.0636702	649.4637602	240.9851044	649.5688982
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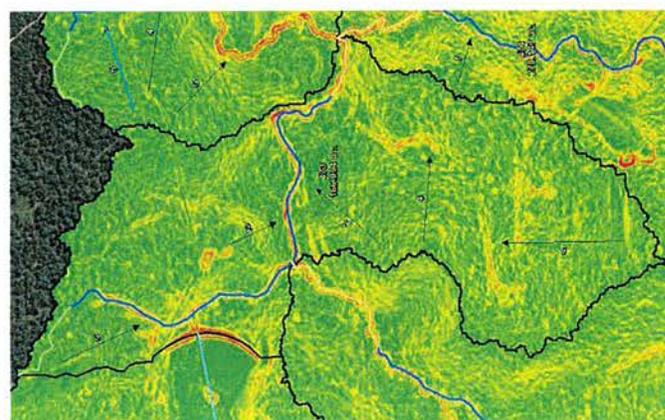
654.232734	226.5578514	659.4555104	241.2040036	659.5767358	265.6284481
664.1658542	226.1402725	669.4472605	240.5367603	669.5697137	265.8272773
674.0785744	226.1525416	679.4390107	239.9068016	679.5632915	267.1689057
683.9914946	226.9214125	689.4307609	239.3562879	689.5568693	267.8235125
693.9044148	226.7673020	699.4429111	239.1391564	699.5504471	267.3205882
703.8173351	226.3226973	709.4426212	239.6529942	709.5440249	266.9435288
713.7302553	224.4001691	719.4080113	239.1177412	719.5376027	266.6534415
723.6431755	223.8952677	729.3977615	237.7110939	729.5311806	266.5336738
733.5560937	223.0388106	739.3895116	237.5107132	739.5247584	266.2491742
743.4690139	222.6735735	749.3812518	236.8608827	749.5183362	266.1434588
753.3819361	222.5462105			759.511914	266.0956135
763.2968563	221.9246112			769.5054918	266.0325386
773.2077765	221.5377425			779.4990996	265.9510848
783.1206967	221.3466275			789.4926974	265.8729069
793.033617	220.9434996			799.4862733	265.8179698
802.9469372	220.0664938			809.4798051	265.7678958
812.8594574	219.8592101			819.4733809	265.7283448
822.7723776	219.8237445			829.4669587	265.6935627
832.6852978	218.8003948			839.4603965	265.6536812
842.5982218	218.5953819			849.4541143	265.6129757
852.511382	218.3004587			859.4476922	265.5045043
862.4240584	218.074436			869.44127	265.9280335
872.3369787	217.7213204			879.4344478	265.9421404
882.2498989	217.4700078			889.4284256	266.7600856
892.1628191	216.6934711			899.4220034	266.4924413
902.0757293	216.0754589			909.4155812	266.698452
911.9886595	215.5874523			919.4093159	266.4461068
921.9015727	215.9132545			929.4027369	266.0874536
931.8144699	215.0664338			939.3963147	266.0284101
941.7274201	215.5874523			949.3898925	265.9244324
951.6403404	215.2481623			959.3847703	265.8098667
961.5532806	215.2117521			969.3770481	265.5558518
971.4661808	214.7368297			979.3706239	265.6881605
981.379101	214.523897			989.3642038	265.9222574
991.2920212	214.6405073			999.3577816	266.0945274
1001.204941	213.9358418			1009.351339	265.7227526
1011.117862	213.7938124			1019.344897	265.218997
1021.030782	213.4748677			1029.338515	265.2646498
1030.943702	213.7938077			1039.332083	265.0550748
1040.856622	213.9579669			1049.325671	265.087662
1050.769542	213.9652721			1059.319248	265.583907
1060.682463	213.9358418			1069.312826	265.7761723
1070.595383	212.2407066			1079.306404	265.1867985
1080.508303	212.2407066			1089.299982	265.1989611
1090.421223	212.6395335			1099.29356	265.2277458
1100.334144				1109.287138	265.8278956
				1119.280715	265.6045923
				1129.274293	265.5670559
				1139.267871	264.9428284
				1149.261449	264.6718997
				1159.255027	264.7316841
				1169.248604	264.0834972
				1179.242182	264.1447469
				1189.23576	264.0143359
				1199.229338	263.8879701
				1209.222916	264.1469046
				1219.216494	264.3222303
				1229.210071	264.1239601
				1239.203649	263.781008
				1249.197227	263.6461048
				1259.190805	263.5366674
				1269.184383	263.3244165
				1279.17796	263.266723
				1289.171538	263.053787
				1299.165116	263.0748158
				1309.158694	262.7915116
				1319.152272	262.9663499
				1329.145849	

Drainage Area 474
 Ac 166.004
 SqMI 0.26

Length (ft)	Slope (ft/ft)	Slope (ft/m)
1 702	0.0230	153.1
2 466	0.0305	161.0
3 718	0.0332	122.5
4 632	0.0354	186.9
5 1,019	0.0270	142.6
AVG	0.0290	153.3

0.04838 ft/ft
 255.4 ft/mi
 4.838 %

RASTER SLOPE ANALYSIS



X	Feature Profile 1 X	Feature Profile 1 Y
79.0904853	215.454024	79.951714
86.9763046	212.8470127	89.27164321
98.98256066	214.236623	99.19071468
108.74883167	214.1737796	109.1097861
118.6350278	213.706528	119.6185963
128.5213289	213.8014535	128.9479291
138.4075849	213.4336669	138.8670005
148.293841	212.977531	148.786072
158.1800971	212.653108	158.7051435
168.0663531	212.4443411	168.624215
177.9526092	212.6005172	178.5432864
187.8388653	211.7391122	188.4632579
197.7251213	211.7906501	198.3814294
207.6113774	211.1451971	208.3005008
217.4976335	210.7646941	218.2195723
227.3838895	210.3600182	228.1386438
237.2701456	209.9777328	238.0577152
247.1564017	209.5590686	247.9767867
257.0426577	209.3220065	257.8958582
266.9289138	209.4666614	267.8149296
276.8151659	209.0579548	277.7340011
286.7014259	208.3541902	287.6530726
296.587682	207.5382745	297.572144
306.4739381	207.2034108	307.4912155
316.3601941	207.443692	317.410287
326.2464602	207.3288561	327.3293584
336.1327063	206.9503375	337.2488209
346.0189623	205.3282432	347.1675014
355.9052184	205.4496095	357.0865728
365.7914745	204.6874318	367.0056443
375.6777305	204.689814	376.9247158
385.5639866	204.8048961	386.8437872
395.4502427	204.0977879	396.7628587
405.3364987	203.5420283	406.6819302
415.2227548	203.0780275	416.6010016
425.1090109	202.7249136	426.5200731
434.9952669	202.7818736	436.4391446
444.881523	202.5352264	446.358216
454.7677791	202.6762728	456.2778875
464.6540351	202.071026	466.1963539
474.5402812	201.5763549	
484.4265473	201.6375562	
494.3128033	201.4096972	
504.1990594	200.9306886	
514.0853155	200.3197886	
523.9715715	200.181514	
533.8578276	200.2083719	
543.7440837	199.884809	
553.6303397	199.796308	
563.5165958	199.7065132	
573.4028519	199.4571741	
583.2891079	199.303876	
593.175364	198.9410892	
603.0616201	199.218079	
612.9478761	199.6883835	
622.8341322	199.818722	
632.7203883	199.9802883	
642.6066443	199.9138542	

X	Feature Profile 1 X	Feature Profile 1 Y
79.951714	213.1281806	79.7457122
89.27164321	212.9577738	89.71394762
99.19071468	212.4768739	99.68216402
109.1097861	212.5899993	109.6503804
119.6185963	212.7004746	119.6185968
128.9479291	212.6687963	128.9479291
138.8670005	212.8782358	138.8670005
148.786072	213.213462	148.786072
158.7051435	213.0960039	158.7051435
168.624215	212.5606881	168.624215
178.5432864	212.2390595	178.5432864
188.4632579	212.0854198	188.4632579
198.3814294	211.8175853	198.3814294
208.3005008	211.8276323	208.3005008
218.2195723	211.2149175	218.2195723
228.1386438	210.9046015	228.1386438
238.0577152	210.6319146	238.0577152
247.9767867	210.3337764	247.9767867
257.8958582	210.4746549	257.8958582
267.8149296	209.852595	267.8149296
277.7340011	209.1554057	277.7340011
287.6530726	208.6741136	287.6530726
297.572144	207.9400544	297.572144
307.4912155	207.1473042	307.4912155
317.410287	206.435575	317.410287
327.3293584	205.8044603	327.3293584
337.2488209	205.2768879	337.2488209
347.1675014	204.9252114	347.1675014
357.0865728	204.3479984	357.0865728
367.0056443	203.4596695	367.0056443
376.9247158	202.7751347	376.9247158
386.8437872	202.0735321	386.8437872
396.7628587	201.6739821	396.7628587
406.6819302	201.5283476	406.6819302
416.6010016	201.5481121	416.6010016
426.5200731	201.1216421	426.5200731
436.4391446	200.7884786	436.4391446
446.358216	200.9141713	446.358216
456.2778875	201.3286777	456.2778875
466.1963539	201.1333274	466.1963539
476.1149394	201.103934	476.1149394
486.0339719	201.062679	486.0339719
495.9529993	201.1945854	495.9529993
505.8719728	201.0860931	505.8719728
515.7910453	202.0661435	515.7910453
525.7091178	202.8661435	525.7091178
535.6281903	202.6227428	535.6281903
545.5472629	202.3034904	545.5472629
555.4663354	202.030666	555.4663354
565.3854079	201.955885	565.3854079
575.3044804	201.878311	575.3044804
585.2235529	201.8523575	585.2235529
595.1426254	201.8222221	595.1426254
605.0616979	201.7910563	605.0616979
614.9807704	201.7597516	614.9807704
624.8998429	201.7114593	624.8998429
634.8189154	201.662886	634.8189154
644.7379879	201.6143046	644.7379879
654.6570604	201.5657241	654.6570604
664.5761329	201.5171435	664.5761329
674.4952054	201.468563	674.4952054
684.4142779	201.4199821	684.4142779
694.3333454	201.3713976	694.3333454
704.2524179	201.3228131	704.2524179
714.1714904	201.2742286	714.1714904
724.0905629	201.2256441	724.0905629
734.0096354	201.1770596	734.0096354
743.9287079	201.1284751	743.9287079
753.8477804	201.0798906	753.8477804
763.7668529	201.0313061	763.7668529
773.6859254	200.9827216	773.6859254
783.6050004	200.9341371	783.6050004
793.5240729	200.8855526	793.5240729
803.4431454	200.8369681	803.4431454
813.3622179	200.7883836	813.3622179
823.2812904	200.7397991	823.2812904
833.2003629	200.6912146	833.2003629
843.1194354	200.6426301	843.1194354
853.0385079	200.5940456	853.0385079
862.9575804	200.5454611	862.9575804
872.8766529	200.4968766	872.8766529
882.7957254	200.4482921	882.7957254
892.7147979	200.4000076	892.7147979
902.6338704	200.3518231	902.6338704
912.5529429	200.3036386	912.5529429
922.4720154	200.2554541	922.4720154
932.3910879	200.2072696	932.3910879
942.3101604	200.1590851	942.3101604
952.2292329	200.1109006	952.2292329
962.1483054	200.0627161	962.1483054
972.0673779	200.0145316	972.0673779
981.9864504	199.9663471	981.9864504
991.9055229	199.9181626	991.9055229
1001.8245954	199.8700001	1001.8245954
1011.7436679	199.8218156	1011.7436679
1021.6627404	199.7736311	1021.6627404
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1041.5008854	199.6772621	1041.5008854
1051.4199579	199.6290776	1051.4199579
1061.3390304	199.5808931	1061.3390304
1071.2581029	199.5327086	1071.2581029
1081.1771754	199.4845241	1081.1771754
1091.0962479	199.4363396	1091.0962479
1101.0153204	199.3881551	1101.0153204
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1130.7725379	199.2436016	1130.7725379
1140.6916104	199.1954171	1140.6916104
1150.6106829	199.1472326	1150.6106829
1160.5297554	199.0990481	1160.5297554
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1180.3679004	199.0026791	1180.3679004
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1390.0000000	197.9918836	1390.0000000
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1580.0000000	197.0775181	1580.0000000
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1600.0000000	196.9812691	1600.0000000
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1620.0000000	196.8850201	1620.0000000
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657.9028225 218.385108
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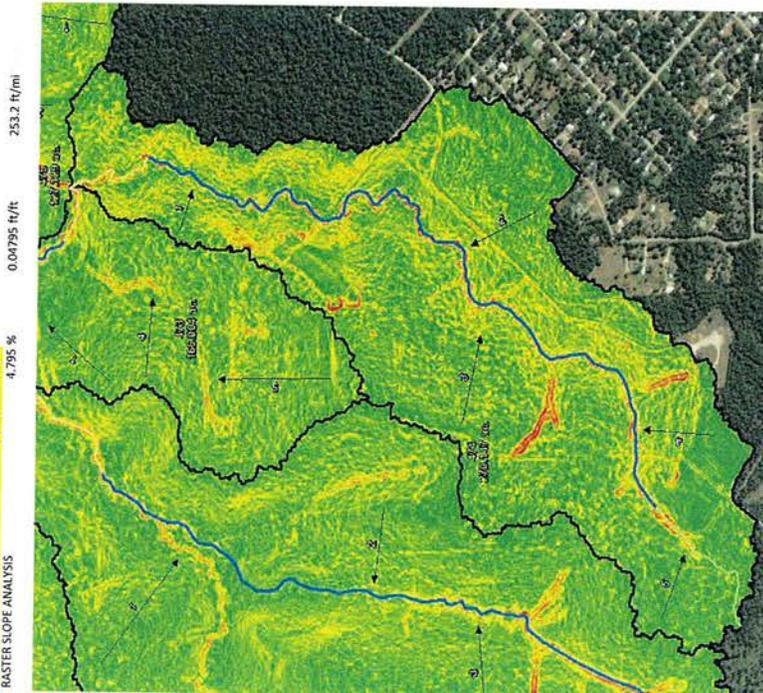
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959.3398129 221.1847447
969.332936 220.988216
979.326059 220.8667409
989.3191821 220.1221585
999.3123051 219.6616402
1009.305428 219.207927
1019.298551 219.1159512

Drainage Area
474

Ac 270.147 SqMI 0.42

Length (ft)	Slope (ft/ft)	Slope (ft/m)	
1	346	0.0273	144.1
2	661	0.0347	183.2
3	734	0.0260	137.3
4	649	0.0293	154.7
5	565	0.0084	44.4

AVG
RASTER SLOPE ANALYSIS
0.0251 133.7
4.795 %



X	1	2	3	4	5	Feature Profile 1
79.10755165	213.7755461	78.90051148	244.910515	79.40293279	250.4912833	79.85326881
88.99599561	213.636102	88.76757542	244.8195469	89.32604883	250.4308821	89.25287784
98.88443956	213.2087975	98.63069315	244.4741779	99.25110537	250.278397	99.16986427
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197.7688791	211.3182766	197.2612787	242.6770793	198.5023702	248.9917529	198.3397285
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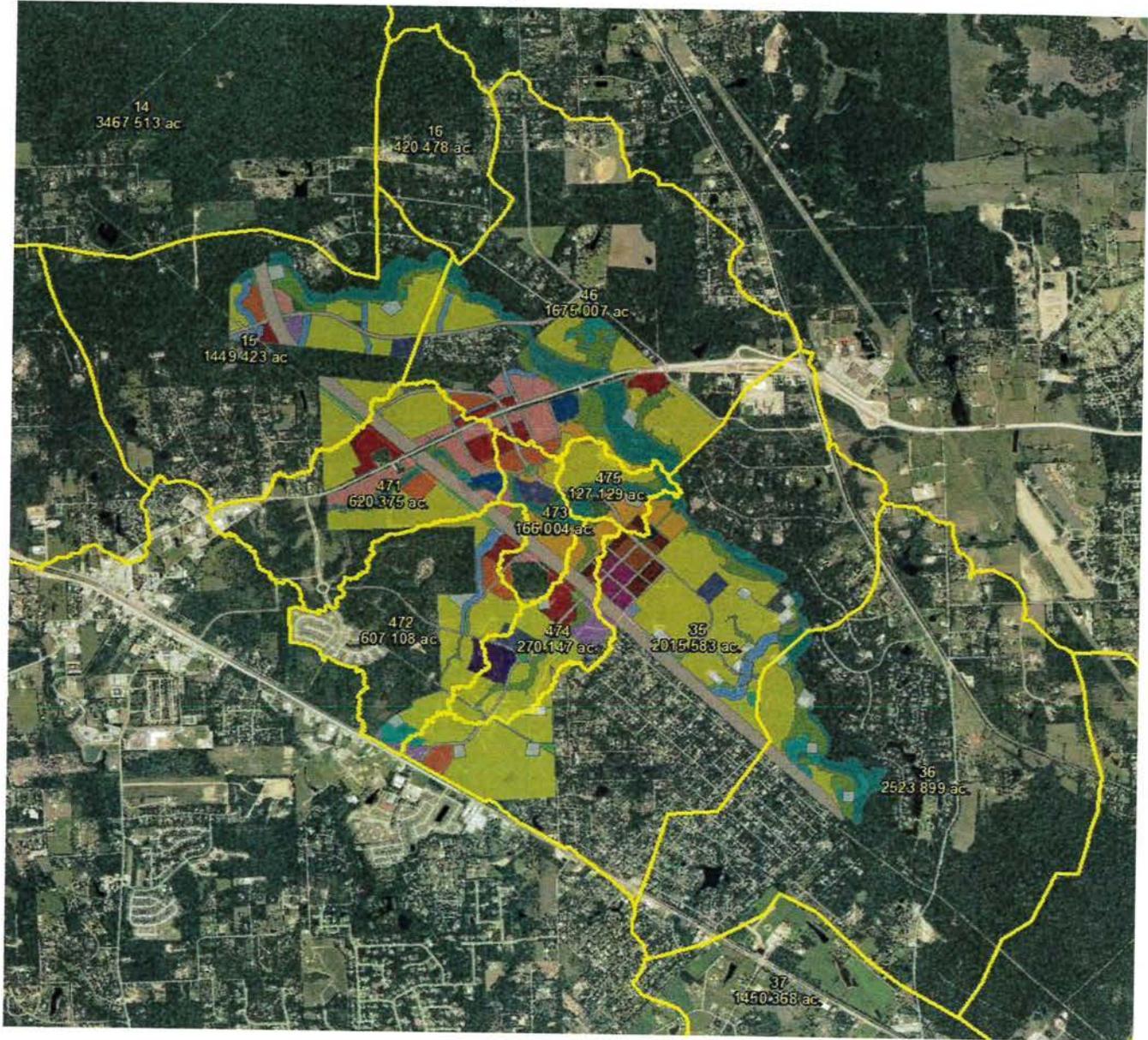
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LAND USE SUMMARY

DA	Area (ac)	Area (sqmi)	% Impervious		CN	
			Ex	Prop	Ex	Prop
471	620.375	0.969	11.22	42.17	58	75
472	607.108	0.949	4.40	21.42	62	70
473	166.004	0.259	0.07	45.79	56	78
474	270.147	0.422	1.74	47.60	58	79
475	127.129	0.199	0.00	30.46	42	64



LU_CODE	LU_DESCRIB	LU_TYPE	PCT_IMP	MUSYM	HYDRO_GI_CN	BasinNo_	Area	Acres	PCT_IMP_Acres	CN_Acres
EX	Single Family Residential 1 acre	Residential	20	BIC	A	51	471 89893.97907	2.064	41.27363594	105.2478
EX	Single Family Residential 1 acre	Residential	20	CoC	B	68	471 223244.3279	5.125	102.4996914	348.499
EX	Single Family Residential 1 acre	Residential	20	Fs	B	68	471 209393.6605	4.807	96.14034	326.8772
EX	Single Family Residential 1 acre	Residential	20	Ss	D	84	471 22785.39292	0.523	10.46161291	43.93877
EX	Single Family Residential 1/4 acre	Residential	38	CoC	B	75	471 298554.4037	6.854	260.4469087	514.04
EX	Single Family Residential 1/4 acre	Residential	38	Fs	B	75	471 422.5987003	0.010	0.368658187	0.727615
EX	Single Family Residential 1/4 acre	Residential	38	Ss	D	87	471 6621.729768	0.152	5.776531937	13.22522
EX	Single Family Residential 1/4 acre	Residential	85	CoC	B	92	471 62167.63134	1.427	121.3096571	131.2999
EX	Commercial	Commercial	85	Ss	D	95	471 24504.28607	0.563	47.81598522	53.4414
EX	Commercial	Commercial	85	CoC	B	92	471 121151.7447	2.781	236.4072154	255.876
EX	Commercial	Commercial	85	CnC	B	92	471 631564.3625	14.499	1232.391433	1333.882
EX	Commercial	Commercial	65	Ss	D	92	471 5189.82968	0.119	7.744236208	10.96107
EX	Single Family Residential 1/8 acre	Residential	65	CnC	B	85	471 157356.3109	3.612	234.8062491	307.0543
EX	Single Family Residential 1/8 acre	Residential	12	CoC	B	65	471 12265.96754	0.282	3.379054418	18.30321
EX	Single Family Residential 2 acres	Residential	90	BIC	A	98	471 87122.33927	2.000	180.0048332	196.0053
EX	Major Thoroughfare	Infrastructure	90	CnC	B	98	471 210.9548491	0.005	0.435857126	0.4746
EX	Major Thoroughfare	Infrastructure	90	CoC	B	98	471 625794.5197	14.366	1292.963884	1407.894
EX	Major Thoroughfare	Infrastructure	90	CnC	B	98	471 9416.231378	0.216	19.45502351	21.18436
EX	Major Thoroughfare	Infrastructure	90	Fs	B	98	471 279679.1733	6.421	577.8495315	629.2139
EX	Major Thoroughfare	Infrastructure	20	CoC	B	68	471 44208.87132	1.015	20.29792072	69.01293
EX	Single Family Residential 1 acre	Residential	72	CoC	B	88	471 43472.62569	0.998	71.85557964	87.82349
EX	Light Industrial	Commercial	5	BIC	A	39	471 217522.6318	4.994	24.96816251	194.7517
EX	Rural Residential	Residential	38	CoC	B	75	471 210.9411256	0.005	0.184016593	0.363191
EX	Single Family Residential 1/4 acre	Residential	90	SegB	B	98	471 52083.38558	1.196	107.6103008	117.1757
EX	Major Thoroughfare	Infrastructure	90	CoC	B	98	471 398709.8822	9.153	823.7807484	897.0057
EX	Major Thoroughfare	Infrastructure	90	CnC	B	98	471 36055.75592	0.828	74.49536348	81.11717
EX	Major Thoroughfare	Infrastructure	0	CnC	B	61	471 130296.4492	2.991		0 182.4629
PAS	Pasture - Good	Undeveloped	0	SegB	B	61	471 109725.1134	2.519	0 153.6555	
PAS	Pasture - Good	Undeveloped	0	CoC	B	61	471 800316.8745	18.373	0 1120.738	
PAS	Pasture - Good	Undeveloped	0	CnC	B	61	471 25229.47584	0.579	0 35.33053	
PAS	Pasture - Good	Undeveloped	0	CoC	B	61	471 50300.31642	1.155	0 70.43892	
PAS	Pasture - Good	Undeveloped	0	Fs	B	61	471 29643.55441	0.681	0 41.51186	
PAS	Pasture - Good	Undeveloped	0	CoC	B	55	471 276792.7553	6.354	0 349.4858	
WD	Woods - Good	Undeveloped	0	CoC	B	61	471 120934.6922	2.776	0 169.353	
PAS	Pasture - Good	Undeveloped	0	CoC	B	61	471 40969.41719	0.941	0 57.37223	
PAS	Pasture - Good	Undeveloped	0	CoC	B	55	471 65653.42768	1.507	0 82.89574	
WD	Woods - Good	Undeveloped	0	CoC	B	61	471 103849.4698	2.384	0 145.4274	
PAS	Pasture - Good	Undeveloped	0	Ss	D	80	471 93946.74195	2.157	0 172.5376	
PAS	Pasture - Good	Undeveloped	0	CnC	B	61	471 125683.6801	2.885	0 176.0033	
PAS	Pasture - Good	Undeveloped	0	SegB	B	61	471 194996.3142	4.476	0 273.0665	
PAS	Pasture - Good	Undeveloped	0	CoC	B	61	471 77677.04428	1.783	0 108.7764	
PAS	Pasture - Good	Undeveloped	0	CoC	B	55	471 38569.11299	0.885	0 48.69837	
WD	Woods - Good	Undeveloped	0	CoC	B	61	471 76058.39624	1.746	0 106.5097	
PAS	Pasture - Good	Undeveloped	0	CoC	B	61	471 121521.8459	2.790	0 170.1752	
PAS	Pasture - Good	Undeveloped	0	CoC	B	55	471 469121.6301	10.770	0 592.3253	
WD	Woods - Good	Undeveloped	0	CoC	B	55	471 92036.02127	2.113	0 116.2071	
WD	Woods - Good	Undeveloped	0	SegB	B	77	471 27508.46107	0.632	0 48.62607	
WD	Woods - Good	Undeveloped	0	Ss	D	77	471 27821.12312	0.639	0 49.17875	
WD	Woods - Good	Undeveloped	0	Ss	D	77	471 1648718.165	37.849	0 2081.715	
WD	Woods - Good	Undeveloped	0	CoC	B	55	471 1648718.165	0.101	0 7.745308	
WD	Woods - Good	Undeveloped	0	SplB	D	77	471 4381.631179	30.847	0 1696.586	
WD	Woods - Good	Undeveloped	0	CnC	B	55	471 1343695.923	1.715	0 137.1723	
WD	Woods - Good	Undeveloped	0	Ss	D	80	471 74690.33931	1.715	0 34.98339	
PAS	Pasture - Good	Undeveloped	0	CoC	B	61	471 24981.58366	0.573	0 1.812345	
PAS	Pasture - Good	Undeveloped	0	CnC	B	61	471 1294.192679	0.030	0 117.4988	
PAS	Pasture - Good	Undeveloped	0	CoC	B	61	471 83905.67962	1.926	0 223.8241	
PAS	Pasture - Good	Undeveloped	0	CoC	B	61	471 159832.433	3.669	0 9.06928947	
PAS	Pasture - Good	Undeveloped	0	CoC	B	100	471 395.0582491	0.009	0.906928947	0.906929
PD	Ponds	Parks & Open Space	100	CoC	B	100	471 1059.246826	0.024	2.43169611	2.431696
PD	Ponds	Parks & Open Space	100	Fs	B	100	471 592381.2423	13.599	1359.920207	1359.92
PD	Ponds	Parks & Open Space	100	W		100	471 592381.2423	13.599	1359.920207	1359.92
WD	Woods - Good	Undeveloped	0	BIC	A	30	471 3250232.093	74.615	0 2238.452	
WD	Woods - Good	Undeveloped	0	CnC	B	55	471 1034608.587	23.751	0 1306.324	
WD	Woods - Good	Undeveloped	0	CoC	B	55	471 1217171.728	27.942	0 1536.833	
WD	Woods - Good	Undeveloped	0	Fs	B	55	471 437508.0351	10.044	0 552.4091	
WD	Woods - Good	Undeveloped	0	Fs	B	55	471 736190.8439	16.901	0 929.5339	
WD	Woods - Good	Undeveloped	0	Fs	B	30	471 18989.81628	0.436	0 13.07839	
WD	Woods - Good	Undeveloped	0	BoyC	A	55	471 2537.245069	0.058	0 3.203592	
WD	Woods - Good	Undeveloped	0	CnC	B	55	471 456154.1912	10.472	0 575.9523	
WD	Woods - Good	Undeveloped	0	CnC	B	55	471 456154.1912	0.213	0 11.70839	
WD	Woods - Good	Undeveloped	0	SegB	B	55	471 9273.04206	0.213	0 7369.489	
WD	Woods - Good	Undeveloped	0	CoC	B	55	471 5836635.528	133.991	0 860.2873	
WD	Woods - Good	Undeveloped	0	Fs	B	55	471 681347.5445	15.642	0 860.2873	
WD	Woods - Good	Undeveloped	0	Ro	B	55	471 382.5202644	0.009	0 0.48298	
WD	Woods - Good	Undeveloped	0	CnC	B	55	471 136681.7092	3.138	0 172.5779	
WD	Woods - Good	Undeveloped	0	Ss	D	77	471 4731.215785	0.109	0 8.36326	
WD	Woods - Good	Undeveloped	0	Fs	B	55	471 1461279.747	33.546	0 1845.05	
WD	Woods - Good	Undeveloped	0	W		100	471 154775.7704	3.553	0 355.3163	
WD	Woods - Good	Undeveloped	0	CnC	B	55	471 850597.8826	19.527	0 1073.987	
WD	Woods - Good	Undeveloped	0	CoC	B	61	471 40844.86434	0.938	0 57.19781	
EX	Open Space	Parks & Open Space	0	CoC	B	61	471 40844.86434	0.938	6957.981263	36011.01
			11.22			58.05	471	620.375		
EX	Single Family Residential 1/4 acre	Residential	38	CoC	B	75	472 1252018.819	28.742	1092.211091	2155.68

EXISTING CONDITIONS LAND USE

EX	Single Family Residential 1/4 acre	Residential	38 Ro	B	75	472	1619788.687	37.185	1413.038799	2788.892
EX	Single Family Residential 1/4 acre	Residential	38 SplB	D	87	472	863.6849596	0.020	0.75344418	1.724991
EX	Major Thoroughfare	Infrastructure	90 CoC	B	98	472	3599.980618	0.083	7.437976484	8.09913
EX	Major Thoroughfare	Infrastructure	90 Ro	B	98	472	5856.538661	0.134	12.10028649	13.17587
EX	Single Family Residential 2 acres	Residential	12 Ro	B	65	472	66648.90914	1.530	18.36058103	99.45315
EX	Major Thoroughfare	Infrastructure	90 LeIA	C/D	98	472	2235.597957	0.051	4.619004044	5.029582
EX	Major Thoroughfare	Infrastructure	90 Ro	B	98	472	58997.39726	1.354	121.8954489	132.7306
PAS	Pasture - Good	Undeveloped	0 CnC	B	61	472	73563.41102	1.689	0	103.0158
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	472	74283.22725	1.705	0	104.0238
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	472	236017.8674	5.418	0	330.5117
PAS	Pasture - Good	Undeveloped	0 Bb	B/D	80	472	59024.47203	1.355	0	108.4012
WD	Woods - Good	Undeveloped	0 CoC	B	55	472	43432.32274	0.997	0	54.83879
WD	Woods - Good	Undeveloped	0 Ro	B	55	472	12023.71632	0.276	0	15.18146
WD	Woods - Good	Undeveloped	0 Ro	B	55	472	1005.033959	0.023	0	1.268982
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	838809.4356	19.256	0	1482.744
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	374201.5006	8.590	0	661.4673
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	838725.1661	19.254	0	1482.595
WD	Woods - Good	Undeveloped	0 Fs	B	55	472	17734.86658	0.407	0	22.39251
WD	Woods - Good	Undeveloped	0 LeIA	C/D	77	472	259928.3292	5.967	0	459.4693
WD	Woods - Good	Undeveloped	0 BoyC	A	30	472	177949.2228	4.085	0	122.5546
WD	Woods - Good	Undeveloped	0 CnC	B	55	472	172427.748	3.958	0	217.7118
WD	Woods - Good	Undeveloped	0 CnC	B	55	472	273312.3927	6.274	0	345.0914
WD	Woods - Good	Undeveloped	0 CoC	B	55	472	13998993.31	321.373	0	17675.5
WD	Woods - Good	Undeveloped	0 W		100	472	175278.7115	4.024	0	402.3846
WD	Woods - Good	Undeveloped	0 LeIA	C/D	77	472	558303.4231	12.817	0	986.9
WD	Woods - Good	Undeveloped	0 Ro	B	55	472	2336973.876	53.650	0	2950.725
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	1430715.518	32.845	0	2529.043
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	261969.4024	6.014	0	463.0772
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	480741.8912	11.036	0	849.7963
WD	Woods - Good	Undeveloped	0 Bb	B/D	77	472	740193.3868	16.993	0	1308.423
			4.40		62.40	472		607.108	2670.416631	37881.9
DSE	Drill Site Existing	Wells & Pipelines	72 Ss	D	93	473	6769.179466	0.155	11.18872639	14.4521
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	473	29034.27146	0.667	0	40.65864
WD	Woods - Good	Undeveloped	0 Fs	B	55	473	365.7547702	0.008	0	0.461812
WD	Woods - Good	Undeveloped	0 BoyC	A	30	473	765443.2995	17.572	0	527.1648
WD	Woods - Good	Undeveloped	0 CnC	B	55	473	239460.2551	5.497	0	302.3488
WD	Woods - Good	Undeveloped	0 CoC	B	55	473	4876427.393	111.947	0	6157.105
WD	Woods - Good	Undeveloped	0 Ss	D	77	473	729125.6574	16.738	0	1288.858
WD	Woods - Good	Undeveloped	0 Bb	B/D	77	473	581388.0693	13.347	0	1027.706
WD	Woods - Good	Undeveloped	0 W		100	473	3121.204699	0.072	0	7.1653
			0.07		56.42	473		166.004	11.189	9365.921
EX	Single Family Residential 1/2 acre	Residential	25 CoC	B	70	474	405488.368	9.309	232.7183012	651.6112
EX	Single Family Residential 1/2 acre	Residential	25 CnC	B	70	474	16040.0717	0.368	9.205734444	25.77606
EX	Single Family Residential 2 acres	Residential	12 CnC	B	65	474	43950.24538	1.009	12.10750561	65.58232
DSE	Drill Site Existing	Wells & Pipelines	72 CoC	B	91	474	43314.19958	0.994	71.59371832	90.48651
DSE	Drill Site Existing	Wells & Pipelines	72 Ss	D	93	474	59249.65549	1.360	97.93331486	126.4972
DSE	Drill Site Existing	Wells & Pipelines	72 CoC	B	91	474	28747.08588	0.660	47.51584443	60.05475
DSE	Drill Site Existing	Wells & Pipelines	72 CnC	B	91	474	167.3967256	0.004	0.276688803	0.349704
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	474	329631.8524	7.567	0	461.6057
WD	Woods - Good	Undeveloped	0 CnC	B	55	474	232527.4405	5.338	0	293.5953
WD	Woods - Good	Undeveloped	0 Ss	D	77	474	12878.7704	0.296	0	22.7655
WD	Woods - Good	Undeveloped	0 WkC	A	30	474	36293.68828	0.833	0	24.99565
WD	Woods - Good	Undeveloped	0 Fs	B	55	474	427994.9575	9.825	0	540.3977
WD	Woods - Good	Undeveloped	0 CoC	B	55	474	8751222.781	200.900	0	11049.52
WD	Woods - Good	Undeveloped	0 Ss	D	77	474	197873.8305	4.543	0	349.777
WD	Woods - Good	Undeveloped	0 CnC	B	55	474	258158.397	5.927	0	325.9576
WD	Woods - Good	Undeveloped	0 Ro	B	55	474	53440.5526	1.227	0	67.47545
WD	Woods - Good	Undeveloped	0 Ss	D	77	474	570766.2295	13.103	0	1008.93
WD	Woods - Good	Undeveloped	0 Bb	B/D	77	474	23231.75476	0.533	0	41.06623
WD	Woods - Good	Undeveloped	0 SplB	D	77	474	4769.705227	0.109	0	8.431297
WD	Woods - Good	Undeveloped	0 Ss	D	77	474	271865.2349	6.241	0	480.5699
			1.74		58.10	474		270.147	471.351	15695.449
PAS	Pasture - Good	Undeveloped	0 BIC	A	39	475	177377.9044	4.072	0	158.8094
WD	Woods - Good	Undeveloped	0 WkC	A	30	475	1044059.033	23.968	0	719.0489
WD	Woods - Good	Undeveloped	0 Fs	B	55	475	275748.3298	6.330	0	348.1671
WD	Woods - Good	Undeveloped	0 BoyC	A	30	475	2158782.229	49.559	0	1486.765
WD	Woods - Good	Undeveloped	0 CoC	B	55	475	36868.20746	0.846	0	46.55077
WD	Woods - Good	Undeveloped	0 BIC	A	30	475	656779.0452	15.078	0	452.3272
WD	Woods - Good	Undeveloped	0 Bb	B/D	77	475	1188121.014	27.276	0	2100.214
			0.00		41.78	475		127.129	0.000	5311.882

PROPOSED CONDITIONS LAND USE

LU_CODE	LU_DESCRIB	LU_TYPE	PCT_IMP	MUSYM	HYDRO_GF	CN	BasinNo_	Area	Acres	PCT_IMP_Acres	CN_Acres
RD	Major Thoroughfare	Infrastructure	90 BIC	A			98	471 21168.3311	0.486	43.73622135	47.62388547
RD	Major Thoroughfare	Infrastructure	90 CnC	B			98	471 127948.651	2.937	264.3567174	287.8550922
RD	Major Thoroughfare	Infrastructure	90 CoC	B			98	471 99048.3535	2.274	204.6453585	222.8360571
RD	Major Thoroughfare	Infrastructure	90 CoC	B			98	471 14189.725	0.325	29.31761355	31.92362364
RD	Major Thoroughfare	Infrastructure	90 BoyC	A			98	471 2192.87437	0.050	4.530732171	4.933463919
RD	Major Thoroughfare	Infrastructure	90 CoC	B			98	471 45318.7045	1.040	93.63368695	101.9566813
RD	Major Thoroughfare	Infrastructure	90 Fs	B			98	471 59795.6169	1.373	123.5446629	134.5264108
MF	Multi-Family	Residential	85 CoC	B			92	471 48943.9018	1.124	95.50577717	103.3709588
MF	Multi-Family	Residential	85 Fs	B			92	471 46589.7842	1.070	90.91211334	98.39899326
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B			92	471 441192.592	10.128	860.9130006	931.8117183
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 Fs	B			92	471 136941.416	3.144	267.2180978	289.224294
RP	Pad Retail	Commercial	85 CnC	B			92	471 2537.24507	0.058	4.951006218	5.358736142
RP	Pad Retail	Commercial	85 CoC	B			92	471 287285.122	6.595	560.5885067	606.754619
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 2537.49966	0.058	0	3.553431567
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 7879.93293	0.181	0	11.03480048
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 9800.15164	0.225	0	13.72381198
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 2602.35383	0.060	0	3.64425123
RP	Pad Retail	Commercial	85 CoC	B			92	471 220940.603	5.072	431.1283584	466.6330467
RP	Pad Retail	Commercial	85 Fs	B			92	471 388793.566	8.925	758.6651304	821.1434352
RP	Pad Retail	Commercial	85 W				100	471 641.930488	0.015	1.252619181	1.473669624
W-U	Wetlands in Uplands	Infrastructure	0 CoC	B			55	471 817.834089	0.019	0	1.0326188
W-U	Wetlands in Uplands	Infrastructure	0 Fs	B			55	471 5123.85389	0.118	0	6.46951249
W-U	Wetlands in Uplands	Infrastructure	0 W				100	471 3754.46354	0.086	0	8.619062306
PD	Ponds	Parks & Open Space	100 CoC	B			100	471 395.05824	0.009	0.906928926	0.906928926
PD	Ponds	Parks & Open Space	100 W	B			100	471 1059.24683	0.024	2.431696117	2.431696117
PD	Ponds	Parks & Open Space	100 W				100	471 267770.627	6.147	614.7167734	614.7167734
RP	Pad Retail	Commercial	85 Fs	B			92	471 17933.4042	0.412	34.99401647	37.87587665
RP	Pad Retail	Commercial	85 BoyC	A			89	471 16754.326	0.385	32.69324402	34.23174962
RP	Pad Retail	Commercial	85 CoC	B			92	471 82841.5777	1.902	161.6513799	174.9638464
RP	Pad Retail	Commercial	85 W				100	471 10714.9393	0.246	20.90839847	24.59811584
W-FP	Wetlands in Floodplain	Infrastructure	0 CoC	B			55	471 57123.5506	1.311	0	7.12569516
W-FP	Wetlands in Floodplain	Infrastructure	0 Fs	B			55	471 11059.1587	0.254	0	13.96358423
W-FP	Wetlands in Floodplain	Infrastructure	0 W				100	471 56448.8267	1.296	0	129.5886747
FW	Floodway	Infrastructure	0 CoC	B			55	471 129205.175	2.966	0	163.1378473
FP	Floodplain	Infrastructure	0 CoC	B			55	471 133045.17	3.054	0	167.9863261
FP	Floodplain	Infrastructure	0 Fs	B			55	471 33044.1495	0.759	0	41.72241099
FP	Floodplain	Infrastructure	0 CoC	B			55	471 87569.576	2.010	0	110.5676465
FW	Floodway	Infrastructure	0 CoC	B			55	471 264.306363	0.006	0	0.333720156
FW	Floodway	Infrastructure	0 W				100	471 103450.358	2.375	0	237.4893426
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 6707.27981	0.154	0	9.392655378
OS	Open Space	Parks & Open Space	0 W				100	471 735.606664	0.017	0	1.688720534
PD	Ponds	Parks & Open Space	100 W				100	471 104383.301	2.396	239.6310865	239.6310865
FP	Floodplain	Infrastructure	0 CoC	B			55	471 28.8218362	0.001	0	0.036391207
FP	Floodplain	Infrastructure	0 W				100	471 25894.4764	0.594	0	59.44553809
OS	Open Space	Parks & Open Space	0 BoyC	A			39	471 42.6159199	0.001	0	0.038154749
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 146.586458	0.003	0	0.205274884
OS	Open Space	Parks & Open Space	0 W				100	471 16263.5295	0.373	0	37.33592642
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 644.438112	0.015	0	0.902450065
MF	Multi-Family	Residential	85 CnC	B			92	471 70503.5087	1.619	137.5757171	148.905482
MF	Multi-Family	Residential	85 CoC	B			92	471 32795.8021	0.753	63.99548159	69.26569772
W-U	Wetlands in Uplands	Infrastructure	0 CoC	B			55	471 6269.71195	0.144	0	7.916302969
RP	Pad Retail	Commercial	85 CoC	B			92	471 274351.393	6.298	535.3505136	579.4382029
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 2353.33851	0.054	0	3.295538318
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 2498.58088	0.057	0	3.498930984
OS	Open Space	Parks & Open Space	0 BIC	A			39	471 5272.79925	0.121	0	4.720825772
SFR	Single Family Residential	Residential	38 BIC	A			61	471 972674.917	22.330	848.5226552	1362.102157
SFR	Single Family Residential	Residential	38 CnC	B			75	471 557892.012	12.807	486.6826555	960.5578727
SFR	Single Family Residential	Residential	38 CoC	B			75	471 377114.705	8.657	328.9797698	649.3021773
DR	Drainage	Infrastructure	0 CnC	B			55	471 863.549756	0.020	0	1.090340602
DR	Drainage	Infrastructure	0 CoC	B			55	471 27555.9409	0.633	0	34.79285472
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B			92	471 116475.417	2.674	227.2821505	245.999504
RD	SH249 Tollway	Infrastructure	90 BIC	A			98	471 524535.024	12.042	1083.75005	1180.083387
RD	SH249 Tollway	Infrastructure	90 CoC	B			98	471 102635.782	2.356	212.0574014	230.9069482
SFR	Single Family Residential	Residential	38 CnC	B			75	471 66926.1857	1.536	58.38372489	115.231036
SFR	Single Family Residential	Residential	38 CoC	B			75	471 170086.028	3.905	148.3762411	292.8478442
OS	Open Space	Parks & Open Space	0 CoC	B			61	471 4183.24896	0.096	0	5.858085085
WTE	Water Treatment & Elevated	Infrastructure	72 CnC	B			88	471 120795.765	2.773	199.6624215	244.0318485
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 BIC	A			89	471 1019224.53	23.398	1988.844922	2082.437624
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B			92	471 1803.42634	0.041	3.519082622	3.808889426
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 Fs	B			92	471 34266.688	0.787	66.86566756	72.37225195
PL	Pipeline	Wells & Pipelines	0 BIC	A			39	471 1893.10999	0.043	0	1.694933188
OS	Open Space	Parks & Open Space	0 BIC	A			39	471 3571.8088	0.082	0	3.19790044
SFR	Single Family Residential	Residential	38 BIC	A			61	471 701891.576	16.113	612.3021093	982.9060176
SFR	Single Family Residential	Residential	38 Fs	B			75	471 403241.347	9.257	351.7716068	694.2860661
SFR	Single Family Residential	Residential	38 Fs	B			75	471 333498.397	7.656	290.9306493	574.2052289
SFR	Single Family Residential	Residential	38 CnC	B			75	471 79744.8049	1.831	69.56617505	137.3016613
SFR	Single Family Residential	Residential	38 CoC	B			75	471 2184868.95	50.158	1905.9922	3761.826711
SFR	Single Family Residential	Residential	38 Fs	B			75	471 51856.2946	1.190	45.23735529	89.28425387
SFR	Single Family Residential	Residential	38 CnC	B			75	471 433196.808	9.945	377.9035512	745.8622722
FP	Floodplain	Infrastructure	0 CoC	B			55	471 50950.7397	1.170	0	64.33174208
FP	Floodplain	Infrastructure	0 Fs	B			55	471 751.565754	0.017	0	0.948946659
FP	Floodplain	Infrastructure	0 Fs	B			55	471 13492.0413	0.310	0	17.03540565
FP	Floodplain	Infrastructure	0 CoC	B			55	471 183.594457	0.004	0	0.231811183
FP	Floodplain	Infrastructure	0 Fs	B			55	471 1778.58064	0.041	0	2.245682622
FP	Floodplain	Infrastructure	0 CoC	B			55	471 5102.00759	0.117	0	6.441928775

FP	Floodplain	Infrastructure	0 Fs	B	55	471	2219.76328	0.051	0	2.802731418
FP	Floodplain	Infrastructure	0 CoC	B	55	471	25414.8919	0.583	0	32.08950994
FP	Floodplain	Infrastructure	0 CoC	B	55	471	7896.16531	0.181	0	9.969905694
FW	Floodway	Infrastructure	0 CoC	B	55	471	226642.571	5.203	0	286.1648623
FW	Floodway	Infrastructure	0 Fs	B	55	471	200334.606	4.599	0	252.9477344
FP	Floodplain	Infrastructure	0 CoC	B	55	471	46834.9363	1.075	0	59.13502052
FP	Floodplain	Infrastructure	0 Fs	B	55	471	65984.9612	1.515	0	83.31434496
PL	Pipeline	Wells & Pipelines	0 Fs	B	61	471	48021.9551	1.102	0	67.24837609
PL	Pipeline	Wells & Pipelines	0 CoC	B	61	471	6781.59334	0.156	0	9.496721613
PL	Pipeline	Wells & Pipelines	0 CnC	B	61	471	22022.4871	0.506	0	30.83957096
MF	Multi-Family	Residential	85 CoC	B	92	471	287573.026	6.602	561.1503032	607.3626812
MF	Multi-Family	Residential	85 CnC	B	92	471	277563.815	6.372	541.6190138	586.2229326
OS	Open Space	Parks & Open Space	0 Fs	B	61	471	89194.6888	2.048	0	124.9053264
OS	Open Space	Parks & Open Space	0 CoC	B	61	471	19650.3307	0.451	0	27.51768079
OS	Open Space	Parks & Open Space	0 CnC	B	61	471	38964.1364	0.894	0	54.56410291
RP	Pad Retail	Commercial	85 CoC	B	92	471	154384.751	3.544	301.2558274	326.0651308
RP	Pad Retail	Commercial	85 Fs	B	92	471	1069017.52	24.541	2086.007563	2257.796421
RD	SH249 Tollway	Infrastructure	90 Fs	B	98	471	247542.394	5.683	511.451228	556.9135594
RD	SH249 Tollway	Infrastructure	90 CoC	B	98	471	526809.562	12.094	1088.449508	1185.200576
RD	SH249 Tollway	Infrastructure	90 W	B	98	471	157098.951	3.606	324.5846094	353.4365747
RD	SH249 Tollway	Infrastructure	90 CnC	B	98	471	78850.6357	1.810	162.9145367	177.3958288
EX	Single Family Residential 1 acre	Residential	20 BIC	A	51	471	89893.979	2.064	41.27363592	105.2477716
EX	Single Family Residential 1 acre	Residential	20 CoC	B	68	471	223244.328	5.125	102.4996914	348.4989507
EX	Single Family Residential 1 acre	Residential	20 Fs	B	68	471	209393.661	4.807	96.14034	326.877156
EX	Single Family Residential 1 acre	Residential	20 Ss	D	84	471	22785.3929	0.523	10.46161291	43.93877423
EX	Single Family Residential 1/4 acre	Residential	38 CoC	B	75	471	298554.404	6.854	260.4469847	514.0399514
EX	Single Family Residential 1/4 acre	Residential	38 Fs	B	75	471	422.5987	0.010	0.368658187	0.727614842
EX	Single Family Residential 1/4 acre	Residential	38 Ss	D	87	471	6621.72977	0.152	5.776531935	13.22521785
EX	Commercial	Commercial	85 CoC	B	92	471	62167.6314	1.427	121.3096571	131.2998642
EX	Commercial	Commercial	85 Ss	D	95	471	24504.2861	0.563	47.81598522	53.44139525
EX	Commercial	Commercial	85 CoC	B	92	471	121151.745	2.781	236.4072153	255.8760448
EX	Commercial	Commercial	85 CnC	B	92	471	631564.363	14.499	1232.391433	1333.882492
EX	Single Family Residential 1/8 acre	Residential	65 Ss	D	92	471	5189.82968	0.119	7.744236208	10.96107279
EX	Single Family Residential 1/8 acre	Residential	65 CnC	B	85	471	157356.311	3.612	234.8062491	307.0543257
EX	Single Family Residential 2 acres	Residential	12 CoC	B	65	471	12265.9675	0.282	3.379054419	18.30321144
EX	Single Family Residential 1 acre	Residential	20 CoC	B	68	471	44208.8713	1.015	20.29792072	69.01293046
EX	Light Industrial	Commercial	72 CoC	B	88	471	43472.6257	0.998	71.85557964	87.82348622
EX	Rural Residential	Residential	5 BIC	A	39	471	217522.632	4.994	24.96816251	194.7516676
EX	Single Family Residential 1/4 acre	Residential	38 CoC	B	75	471	210.941126	0.005	0.184016593	0.363190643
EX	Major Thoroughfare	Infrastructure	90 SegB	B	98	471	52083.3856	1.196	107.6103008	117.1756608
EX	Major Thoroughfare	Infrastructure	90 CoC	B	98	471	398709.884	9.153	823.7807512	897.0057069
EX	Major Thoroughfare	Infrastructure	90 CnC	B	98	471	36055.7559	0.828	74.49536348	81.11717356
EX	Major Thoroughfare	Infrastructure	90 BIC	A	98	471	87122.3393	2.000	180.0048332	196.0052628
EX	Major Thoroughfare	Infrastructure	90 CnC	B	98	471	210.954849	0.005	0.435857126	0.474599982
EX	Major Thoroughfare	Infrastructure	90 CoC	B	98	471	625794.525	14.366	1292.963894	1407.894018
EX	Major Thoroughfare	Infrastructure	90 CnC	B	98	471	9416.23139	0.216	19.45502354	21.18435896
EX	Major Thoroughfare	Infrastructure	90 Fs	B	98	471	279679.173	6.421	577.8495315	629.2139343
WD	Woods - Good	Undeveloped	0 CoC	B	55	471	149609.196	3.435	0	188.9005
WD	Woods - Good	Undeveloped	0 Ro	B	55	471	382.520264	0.009	0	0.482980132
WD	Woods - Good	Undeveloped	0 CnC	B	55	471	376409.386	8.641	0	475.2643767
WD	Woods - Good	Undeveloped	0 CoC	B	55	471	596020.986	13.683	0	752.5517504
WD	Woods - Good	Undeveloped	0 Ss	D	77	471	4731.21579	0.109	0	8.363260227
PAS	Pasture - Good	Undeveloped	0 CnC	B	61	471	130296.449	2.991	0	182.462888
PAS	Pasture - Good	Undeveloped	0 SegB	B	61	471	109725.113	2.519	0	153.6554618
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	471	800316.875	18.373	0	1120.737588
PAS	Pasture - Good	Undeveloped	0 CnC	B	61	471	25229.4758	0.579	0	35.33053319
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	471	50300.3164	1.155	0	70.43891877
PAS	Pasture - Good	Undeveloped	0 Fs	B	61	471	29643.5544	0.681	0	41.51186452
WD	Woods - Good	Undeveloped	0 CoC	B	55	471	276792.755	6.354	0	349.4858021
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	471	120934.692	2.776	0	169.3529896
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	471	40969.4172	0.941	0	57.37223252
WD	Woods - Good	Undeveloped	0 SegB	B	55	471	9273.04206	0.213	0	11.70838644
WD	Woods - Good	Undeveloped	0 CoC	B	55	471	212565.436	4.880	0	268.3907019
WD	Woods - Good	Undeveloped	0 CnC	B	55	471	136681.709	3.138	0	172.5779157
WD	Woods - Good	Undeveloped	0 Fs	B	55	471	55844.4119	1.282	0	70.51062113
WD	Woods - Good	Undeveloped	0 CoC	B	55	471	65653.4277	1.507	0	82.89574204
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	471	103849.47	2.384	0	145.4274026
PAS	Pasture - Good	Undeveloped	0 Ss	D	80	471	93946.742	2.157	0	172.5376345
PAS	Pasture - Good	Undeveloped	0 CnC	B	61	471	125683.68	2.885	0	176.003317
PAS	Pasture - Good	Undeveloped	0 SegB	B	61	471	194996.314	4.476	0	273.0664639
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	471	77677.0443	1.783	0	108.7763935
WD	Woods - Good	Undeveloped	0 CoC	B	55	471	38569.113	0.885	0	48.69837499
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	471	76058.3962	1.746	0	106.5096917
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	471	121521.846	2.790	0	170.1752204
WD	Woods - Good	Undeveloped	0 CoC	B	55	471	469121.63	10.770	0	592.3252905
WD	Woods - Good	Undeveloped	0 SegB	B	55	471	92036.0213	2.113	0	116.2070976
WD	Woods - Good	Undeveloped	0 Ss	D	77	471	27508.4611	0.632	0	48.62606754
WD	Woods - Good	Undeveloped	0 Ss	D	77	471	27821.1231	0.639	0	49.17875298
WD	Woods - Good	Undeveloped	0 CoC	B	55	471	1648718.17	37.849	0	2081.714855
WD	Woods - Good	Undeveloped	0 SplB	D	77	471	4381.63118	0.101	0	7.74530764
WD	Woods - Good	Undeveloped	0 CnC	B	55	471	1343695.92	30.847	0	1696.585762
PAS	Pasture - Good	Undeveloped	0 Ss	D	80	471	74690.3393	1.715	0	137.1723403
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	471	24981.5837	0.573	0	34.9833931
PAS	Pasture - Good	Undeveloped	0 CnC	B	61	471	1294.19268	0.030	0	1.81234512
WD	Woods - Good	Undeveloped	0 CnC	B	55	471	89678.9145	2.059	0	113.2309527
EX	Open Space	Parks & Open Space	0 CoC	B	61	471	40844.863	0.938	0	57.19781092

42.17 74.74 471 620.375 26158.540 46366.237

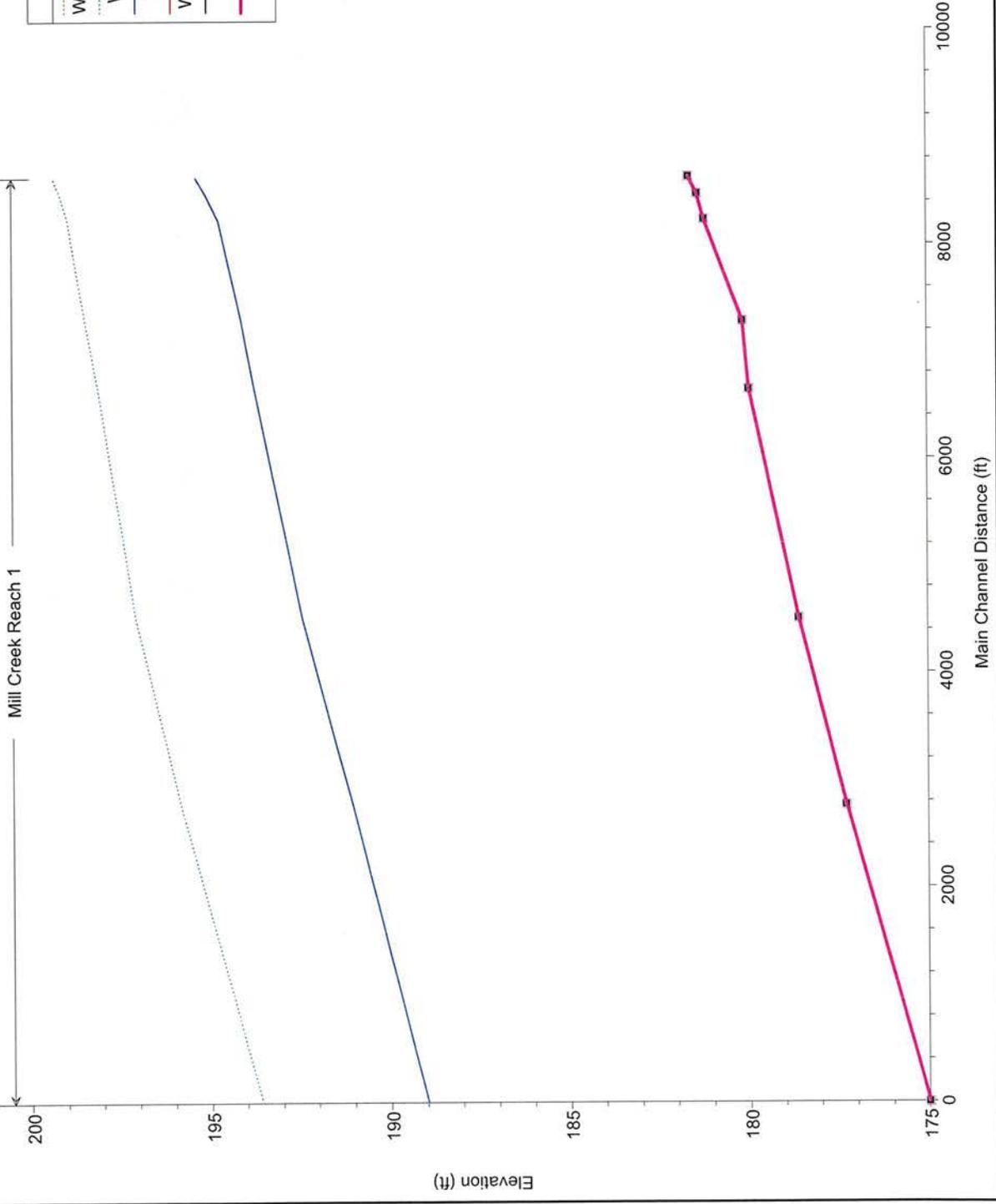
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	472	9159.52587	0.210	18.92464023	20.60683047
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	472	22524.6872	0.517	46.53860994	50.67537527
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	472	26233.4819	0.602	54.20140897	59.01931199
RD	Major Thoroughfare	Infrastructure	90 CoC	B	98	472	255160.911	5.858	527.1919651	574.0534731
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	472	49563.8615	1.138	102.4046726	111.5073102
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	472	21902.591	0.503	45.25328729	49.27580172
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	472	15389.2315	0.353	31.7959329	34.62223805
RD	Major Thoroughfare	Infrastructure	90 BoyC	A	98	472	2621.99977	0.060	5.417354906	5.898897565
RD	Major Thoroughfare	Infrastructure	90 CoC	B	98	472	5333.73979	0.122	11.02012354	11.99969008
RP	Pad Retail	Commercial	85 BoyC	A	89	472	129297.977	2.968	252.3032157	264.1763082
RP	Pad Retail	Commercial	85 CoC	B	92	472	663.941337	0.015	1.295569643	1.402263614
RP	Pad Retail	Commercial	85 Bb	B/D	95	472	223.201276	0.005	0.43553968	0.486779642
OS	Open Space	Parks & Open Space	0 BoyC	A	39	472	666.1219	0.015	0	0.596390131
OS	Open Space	Parks & Open Space	0 CoC	B	61	472	3145.94276	0.072	0	4.405475403
SR	Special Residential	Residential	38 CoC	B	75	472	63145.4375	1.450	55.08555155	108.7214833
FW	Floodway	Infrastructure	0 BoyC	A	30	472	1850.29109	0.042	0	1.274305159
FW	Floodway	Infrastructure	0 Bb	B/D	77	472	3979.81803	0.091	0	7.035031872
FP	Floodplain	Infrastructure	0 BoyC	A	30	472	24435.2407	0.561	0	16.82867817
FP	Floodplain	Infrastructure	0 CoC	B	55	472	44462.5072	1.021	0	56.13952935
FP	Floodplain	Infrastructure	0 Bb	B/D	77	472	78677.4397	1.806	0	139.0762823
RP	Pad Retail	Commercial	85 Fs	B	92	472	304.907847	0.007	0.594976285	0.643974332
RP	Pad Retail	Commercial	85 CoC	B	92	472	2147.89331	0.049	4.191251863	4.536413781
OS	Open Space	Parks & Open Space	0 CoC	B	61	472	3208.35728	0.074	0	4.492878659
SFR	Single Family Residential	Residential	38 LeIA	C/D	87	472	55.0858351	0.001	0.048054677	0.110019919
SFR	Single Family Residential	Residential	38 CoC	B	75	472	347287.029	7.973	302.9593002	597.9459872
SFR	Single Family Residential	Residential	38 Ro	B	75	472	622802.888	14.298	543.3083043	1072.319022
SFR	Single Family Residential	Residential	38 CoC	B	75	472	535793.964	12.300	467.4052029	922.5102689
DR	Drainage	Infrastructure	0 CoC	B	55	472	8056.62415	0.185	0	10.17250524
DR	Drainage	Infrastructure	0 Bb	B/D	77	472	17705.837	0.406	0	31.29819676
SFR	Single Family Residential	Residential	38 CoC	B	75	472	100140.666	2.299	87.35870802	172.4185027
SFR	Single Family Residential	Residential	38 Ss	D	87	472	482463.558	11.076	420.8818918	963.5980154
DSP	Drill Site Proposed	Wells & Pipelines	72 CoC	B	88	472	109230.173	2.508	180.5457397	220.6670152
DSP	Drill Site Proposed	Wells & Pipelines	72 Ss	D	93	472	73724.6125	1.692	121.8588636	157.4010321
OS	Open Space	Parks & Open Space	0 CoC	B	61	472	53212.1493	1.222	0	74.51655429
MF	Multi-Family	Residential	85 CnC	B	92	472	5041.63708	0.116	9.837905224	10.64808565
MF	Multi-Family	Residential	85 CoC	B	92	472	257245.804	5.906	501.9718396	543.3106969
MF	Multi-Family	Residential	85 Ss	D	95	472	105392.514	2.419	205.6557327	229.8505248
PL	Pipeline	Wells & Pipelines	0 CoC	B	61	472	30096.7598	0.691	0	42.1465185
PL	Pipeline	Wells & Pipelines	0 CoC	B	61	472	4527.77271	0.104	0	6.340544886
PL	Pipeline	Wells & Pipelines	0 Bb	B/D	80	472	12038.9272	0.276	0	22.1100591
GL	Gathering Lines (30-ft Easement)	Wells & Pipelines	72 CoC	B	85	472	61772.8499	1.418	102.1038842	120.5393077
GL	Gathering Lines (30-ft Easement)	Wells & Pipelines	72 Bb	B/D	91	472	15794.1324	0.363	26.10600397	32.99508835
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CnC	B	92	472	229919.607	5.278	448.6493714	485.5969666
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 Ss	D	95	472	216471.563	4.970	422.4077798	457.1943028
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B	92	472	10776.9049	0.247	21.02931394	23.50335087
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 Bb	B/D	95	472	570.757495	0.013	1.113737078	1.244764969
DR	Drainage	Infrastructure	0 CoC	B	55	472	366506.657	8.414	0	462.760931
DR	Drainage	Infrastructure	0 Bb	B/D	77	472	210479.313	4.832	0	372.0593912
OS	Open Space	Parks & Open Space	0 CoC	B	61	472	55491.0879	1.274	0	77.70790548
OS	Open Space	Parks & Open Space	0 Bb	B/D	80	472	82.3066244	0.002	0	0.151160008
RD	SH249 Tollway	Infrastructure	90 Fs	B	98	472	17429.9587	0.400	36.01231143	39.21340578
RD	SH249 Tollway	Infrastructure	90 BoyC	A	98	472	19077.5897	0.438	39.41650772	42.9201973
RD	SH249 Tollway	Infrastructure	90 CnC	B	98	472	38351.1479	0.880	79.23790885	86.28127853
RD	SH249 Tollway	Infrastructure	90 CoC	B	98	472	377380.727	8.663	779.7122457	849.0200009
RD	SH249 Tollway	Infrastructure	90 Bb	B/D	98	472	99066.7542	2.274	204.6833764	222.8774543
MF	Multi-Family	Residential	85 CoC	B	92	472	123005.405	2.824	240.0243206	259.7910293
MF	Multi-Family	Residential	85 Ss	D	95	472	141827.373	3.256	276.7522205	309.3113053
SFR	Single Family Residential	Residential	38 Ss	D	87	472	573868.664	13.174	500.6200466	1146.156423
SFR	Single Family Residential	Residential	38 CoC	B	75	472	603993.597	13.866	526.8998317	1039.933878
SFR	Single Family Residential	Residential	38 Ss	D	87	472	182107.925	4.181	158.8636628	363.7141754
ES	Elementary School	Civic/Institutional	65 CoC	B	85	472	94588.2167	2.171	141.1440331	184.5729664
ES	Elementary School	Civic/Institutional	65 Ss	D	92	472	3759.28613	0.086	5.609586741	7.939722772
SFR	Single Family Residential	Residential	38 Ss	D	87	472	42711.9281	0.981	37.26017607	85.30619257
SFR	Single Family Residential	Residential	38 CoC	B	75	472	855547.137	19.641	746.3450686	1473.049478
PL	Pipeline	Wells & Pipelines	0 CoC	B	61	472	13555.0545	0.311	0	18.98205516
MS	Middle School	Civic/Institutional	65 Ss	D	92	472	195911.092	4.497	292.3374881	413.7699832
MS	Middle School	Civic/Institutional	65 CoC	B	85	472	190930.207	4.383	284.9050381	372.5681268
SFR	Single Family Residential	Residential	38 CoC	B	75	472	358545.44	8.231	312.7806867	617.3303027
SFR	Single Family Residential	Residential	38 Ss	D	87	472	126003.121	2.893	109.9200782	251.6591264
FP	Floodplain	Infrastructure	0 CoC	B	55	472	105984.308	2.433	0	133.8185707
GL	Gathering Lines (30-ft Easement)	Wells & Pipelines	72 CoC	B	85	472	42449.4942	0.975	70.16445315	82.83303497
GL	Gathering Lines (30-ft Easement)	Wells & Pipelines	72 Ro	B	85	472	16072.385	0.369	26.56592567	31.36255113
DSP	Drill Site Proposed	Wells & Pipelines	72 LeIA	C/D	93	472	34161.4127	0.784	56.46514502	72.93414566
DSP	Drill Site Proposed	Wells & Pipelines	72 Ro	B	88	472	79827.5834	1.833	131.9464188	161.2678452
CH	Church	Civic/Institutional	65 LeIA	C/D	92	472	22829.7514	0.524	34.06643344	48.21710579
CH	Church	Civic/Institutional	65 Ro	B	85	472	88553.5969	2.033	132.1392057	172.7974228
CH	Church	Civic/Institutional	65 Ro	B	85	472	58663.1276	1.347	87.53680656	114.4712086
W-U	Wetlands in Uplands	Infrastructure	0 LeIA	C/D	77	472	237043.492	5.442	0	419.0162737
W-U	Wetlands in Uplands	Infrastructure	0 LeIA	C/D	77	472	54229.5671	1.245	0	95.86034582
W-U	Wetlands in Uplands	Infrastructure	0 Ro	B	55	472	185649.889	4.262	0	234.4064252
EX	Single Family Residential 1/4 acre	Residential	38 CoC	B	75	472	1252018.82	28.742	1092.211091	2155.679784
EX	Single Family Residential 1/4 acre	Residential	38 Ro	B	75	472	1619788.69	37.185	1413.038799	2788.892367
EX	Single Family Residential 1/4 acre	Residential	38 SpIB	D	87	472	863.68496	0.020	0.75344418	1.724990622
EX	Major Thoroughfare	Infrastructure	90 CoC	B	98	472	3599.98062	0.083	7.437976486	8.099129951

EX	Major Thoroughfare	Infrastructure	90 Ro	B	98	472	5856.53866	0.134	12.10028649	13.17586751
EX	Single Family Residential 2 acres	Residential	12 Ro	B	65	472	66648.9091	1.530	18.36058103	99.45314723
EX	Major Thoroughfare	Infrastructure	90 LeIA	C/D	98	472	2235.59794	0.051	4.619004014	5.029582148
EX	Major Thoroughfare	Infrastructure	90 Ro	B	98	472	58997.3972	1.354	121.8954488	132.7305998
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	824762.317	18.934	0	1457.913187
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	298729.24	6.858	0	528.0567369
WD	Woods - Good	Undeveloped	0 CoC	B	55	472	4199660.5	96.411	0	5302.601645
WD	Woods - Good	Undeveloped	0 W		100	472	175278.711	4.024	0	402.3845534
WD	Woods - Good	Undeveloped	0 LeIA	C/D	77	472	469912.443	10.788	0	830.6533089
WD	Woods - Good	Undeveloped	0 Ro	B	55	472	1286409.44	29.532	0	1624.254344
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	63555.934	1.459	0	112.3463479
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	44760.9808	1.028	0	79.12294593
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	4887.59239	0.112	0	8.639683515
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	52947.5737	1.216	0	93.59419585
WD	Woods - Good	Undeveloped	0 CnC	B	55	472	172427.748	3.958	0	217.7118031
WD	Woods - Good	Undeveloped	0 CoC	B	55	472	4510251.39	103.541	0	5694.761861
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	635404.431	14.587	0	1123.189651
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	195305.831	4.484	0	345.2375792
WD	Woods - Good	Undeveloped	0 Bb	B/D	77	472	301574.901	6.923	0	533.0869468
PAS	Pasture - Good	Undeveloped	0 CnC	B	61	472	73563.411	1.689	0	103.015796
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	472	74283.2273	1.705	0	104.0238031
PAS	Pasture - Good	Undeveloped	0 CoC	B	61	472	236017.867	5.418	0	330.511706
PAS	Pasture - Good	Undeveloped	0 Bb	B/D	80	472	59024.472	1.355	0	108.4012342
WD	Woods - Good	Undeveloped	0 CoC	B	55	472	43432.3227	0.997	0	54.83879134
WD	Woods - Good	Undeveloped	0 Ro	B	55	472	12023.7163	0.276	0	15.18146
WD	Woods - Good	Undeveloped	0 Ss	D	77	472	21488.656	0.493	0	37.98499802
			21.42		69.68	472		607.108	13001.721	42302.272
OS	Open Space	Parks & Open Space	0 CnC	B	61	473	3718.27631	0.085	0	5.206952591
OS	Open Space	Parks & Open Space	0 CoC	B	61	473	1935.78645	0.044	0	2.710812069
RD	Major Thoroughfare	Infrastructure	90 CnC	B	98	473	15096.5489	0.347	31.19121671	33.96376931
RD	Major Thoroughfare	Infrastructure	90 CoC	B	98	473	40530.302	0.930	83.74029344	91.18387508
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	473	8622.91451	0.198	17.81593907	19.39957809
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B	92	473	27803.0335	0.638	54.25293505	58.72082382
MF	Multi-Family	Residential	85 CoC	B	92	473	302248.793	6.939	589.7875888	638.3583314
SR	Special Residential	Residential	38 CoC	B	75	473	84491.7396	1.940	73.70721085	145.4747583
SR	Special Residential	Residential	38 CoC	B	75	473	59723.5064	1.371	52.10039582	102.8297286
OS	Open Space	Parks & Open Space	0 CoC	B	61	473	25323.2026	0.581	0	35.46178503
SFR	Single Family Residential	Residential	38 BoyC	A	61	473	47818.8716	1.098	41.7152691	66.9639846
SFR	Single Family Residential	Residential	38 CoC	B	75	473	266401.566	6.116	232.3980607	458.6803829
RD	Major Thoroughfare	Infrastructure	90 BoyC	A	98	473	27303.5728	0.627	56.41234058	61.42677085
RD	Major Thoroughfare	Infrastructure	90 CoC	B	98	473	362396.086	8.319	748.7522438	815.3079988
OS	Open Space	Parks & Open Space	0 CoC	B	61	473	23889.673	0.548	0	33.45431715
OS	Open Space	Parks & Open Space	0 CoC	B	61	473	27095.8522	0.622	0	37.94414563
RP	Pad Retail	Commercial	85 BoyC	A	89	473	81614.4632	1.874	159.2568726	166.7513137
RP	Pad Retail	Commercial	85 CoC	B	92	473	2049.51224	0.047	3.999277792	4.328630081
ES	Elementary School	Civic/Institutional	65 BoyC	A	77	473	314482.914	7.220	469.2697287	555.9041401
ES	Elementary School	Civic/Institutional	65 CoC	B	85	473	143917.987	3.304	214.753654	280.8317014
ES	Elementary School	Civic/Institutional	65 Bb	B/D	92	473	68009.5066	1.561	101.4834236	143.6380764
PK	Parks & Recreation	Parks & Open Space	5 BoyC	A	39	473	97019.8488	2.227	11.13634628	86.86350098
PK	Parks & Recreation	Parks & Open Space	5 CoC	B	61	473	2323.7854	0.053	0.266733861	3.25415311
PK	Parks & Recreation	Parks & Open Space	5 Bb	B/D	80	473	13346.2375	0.306	1.531937266	24.51099625
FP	Floodplain	Infrastructure	0 BoyC	A	30	473	39390.7451	0.904	0	27.12861233
FP	Floodplain	Infrastructure	0 CoC	B	55	473	9382.48379	0.215	0	11.84657045
FP	Floodplain	Infrastructure	0 Bb	B/D	77	473	31306.3217	0.719	0	55.3394575
SR	Special Residential	Residential	38 CoC	B	75	473	990928.238	22.749	864.446121	1706.14366
SR	Special Residential	Residential	38 Bb	B/D	87	473	18000.4536	0.413	15.70287501	35.9513191
FP	Floodplain	Infrastructure	0 Fs	B	55	473	365.75477	0.008	0	0.461811579
FP	Floodplain	Infrastructure	0 CoC	B	55	473	318.696561	0.007	0	0.402394648
FP	Floodplain	Infrastructure	0 Bb	B/D	77	473	9613.10925	0.221	0	16.99286989
FW	Floodway	Infrastructure	0 BoyC	A	30	473	102543.747	2.354	0	70.62241498
FW	Floodway	Infrastructure	0 CoC	B	55	473	173990.616	3.994	0	219.6851208
FW	Floodway	Infrastructure	0 Bb	B/D	77	473	437820.843	10.051	0	773.9257327
FP	Floodplain	Infrastructure	0 BoyC	A	30	473	42483.788	0.975	0	29.25880715
FP	Floodplain	Infrastructure	0 CoC	B	55	473	213783.78	4.908	0	269.9290148
FP	Floodplain	Infrastructure	0 Bb	B/D	77	473	179.808431	0.004	0	0.317843187
W-FW	Wetlands in Floodway	Infrastructure	0 CoC	B	55	473	1.42916822	0.000	0	0.001804505
W-FW	Wetlands in Floodway	Infrastructure	0 Bb	B/D	77	473	3111.78922	0.071	0	5.500637516
MF	Multi-Family	Residential	85 CoC	B	92	473	349051.181	8.013	681.1145636	737.2063512
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B	92	473	286813.944	6.584	559.6690831	605.7594782
RP	Pad Retail	Commercial	85 BoyC	A	89	473	2947.54314	0.068	5.751633766	6.022298885
FP	Floodplain	Infrastructure	0 CoC	B	55	473	8858.15919	0.203	0	11.18454443
FP	Floodplain	Infrastructure	0 CoC	B	55	473	35593.0867	0.817	0	44.94076599
FW	Floodway	Infrastructure	0 CoC	B	55	473	13992.6731	0.321	0	17.66751656
OS	Open Space	Parks & Open Space	0 CoC	B	61	473	10026.6253	0.230	0	14.04095828
OS	Open Space	Parks & Open Space	0 BoyC	A	39	473	9837.80671	0.226	0	8.807953662
OS	Open Space	Parks & Open Space	0 CoC	B	61	473	8029.4907	0.184	0	11.24423629
OS	Open Space	Parks & Open Space	0 W		100	473	3121.2047	0.072	0	7.165300044
OS	Open Space	Parks & Open Space	0 CnC	B	61	473	5706.40243	0.131	0	7.991059419
MF	Multi-Family	Residential	85 CnC	B	92	473	376.825993	0.009	0.735312428	0.795867569
MF	Multi-Family	Residential	85 Ss	D	95	473	17522.535	0.402	34.19227439	38.21489491
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CnC	B	92	473	119490.112	2.743	233.1648195	252.3666282
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B	92	473	36275.6356	0.833	70.78579029	76.61520831
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 Ss	D	95	473	6167.29554	0.142	12.03443803	13.45025427
RD	SH249 Tollway	Infrastructure	90 CnC	B	98	473	93748.9476	2.152	193.6961727	210.9136103
RD	SH249 Tollway	Infrastructure	90 CoC	B	98	473	505630.907	11.608	1044.691956	1137.553463

RP	Pad Retail	Commercial	85 CnC	B	92	473	1316.05383	0.030	2.568057293	2.779544364
RP	Pad Retail	Commercial	85 CoC	B	92	473	132471.079	3.041	258.4949896	279.7828123
RP	Pad Retail	Commercial	85 Ss	D	95	473	12115.136	0.278	23.64064656	26.4218991
MF	Multi-Family	Residential	85 CnC	B	92	473	7.08776955	0.000	0.013830588	0.014969578
MF	Multi-Family	Residential	85 CoC	B	92	473	77119.085	1.770	150.4848996	162.8777737
MF	Multi-Family	Residential	85 Ss	D	95	473	70180.7161	1.611	136.9458418	153.0571173
SFR	Single Family Residential	Residential	38 Ss	D	87	473	90424.3133	2.076	78.88255061	180.5995238
DSE	Drill Site Existing	Wells & Pipelines	72 Ss	D	93	473	6769.17947	0.155	11.1887264	14.45210493
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B	92	473	143557.947	3.296	280.1291443	303.1986032
WD	Woods - Good	Undeveloped	0 CoC	B	55	473	539505.782	12.385	0	681.1941697
WD	Woods - Good	Undeveloped	0 Ss	D	77	473	524092.747	12.032	0	926.4265729
			45.79		78.49	473		166.004	7601.905	13029.424
OS	Open Space	Parks & Open Space	0 CoC	B	61	474	45075.3263	1.035	0	63.1220134
OS	Open Space	Parks & Open Space	0 CoC	B	61	474	5624.64903	0.129	0	7.876574629
OS	Open Space	Parks & Open Space	0 CoC	B	61	474	5624.65	0.129	0	7.876575993
OS	Open Space	Parks & Open Space	0 CnC	B	61	474	3807.07218	0.087	0	5.331299424
OS	Open Space	Parks & Open Space	0 CnC	B	61	474	5578.90906	0.128	0	7.812521875
HDR	Town Center High Density Residential	Residential	85 CoC	B	92	474	46081.5686	1.058	89.92041626	97.32562702
HDR	Town Center High Density Residential	Residential	85 SPlB	D	95	474	4340.61138	0.100	8.469971696	9.466438954
HDR	Town Center High Density Residential	Residential	85 Fs	B	92	474	159.144164	0.004	0.310543019	0.33611715
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	474	266.008449	0.006	0.549604234	0.598457944
RD	Major Thoroughfare	Infrastructure	90 CoC	B	98	474	443103.527	10.172	915.5031559	996.8812142
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	474	44477.9399	1.021	91.89657012	100.0651541
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	474	5588.74774	0.128	11.54699947	12.57339942
RD	Major Thoroughfare	Infrastructure	90 Ss	D	98	474	23062.9231	0.529	47.65066766	51.88628257
RD	Major Thoroughfare	Infrastructure	90 CnC	B	98	474	11876.8945	0.273	24.53903823	26.72028607
RD	Major Thoroughfare	Infrastructure	90 WkC	A	98	474	1862.00124	0.043	3.847109993	4.189075326
RD	Major Thoroughfare	Infrastructure	90 Fs	B	98	474	6967.52679	0.160	14.39571651	15.67533576
RD	Major Thoroughfare	Infrastructure	90 CoC	B	98	474	74537.2676	1.711	154.0026189	167.6917406
RD	Major Thoroughfare	Infrastructure	90 SPlB	D	98	474	429.09385	0.010	0.886557541	0.965362656
SR	Special Residential	Residential	38 CoC	B	75	474	371288.045	8.524	323.8968255	639.2700504
PK	Parks & Recreation	Parks & Open Space	5 Fs	B	61	474	17022.4178	0.391	1.95390471	23.83763746
SR	Special Residential	Residential	38 WkC	A	61	474	34431.687	0.790	30.03682525	48.21700895
SR	Special Residential	Residential	38 Fs	B	75	474	311727.397	7.156	271.9385006	536.7207249
SR	Special Residential	Residential	38 CoC	B	75	474	103113.889	2.367	89.95242809	177.537687
FP	Floodplain	Infrastructure	0 CoC	B	55	474	92118.4717	2.115	0	116.3112016
FP	Floodplain	Infrastructure	0 CoC	B	55	474	260147.309	5.972	0	328.4688248
FP	Floodplain	Infrastructure	0 Bb	B/D	77	474	8855.71439	0.203	0	15.65404058
FW	Floodway	Infrastructure	0 Bb	B/D	77	474	14376.0404	0.330	0	25.41219258
FP	Floodplain	Infrastructure	0 CoC	B	55	474	5246.1327	0.120	0	6.623904918
FP	Floodplain	Infrastructure	0 CoC	B	55	474	7776.95241	0.179	0	9.819384356
TCO	Town Center Retail/Office	Mixed-Use	85 CnC	B	92	474	1512.9597	0.035	2.952285919	3.195415348
TCO	Town Center Retail/Office	Mixed-Use	85 CnC	B	92	474	26552.4924	0.610	51.81271466	56.0796441
TCO	Town Center Retail/Office	Mixed-Use	85 CoC	B	92	474	36202.8417	0.831	70.64374522	76.46146542
HDR	Town Center High Density Residential	Residential	85 CoC	B	92	474	115467.379	2.651	225.3151341	243.8704981
SFR	Single Family Residential	Residential	38 CoC	B	75	474	395034.168	9.069	344.6119923	680.1552479
SFR	Single Family Residential	Residential	38 Ro	B	75	474	53440.5526	1.227	46.6193985	92.01197073
RD	SH249 Tollway	Infrastructure	90 CnC	B	98	474	111174.387	2.552	229.6991459	250.1168477
RD	SH249 Tollway	Infrastructure	90 CoC	B	98	474	381233.416	8.752	787.6723462	857.6876659
FP	Floodplain	Infrastructure	0 CoC	B	55	474	77686.585	1.783	0	98.08912246
SFR	Single Family Residential	Residential	38 CoC	B	75	474	364918.039	8.377	318.339887	628.3024087
SFR	Single Family Residential	Residential	38 Ss	D	87	474	393247.171	9.028	343.053088	785.4110172
DSE	Drill Site Existing	Wells & Pipelines	72 CoC	B	88	474	43314.1996	0.994	71.59371831	87.50343349
DSE	Drill Site Existing	Wells & Pipelines	72 Ss	D	93	474	59249.6555	1.360	97.9333149	126.4971984
ES	Elementary School	Civic/Institutional	65 CoC	B	85	474	323444.973	7.425	482.6428666	631.1483641
ES	Elementary School	Civic/Institutional	65 Ss	D	92	474	158111.727	3.630	235.9334767	333.9366132
SFR	Single Family Residential	Residential	38 CoC	B	75	474	531595.68	12.204	463.7427878	915.2818179
SFR	Single Family Residential	Residential	38 CoC	B	75	474	1524820.4	35.005	1330.192269	2625.379478
SFR	Single Family Residential	Residential	38 CnC	B	75	474	233197.064	5.353	203.4317823	401.5100967
SFR	Single Family Residential	Residential	38 Ss	D	87	474	219734.695	5.044	191.6877501	438.8640593
PL	Pipeline	Wells & Pipelines	0 CoC	B	61	474	3093.45138	0.071	0	4.331968182
SFR	Single Family Residential	Residential	38 CoC	B	75	474	17230.2712	0.396	15.03099873	29.6664485
PL	Pipeline	Wells & Pipelines	0 CoC	B	61	474	35947.4761	0.825	0	50.33967034
CH	Church	Civic/Institutional	65 CnC	B	85	474	72024.7265	1.653	107.4749132	140.5441173
CH	Church	Civic/Institutional	65 CoC	B	85	474	792149.927	18.185	1182.041903	1545.747103
DSE	Drill Site Existing	Wells & Pipelines	72 CoC	B	88	474	28747.0859	0.660	47.51584443	58.07492096
DSE	Drill Site Existing	Wells & Pipelines	72 CnC	B	88	474	167.396726	0.004	0.276688803	0.338175203
GL	Gathering Lines (30-ft Easement)	Wells & Pipelines	72 CoC	B	85	474	15766.2222	0.362	26.05987133	30.76512587
GL	Gathering Lines (30-ft Easement)	Wells & Pipelines	72 CnC	B	85	474	24961.3321	0.573	41.25840011	48.70783346
MS	Middle School	Civic/Institutional	65 Ss	D	92	474	12612.762	0.290	18.82069621	26.63852387
MS	Middle School	Civic/Institutional	65 CoC	B	85	474	765442.327	17.572	1142.188964	1493.631722
MS	Middle School	Civic/Institutional	65 Ss	D	92	474	59263.2518	1.360	88.43230865	125.1657292
FP	Floodplain	Infrastructure	0 CoC	B	55	474	133847.777	3.073	0	168.999719
FP	Floodplain	Infrastructure	0 Ss	D	77	474	3885.96637	0.089	0	6.869132467
SFR	Single Family Residential	Residential	38 CoC	B	75	474	191505.193	4.396	167.0614635	329.7265727
SFR	Single Family Residential	Residential	38 Ss	D	87	474	18578.2986	0.426	16.20696392	37.1054174
FP	Floodplain	Infrastructure	0 CoC	B	55	474	707047.152	16.232	0	892.7363024
FP	Floodplain	Infrastructure	0 Ss	D	77	474	2784.3024	0.064	0	4.92174666
FP	Floodplain	Infrastructure	0 Ss	D	77	474	6603.3522	0.152	0	11.67259227
SFR	Single Family Residential	Residential	38 CoC	B	75	474	223449.841	5.130	194.9286955	384.7276885
SFR	Single Family Residential	Residential	38 CoC	B	75	474	174264.588	4.001	152.0214499	300.0423354
SFR	Single Family Residential	Residential	38 Ss	D	87	474	91348.3364	2.097	79.68863136	182.4450244
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B	92	474	155851.113	3.578	304.1171854	329.1621301
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 CoC	B	92	474	689610.943	15.831	1345.659553	1456.478575
NR	Neighborhood Retail and/or Big Box Retail	Commercial	85 Ss	D	95	474	13168.2955	0.302	25.69570981	28.7187345

GL	Gathering Lines (30-ft Easement)	Wells & Pipelines	72 CoC	B	85	474	40309.4737	0.925	66.62722923	78.65714562
OS	Open Space	Parks & Open Space	0 CoC	B	61	474	6416.90414	0.147	0	8.986022784
GL	Gathering Lines (30-ft Easement)	Wells & Pipelines	72 CoC	B	85	474	2194.90217	0.050	3.627937465	4.282981729
EX	Single Family Residential 1/2 acre	Residential	25 CoC	B	70	474	405488.239	9.309	232.7182273	651.6110365
EX	Single Family Residential 1/2 acre	Residential	25 CnC	B	70	474	16040.0727	0.368	9.205735043	25.77605812
EX	Single Family Residential 2 acres	Residential	12 CnC	B	65	474	43950.2454	1.009	12.10750561	65.58232206
WD	Woods - Good	Undeveloped	0 CoC	B	55	474	8704.39837	0.200	0	10.99040198
WD	Woods - Good	Undeveloped	0 Ss	D	77	474	650.288003	0.015	0	1.149498995
			47.60		79.11	474		270.147	12857.942	21370.361
PK	Parks & Recreation	Parks & Open Space	5 Fs	B	61	475	2285.29766	0.052	0.262316077	3.200256139
CV	Civic	Civic/Institutional	85 Fs	B	92	475	32706.0994	0.751	63.82044188	69.07624298
TCR	Town Center Retail/Residential	Mixed-Use	85 WkC	A	89	475	44520.5559	1.022	86.87436289	90.9625682
TCR	Town Center Retail/Residential	Mixed-Use	85 Fs	B	92	475	25573.9842	0.587	49.90332082	54.01300607
HDR	Town Center High Density Residential	Residential	85 WkC	A	89	475	61089.4088	1.402	119.2056874	124.8153668
HDR	Town Center High Density Residential	Residential	85 Fs	B	92	475	70624.6271	1.621	137.8120593	149.1612877
SR	Special Residential	Residential	38 BoyC	A	61	475	46020.6665	1.056	40.14658693	64.44583691
SR	Special Residential	Residential	38 BIC	A	61	475	2161.31801	0.050	1.885447301	3.026639088
SFR	Single Family Residential	Residential	38 BoyC	A	61	475	1325443.37	30.428	1156.263726	1856.10756
SFR	Single Family Residential	Residential	38 CoC	B	75	475	32678.5727	0.750	28.50747852	56.26476023
SFR	Single Family Residential	Residential	38 BIC	A	61	475	799985.629	18.365	697.8754338	1120.273723
SFR	Single Family Residential	Residential	38 Bb	B/D	87	475	38412.9339	0.882	33.50990563	76.72004711
RD	Major Thoroughfare	Infrastructure	90 WkC	A	98	475	128234.256	2.944	264.9468096	288.4976371
RD	Major Thoroughfare	Infrastructure	90 Fs	B	98	475	7573.91748	0.174	15.64858984	17.0395756
RD	Major Thoroughfare	Infrastructure	90 BoyC	A	98	475	101078.874	2.320	208.8406478	227.4042609
RD	Major Thoroughfare	Infrastructure	90 CoC	B	98	475	4189.63472	0.096	8.656270086	9.425716316
RD	Major Thoroughfare	Infrastructure	90 Bb	B/D	98	475	25677.3105	0.589	53.05229438	57.76805388
PK	Parks & Recreation	Parks & Open Space	5 BoyC	A	39	475	114742.85	2.634	13.17066693	102.7312021
FP	Floodplain	Infrastructure	0 BoyC	A	30	475	32115.8774	0.737	0	22.11837287
FP	Floodplain	Infrastructure	0 Bb	B/D	77	475	437.497668	0.010	0	0.773354464
PK	Parks & Recreation	Parks & Open Space	5 WkC	A	39	475	34627.7364	0.795	3.974717214	31.00279427
PK	Parks & Recreation	Parks & Open Space	5 Fs	B	61	475	64269.7322	1.475	7.377150165	90.00123202
PK	Parks & Recreation	Parks & Open Space	5 BoyC	A	39	475	45420.0453	1.043	5.213503827	40.66532985
PK	Parks & Recreation	Parks & Open Space	5 Bb	B/D	80	475	109448.949	2.513	12.5630107	201.0081713
SR	Special Residential	Residential	38 WkC	A	61	475	73972.8398	1.698	64.53094381	103.5891466
SR	Special Residential	Residential	38 Fs	B	75	475	5132.77788	0.118	4.477629922	8.837427478
FP	Floodplain	Infrastructure	0 BoyC	A	30	475	4010.98172	0.092	0	2.762384104
FP	Floodplain	Infrastructure	0 Fs	B	55	475	499.045433	0.011	0	0.63010787
FP	Floodplain	Infrastructure	0 BoyC	A	30	475	2774.34249	0.064	0	1.910704197
FP	Floodplain	Infrastructure	0 Bb	B/D	77	475	20173.3878	0.463	0	35.66002885
FW	Floodway	Infrastructure	0 BoyC	A	30	475	228864.155	5.254	0	157.6199414
FW	Floodway	Infrastructure	0 Bb	B/D	77	475	111682.103	2.564	0	197.4178597
FP	Floodplain	Infrastructure	0 BoyC	A	30	475	51698.0821	1.187	0	35.60473974
FP	Floodplain	Infrastructure	0 BIC	A	30	475	32010.0028	0.735	0	22.04545649
FP	Floodplain	Infrastructure	0 Bb	B/D	77	475	176441.275	4.051	0	311.8911429
FP	Floodplain	Infrastructure	0 WkC	A	30	475	66540.4346	1.528	0	45.82674557
FW	Floodway	Infrastructure	0 BoyC	A	30	475	197590.274	4.536	0	136.0814556
FW	Floodway	Infrastructure	0 Bb	B/D	77	475	647958.522	14.875	0	1145.381225
FW	Floodway	Infrastructure	0 BoyC	A	30	475	2789.76175	0.064	0	1.92132352
SR	Special Residential	Residential	38 WkC	A	61	475	457583.986	10.505	399.1779493	640.7856554
SR	Special Residential	Residential	38 Fs	B	75	475	67082.8485	1.540	58.52039124	115.5007722
SR	Special Residential	Residential	38 BoyC	A	61	475	6232.95387	0.143	5.437379406	8.728424836
SR	Special Residential	Residential	38 Bb	B/D	87	475	46439.4637	1.066	40.51192884	92.75099498
DSP	Drill Site Proposed	Wells & Pipelines	72 WkC	A	81	475	175320.061	4.025	289.7852242	326.0083773
W-FW	Wetlands in Floodway	Infrastructure	0 WkC	A	30	475	2169.75543	0.050	0	1.494321919
W-FW	Wetlands in Floodway	Infrastructure	0 Bb	B/D	77	475	11449.5715	0.263	0	20.2391415
			30.46		64.26	475		127.129	3871.952	8169.190

Mill Creek Phase 1 Plan: 1) Aug2019 Post 8/15/2019 2) PRE-PROJ 4/2/2019



Legend

WS 100_YR - Aug2019 Post

WS 100_YR - PRE-PROJ

WS 10_YR - PRE-PROJ

WS 10_YR - Aug2019 Post

Ground

Ground

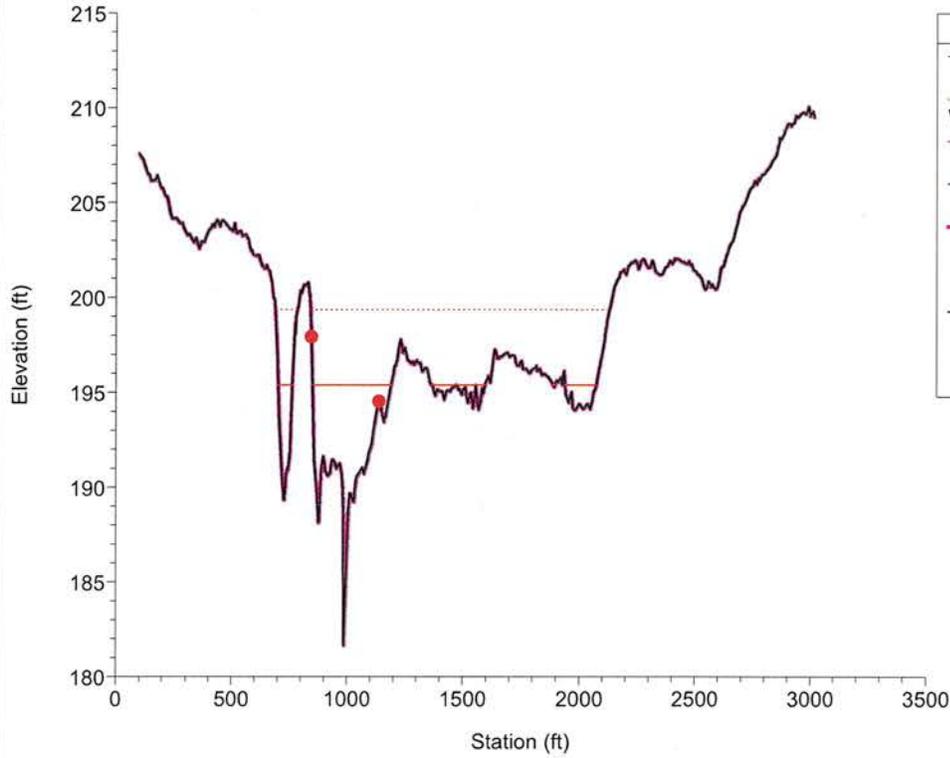
HEC-RAS River: Mill Creek Reach: Reach 1 Profile: 10_YR

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
Reach 1	69267	10_YR	PRE-PROJ	2395.00	181.65	196.38		195.42	0.001286	1.49	1885.09	766.74	0.12
Reach 1	69267	10_YR	Aug2019 Post	2395.00	181.65	195.38		195.42	0.001286	1.49	1885.09	766.74	0.12
Reach 1	69108	10_YR	PRE-PROJ	2395.00	181.41	195.10		195.16	0.002033	1.99	1570.60	741.27	0.15
Reach 1	69108	10_YR	Aug2019 Post	2395.00	181.41	195.10		195.16	0.002033	1.99	1570.60	741.27	0.15
Reach 1	68869	10_YR	PRE-PROJ	2395.00	181.22	194.76	190.35	194.79	0.001246	1.61	2260.76	968.62	0.12
Reach 1	68869	10_YR	Aug2019 Post	2395.00	181.22	194.76		194.79	0.001246	1.61	2260.76	968.62	0.12
Reach 1	67922	10_YR	PRE-PROJ	2395.00	180.16	194.12		194.13	0.000523	1.00	3254.48	1079.51	0.08
Reach 1	67922	10_YR	Aug2019 Post	2395.00	180.16	194.12		194.13	0.000523	1.00	3254.48	1079.51	0.08
Reach 1	67285	10_YR	PRE-PROJ	2395.00	179.99	193.76		193.78	0.000575	1.17	2690.99	840.72	0.08
Reach 1	67285	10_YR	Aug2019 Post	2395.00	179.99	193.76		193.78	0.000575	1.17	2690.99	840.72	0.08
Reach 1	65144	10_YR	PRE-PROJ	2395.00	178.62	192.44		192.47	0.000891	1.44	2414.31	781.12	0.10
Reach 1	65144	10_YR	Aug2019 Post	2395.00	178.62	192.44		192.47	0.000891	1.44	2414.31	781.12	0.10
Reach 1	63400	10_YR	PRE-PROJ	2460.00	177.30	191.05		191.08	0.000891	1.78	2399.50	596.47	0.11
Reach 1	63400	10_YR	Aug2019 Post	2460.00	177.30	191.05		191.08	0.000891	1.78	2399.50	596.47	0.11
Reach 1	60640	10_YR	PRE-PROJ	2464.00	175.00	189.00	182.81	189.02	0.000699	1.47	2840.52	916.28	0.09
Reach 1	60640	10_YR	Aug2019 Post	2464.00	175.00	189.00	182.81	189.02	0.000699	1.47	2840.52	916.28	0.09

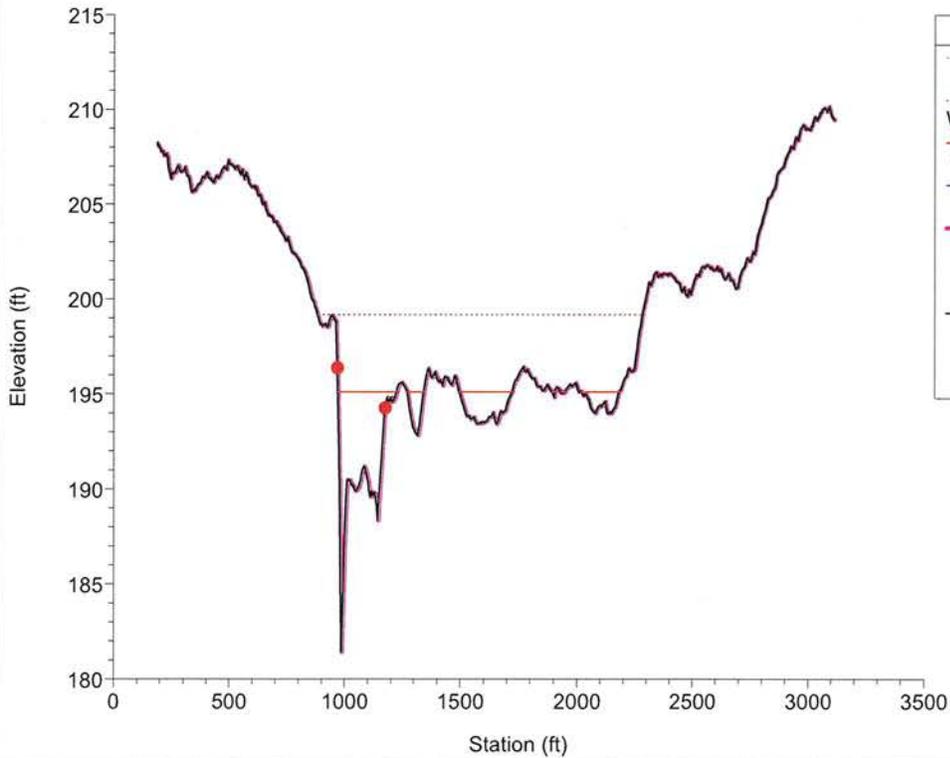
HEC-RAS River: Mill Creek Reach: Reach 1 Profile: 100_YR

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
Reach 1	69267	100_YR	PRE-PROJ	9036.00	181.65	199.37		199.41	0.001026	1.97	6688.23	1385.09	0.12
Reach 1	69267	100_YR	Aug2019 Post	9036.00	181.65	199.37		199.41	0.001027	1.97	6685.50	1385.00	0.12
Reach 1	69108	100_YR	PRE-PROJ	9036.00	181.41	199.18		199.22	0.001209	2.23	6583.78	1401.44	0.13
Reach 1	69108	100_YR	Aug2019 Post	9036.00	181.41	199.18		199.22	0.001210	2.23	6580.70	1401.36	0.13
Reach 1	68869	100_YR	PRE-PROJ	9036.00	181.22	198.97	193.00	199.00	0.000813	1.89	7871.28	1832.12	0.11
Reach 1	68869	100_YR	Aug2019 Post	9036.00	181.22	198.97		199.00	0.000814	1.89	7867.10	1691.14	0.11
Reach 1	67922	100_YR	PRE-PROJ	9036.00	180.16	198.50		198.52	0.000475	1.43	9789.93	1681.01	0.08
Reach 1	67922	100_YR	Aug2019 Post	9036.00	180.16	198.50		198.52	0.000475	1.43	9716.94	1635.79	0.08
Reach 1	67285	100_YR	PRE-PROJ	9036.00	179.99	198.13		198.16	0.000700	1.84	7117.63	1060.82	0.10
Reach 1	67285	100_YR	Aug2019 Post	9036.00	179.99	198.13		198.16	0.000699	1.84	7105.92	1051.62	0.10
Reach 1	65144	100_YR	PRE-PROJ	9036.00	178.62	197.10		197.12	0.000614	1.75	8803.18	1656.83	0.09
Reach 1	65144	100_YR	Aug2019 Post	9036.00	178.62	197.10		197.12	0.000614	1.75	8802.53	1655.45	0.09
Reach 1	63400	100_YR	PRE-PROJ	9197.00	177.30	195.86		195.91	0.001156	2.69	6085.14	885.17	0.13
Reach 1	63400	100_YR	Aug2019 Post	9197.00	177.30	195.86		195.91	0.001156	2.69	6085.16	885.17	0.13
Reach 1	60640	100_YR	PRE-PROJ	9203.00	175.00	193.60	186.10	193.63	0.000706	2.03	8361.14	1356.60	0.10
Reach 1	60640	100_YR	Aug2019 Post	9203.00	175.00	193.60	186.11	193.63	0.000706	2.03	8361.14	1356.60	0.10

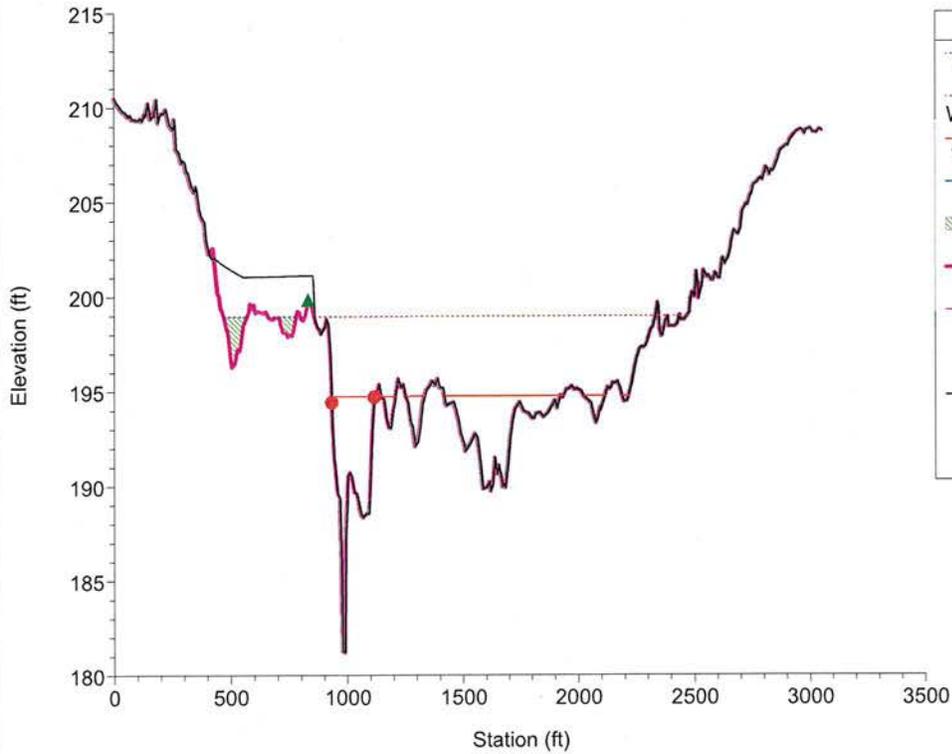
Mill Creek Phase 1 Plan: 1) Aug2019 Post 2) PRE-PROJ
Audobon Development



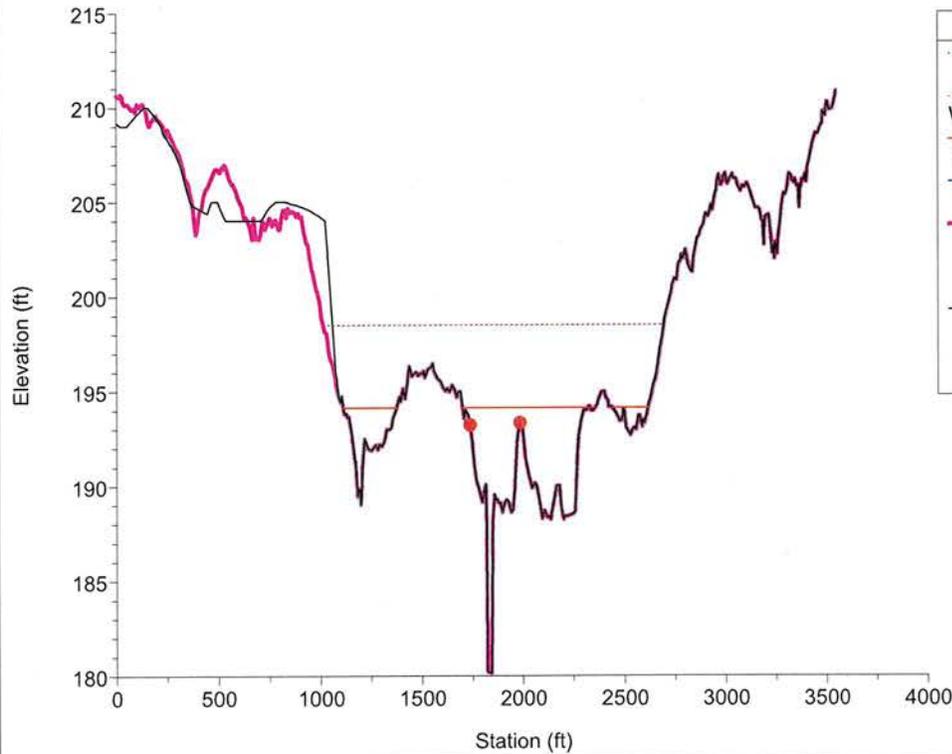
Mill Creek Phase 1 Plan: 1) Aug2019 Post 2) PRE-PROJ
Audobon Development



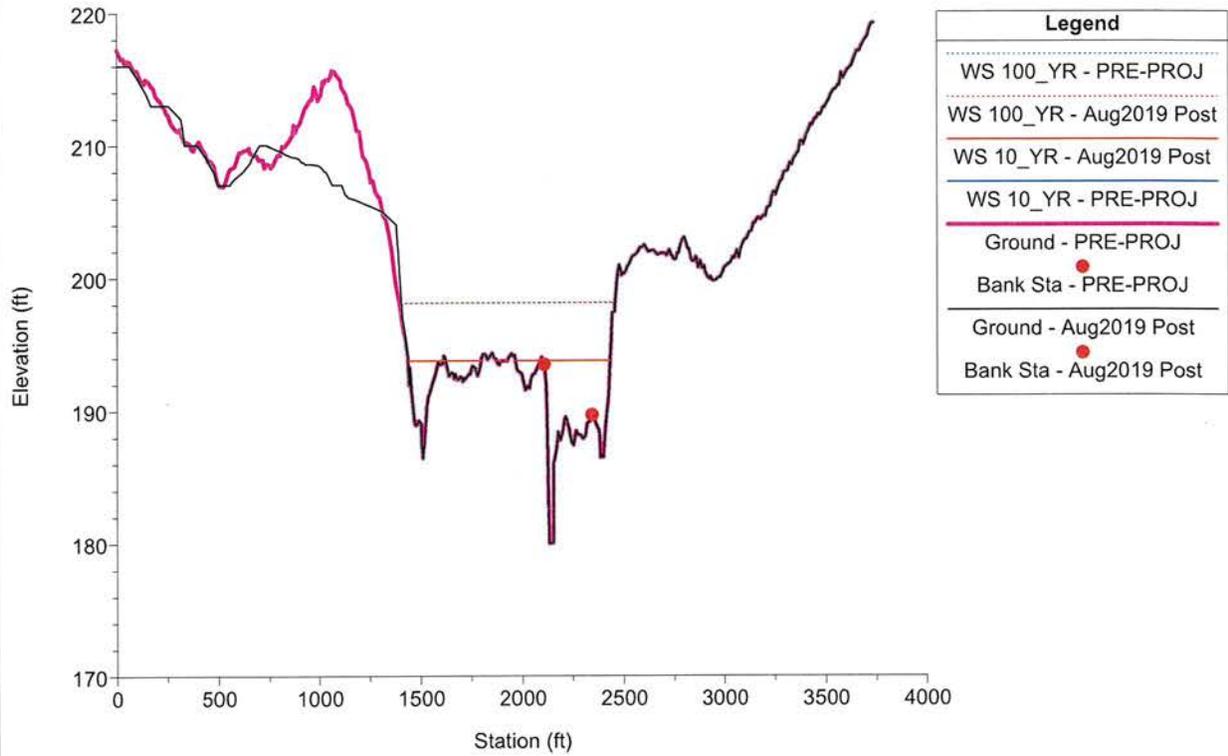
Mill Creek Phase 1 Plan: 1) Aug2019 Post 2) PRE-PROJ
 Audobon Development - Added Xsec - Fill Sta. 407.40 to 873.92



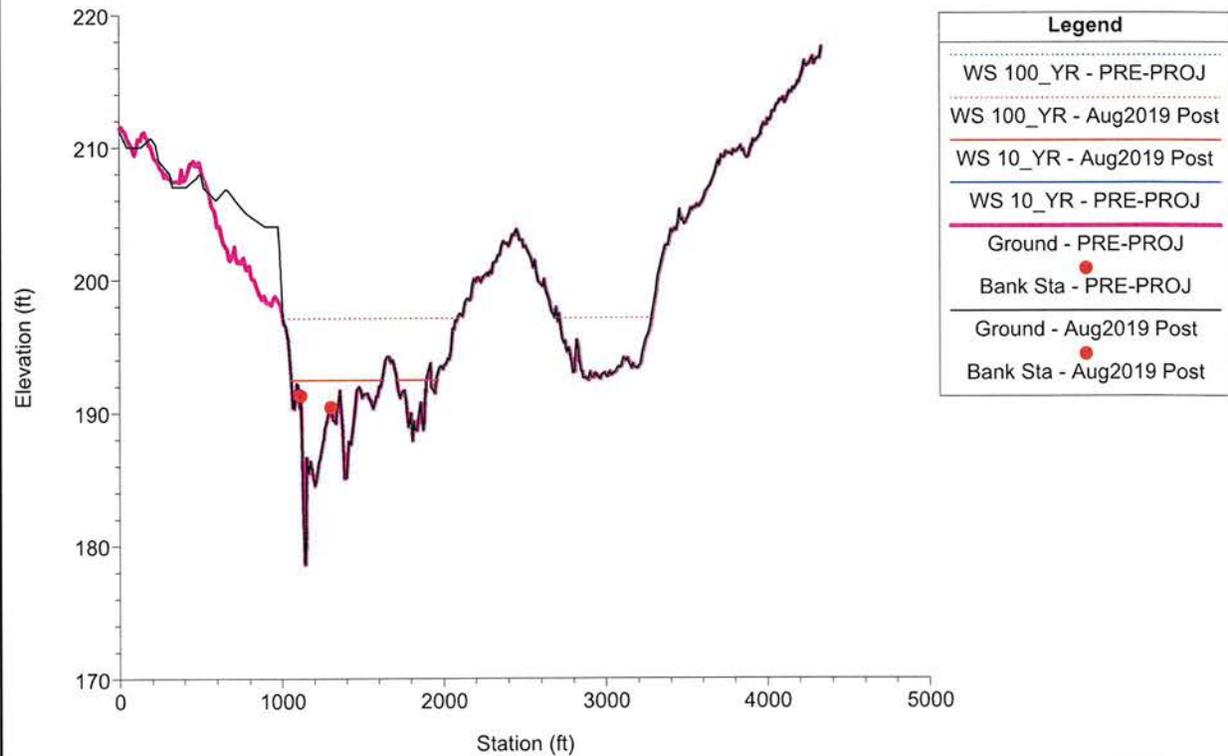
Mill Creek Phase 1 Plan: 1) Aug2019 Post 2) PRE-PROJ
 Audobon Development - Added Xsec - Fill Sta. 774.25 to 1072.37



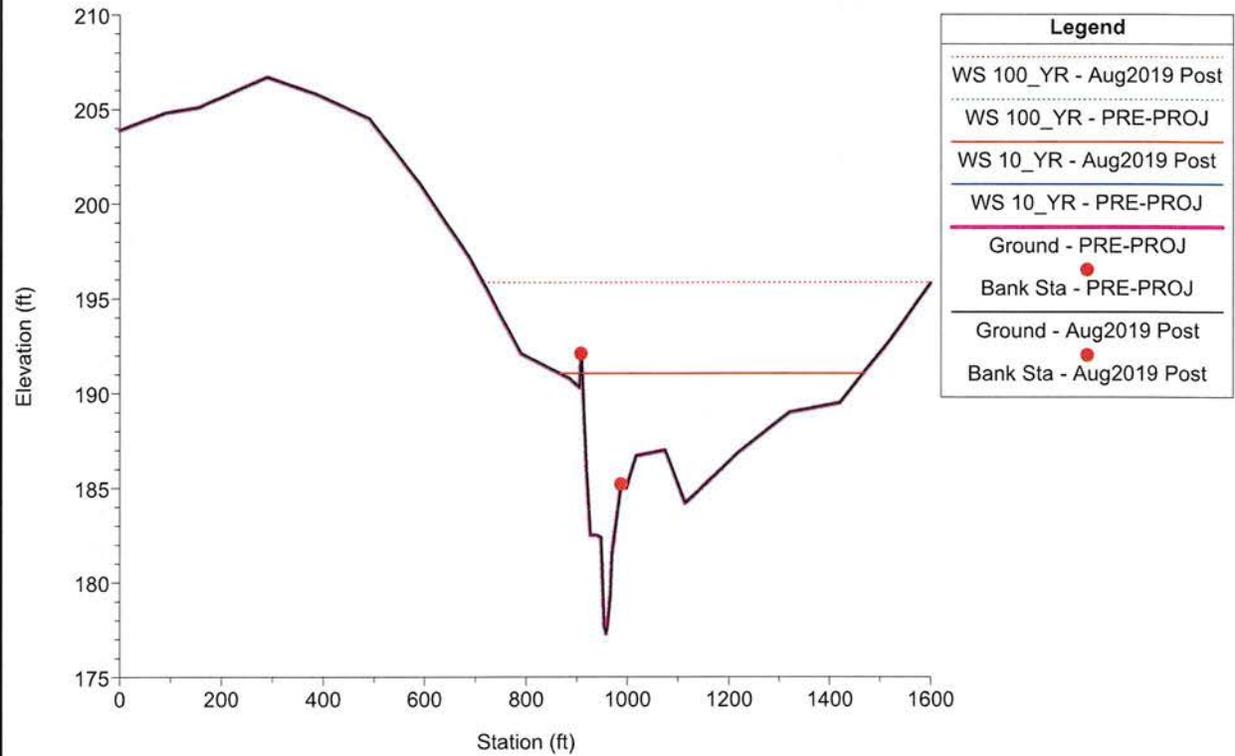
Mill Creek Phase 1 Plan: 1) Aug2019 Post 2) PRE-PROJ
 Audobon Development - Added Xsec - Fill Sta. 1253.56 to 1390.25



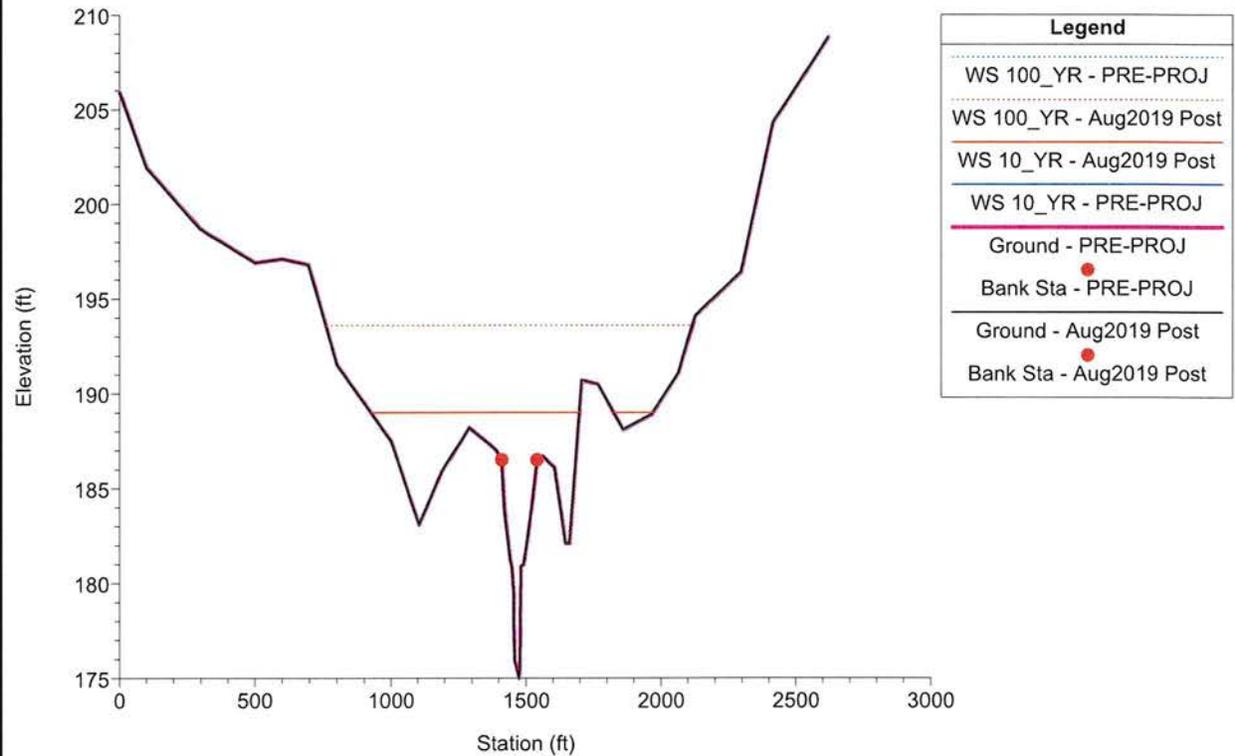
Mill Creek Phase 1 Plan: 1) Aug2019 Post 2) PRE-PROJ
 Audobon Development - Added Xsec - Fill Sta. 829.70 to 1003.80



Mill Creek Phase 1 Plan: 1) Aug2019 Post 2) PRE-PROJ
FEMA XSEC Z



Mill Creek Phase 1 Plan: 1) Aug2019 Post 2) PRE-PROJ
FEMA XSEC Y

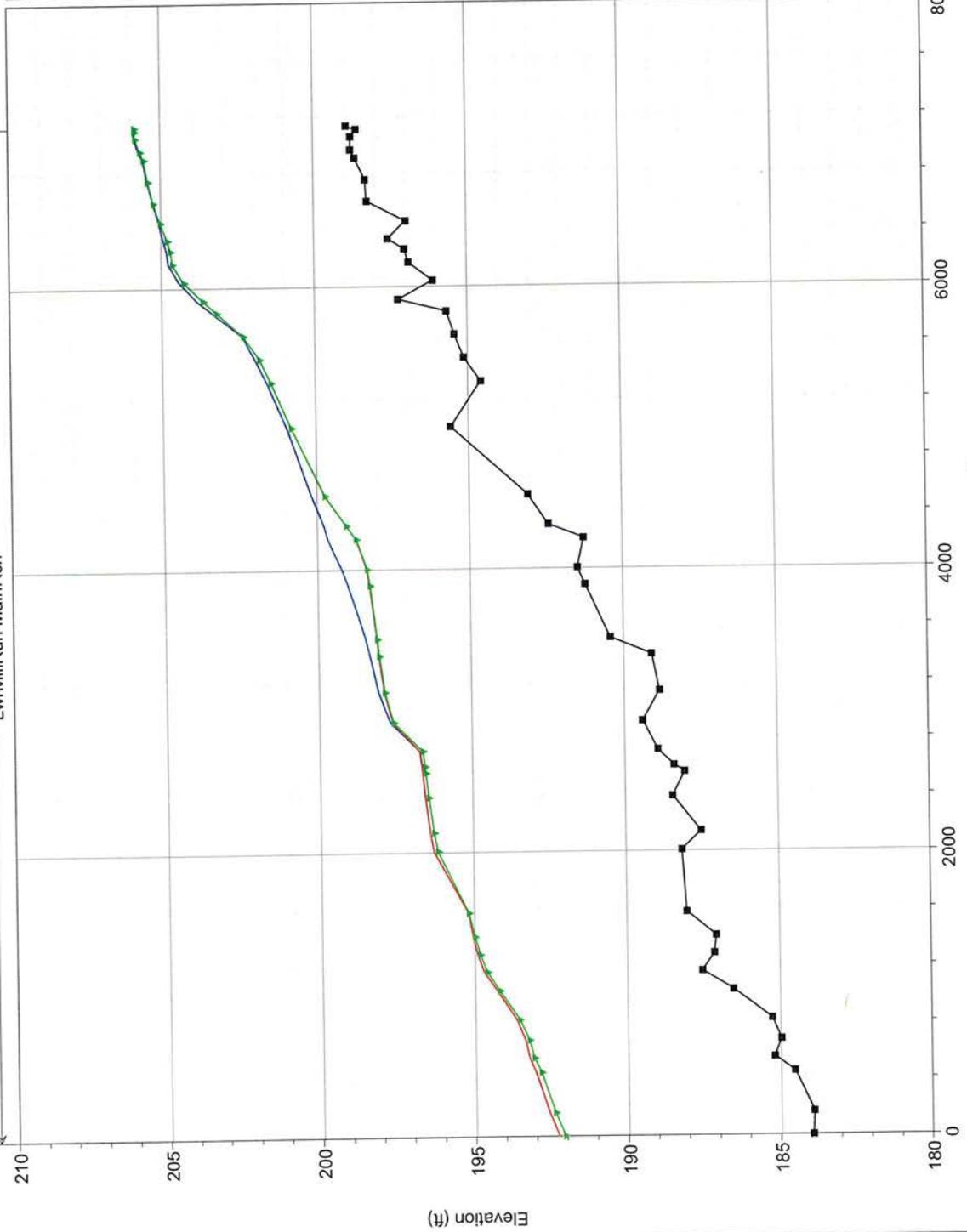
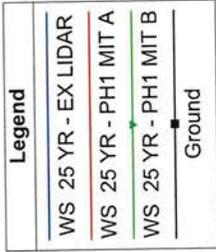


Appendix C – HYDRAULIC SUPPORT DATA - TRIB 4



MILL CREEK TRIB 4 Plan: 1) EX LIDAR 9/25/2018 2) PH1 MIT A 9/25/2018 3) PH1 MIT B 9/25/2018

LwrMillRun MainRch



Main Channel Distance (ft)

Elevation (ft)

HEC-RAS River: LwMlRRun Reach: MainRch Profile: 25 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
MainRch	8636	25 YR	EX LIDAR	943.00	198.92	205.89		205.95	0.000546	2.11	648.79	297.26	0.16
MainRch	8636	25 YR	PH1 NON-MIT	943.00	198.92	205.99		206.05	0.000498	2.04	679.34	299.57	0.15
MainRch	8636	25 YR	PH1 MIT A	943.00	198.92	205.86		205.92	0.000562	2.13	639.50	294.23	0.16
MainRch	8636	25 YR	PH1 MIT B	943.00	198.92	205.86		205.92	0.000562	2.13	639.50	294.23	0.16
MainRch	8610	25 YR	EX LIDAR	943.00	198.60	205.89		205.93	0.000379	1.79	809.41	272.25	0.13
MainRch	8610	25 YR	PH1 NON-MIT	943.00	198.60	206.00		206.03	0.000351	1.74	837.37	276.72	0.13
MainRch	8610	25 YR	PH1 MIT A	943.00	198.60	205.86		205.90	0.000388	1.80	800.95	270.38	0.14
MainRch	8610	25 YR	PH1 MIT B	943.00	198.60	205.86		205.90	0.000388	1.80	800.95	270.38	0.14
MainRch	8560	25 YR	EX LIDAR	943.00	198.77	205.87		205.91	0.000487	1.82	694.59	253.53	0.14
MainRch	8560	25 YR	PH1 NON-MIT	943.00	198.77	205.97		206.01	0.000449	1.77	721.14	257.49	0.13
MainRch	8560	25 YR	PH1 MIT A	943.00	198.77	205.84		205.88	0.000499	1.83	686.52	251.72	0.14
MainRch	8560	25 YR	PH1 MIT B	943.00	198.77	205.84		205.88	0.000499	1.83	686.52	251.72	0.14
MainRch	8468	25 YR	EX LIDAR	943.00	198.78	205.73		205.83	0.001815	3.29	622.52	301.44	0.26
MainRch	8468	25 YR	PH1 NON-MIT	943.00	198.78	205.85		205.94	0.001573	3.11	659.47	303.14	0.24
MainRch	8468	25 YR	PH1 MIT A	943.00	198.78	205.68		205.79	0.002055	3.47	606.75	300.72	0.27
MainRch	8468	25 YR	PH1 MIT B	943.00	198.78	205.68		205.79	0.002055	3.47	606.75	300.72	0.27
MainRch	8410	25 YR	EX LIDAR	943.00	198.65	205.59		205.73	0.002312	3.86	560.42	298.68	0.29
MainRch	8410	25 YR	PH1 NON-MIT	943.00	198.65	205.72		205.86	0.002041	3.69	582.17	285.92	0.27
MainRch	8410	25 YR	PH1 MIT A	943.00	198.65	205.56		205.70	0.002131	3.70	537.32	280.31	0.28
MainRch	8410	25 YR	PH1 MIT B	943.00	198.65	205.56		205.70	0.002131	3.70	537.32	280.31	0.28
MainRch	8257	25 YR	EX LIDAR	943.00	198.31	205.45		205.51	0.001068	2.37	752.25	340.87	0.20
MainRch	8257	25 YR	PH1 NON-MIT	943.00	198.31	205.61		205.67	0.000906	2.23	800.61	334.08	0.18
MainRch	8257	25 YR	PH1 MIT A	943.00	198.31	205.44		205.49	0.001019	2.31	741.99	329.91	0.19
MainRch	8257	25 YR	PH1 MIT B	943.00	198.31	205.44		205.49	0.001019	2.31	741.99	329.91	0.19
MainRch	8104	25 YR	EX LIDAR	943.00	198.26	205.27		205.33	0.001508	2.85	822.12	429.21	0.23
MainRch	8104	25 YR	PH1 NON-MIT	943.00	198.26	205.44		205.50	0.001452	2.87	742.44	304.77	0.23
MainRch	8104	25 YR	PH1 MIT A	943.00	198.26	205.26		205.32	0.001482	2.82	687.18	302.08	0.23
MainRch	8104	25 YR	PH1 MIT B	943.00	198.26	205.26		205.32	0.001482	2.82	687.18	302.08	0.23
MainRch	7964	25 YR	EX LIDAR	943.00	196.99	205.06		205.15	0.001436	3.19	727.76	326.94	0.23
MainRch	7964	25 YR	PH1 NON-MIT	943.00	196.99	205.16		205.29	0.001810	3.62	560.67	223.79	0.26
MainRch	7964	25 YR	PH1 MIT A	943.00	196.99	205.02		205.12	0.001534	3.28	530.29	220.62	0.24
MainRch	7964	25 YR	PH1 MIT B	943.00	196.99	205.02		205.12	0.001534	3.28	530.29	220.62	0.24
MainRch	7840	25 YR	EX LIDAR	943.00	197.58	204.93		204.99	0.001296	2.59	782.84	323.20	0.22
MainRch	7840	25 YR	PH1 NON-MIT	943.00	197.58	204.95		205.06	0.001978	3.20	529.64	209.66	0.27
MainRch	7840	25 YR	PH1 MIT A	943.00	197.58	204.80		204.91	0.002075	3.21	499.73	203.96	0.27
MainRch	7840	25 YR	PH1 MIT B	943.00	197.58	204.80		204.91	0.002075	3.21	499.73	203.96	0.27

HEC-RAS River: LwrnMillRun Reach: MainRch Profile: 25 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
MainRch	7766	25 YR	EX LIDAR	943.00	197.04	204.83		204.89	0.001228	2.57	781.10	347.82	0.21
MainRch	7766	25 YR	PH1 NON-MIT	943.00	197.04	204.86		204.92	0.001214	2.57	759.28	322.55	0.21
MainRch	7766	25 YR	PH1 MIT A	943.00	197.04	204.71		204.77	0.001337	2.64	710.50	307.86	0.22
MainRch	7766	25 YR	PH1 MIT B	943.00	197.04	204.71		204.77	0.001337	2.64	710.50	307.86	0.22
MainRch	7674	25 YR	EX LIDAR	943.00	196.91	204.78		204.81	0.000593	1.94	1120.83	448.81	0.15
MainRch	7674	25 YR	PH1 NON-MIT	943.00	196.91	204.81		204.84	0.000593	1.95	1135.49	460.72	0.15
MainRch	7674	25 YR	PH1 MIT A	943.00	196.91	204.65		204.68	0.000668	2.03	1063.79	432.21	0.16
MainRch	7674	25 YR	PH1 MIT B	943.00	196.91	204.65		204.68	0.000668	2.03	1063.79	432.21	0.16
MainRch	7544	25 YR	EX LIDAR	1823.00	196.12	204.42		204.58	0.002734	4.07	908.32	353.24	0.32
MainRch	7544	25 YR	PH1 NON-MIT	1823.00	196.12	204.47		204.62	0.002585	3.98	921.24	341.42	0.31
MainRch	7544	25 YR	PH1 MIT A	1823.00	196.12	204.28		204.44	0.002882	4.10	856.38	339.11	0.33
MainRch	7544	25 YR	PH1 MIT B	1823.00	196.12	204.28		204.44	0.002882	4.10	856.38	339.11	0.33
MainRch	7412	25 YR	EX LIDAR	1875.00	197.26	203.86		204.12	0.004722	5.39	761.96	329.94	0.42
MainRch	7412	25 YR	PH1 NON-MIT	1875.00	197.26	203.90		204.17	0.004676	5.40	695.72	243.94	0.42
MainRch	7412	25 YR	PH1 MIT A	1875.00	197.26	203.65		203.94	0.005307	5.56	634.87	241.99	0.44
MainRch	7412	25 YR	PH1 MIT B	1875.00	197.26	203.65		203.94	0.005307	5.56	634.87	241.99	0.44
MainRch	7325	25 YR	EX LIDAR	1875.00	195.68	203.35		203.66	0.005927	5.68	694.09	333.98	0.46
MainRch	7325	25 YR	PH1 NON-MIT	1875.00	195.68	203.39		203.71	0.005973	5.73	620.27	227.19	0.46
MainRch	7325	25 YR	PH1 MIT A	1875.00	195.68	203.20		203.47	0.005391	5.30	578.09	224.73	0.44
MainRch	7325	25 YR	PH1 MIT B	1875.00	195.68	203.20		203.47	0.005391	5.30	578.09	224.73	0.44
MainRch	7162	25 YR	EX LIDAR	1960.00	195.42	202.36		202.68	0.006142	5.87	825.27	539.53	0.46
MainRch	7162	25 YR	PH1 NON-MIT	1960.00	195.42	202.55		202.81	0.004995	5.42	859.91	436.93	0.42
MainRch	7162	25 YR	PH1 MIT A	1960.00	195.42	202.34		202.60	0.005353	5.46	767.58	432.29	0.43
MainRch	7162	25 YR	PH1 MIT B	1960.00	195.42	202.34		202.60	0.005353	5.46	767.57	432.29	0.43
MainRch	6997	25 YR	EX LIDAR	1960.00	195.12	201.97		202.06	0.002636	3.67	1436.43	819.59	0.31
MainRch	6997	25 YR	PH1 NON-MIT	1960.00	195.12	201.99		202.16	0.004143	4.62	955.65	435.18	0.38
MainRch	6997	25 YR	PH1 MIT A	1960.00	195.12	201.82		201.97	0.003717	4.27	883.54	429.32	0.36
MainRch	6997	25 YR	PH1 MIT B	1960.00	195.12	201.82		201.97	0.003717	4.27	883.54	429.32	0.36
MainRch	6830	25 YR	EX LIDAR	2000.00	194.57	201.59		201.64	0.002210	3.15	1675.96	864.12	0.28
MainRch	6830	25 YR	PH1 NON-MIT	2000.00	194.57	201.59		201.64	0.002211	3.15	1675.92	864.11	0.28
MainRch	6830	25 YR	PH1 MIT A	2000.00	194.57	201.46	200.15	201.50	0.001935	2.88	1563.94	847.82	0.26
MainRch	6830	25 YR	PH1 MIT B	2000.00	194.57	201.46	200.15	201.50	0.001936	2.88	1563.90	847.82	0.26
MainRch	6509	25 YR	EX LIDAR	2085.00	195.57	200.94		201.01	0.002899	3.55	1576.41	846.68	0.31
MainRch	6509	25 YR	PH1 NON-MIT	2085.00	195.57	200.94		201.01	0.002900	3.55	1576.25	846.65	0.31
MainRch	6509	25 YR	PH1 MIT A	2085.00	195.57	200.81		200.88	0.003178	3.69	1461.12	829.50	0.33

HEC-RAS River LwrMillRun Reach: MainRch Profile: 25 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
MainRch	6509	25 YR	PH1 MIT B	2085.00	195.57	200.81		200.88	0.003179	3.69	1460.96	829.47	0.33
MainRch	6026	25 YR	EX LIDAR	2260.00	193.07	200.16		200.21	0.001637	3.01	1815.13	656.12	0.24
MainRch	6026	25 YR	PH1 NON-MIT	2260.00	193.07	200.16		200.21	0.001639	3.01	1814.73	655.11	0.24
MainRch	6026	25 YR	PH1 MIT A	2260.00	193.07	199.74		199.80	0.002593	3.56	1535.69	650.74	0.30
MainRch	6026	25 YR	PH1 MIT B	2260.00	193.07	199.73		199.80	0.002599	3.56	1534.53	650.71	0.30
MainRch	5815	25 YR	EX LIDAR	2260.00	192.41	199.78		199.89	0.001692	3.51	1323.89	477.62	0.26
MainRch	5815	25 YR	PH1 NON-MIT	2260.00	192.41	199.78		199.89	0.001693	3.51	1323.46	477.54	0.26
MainRch	5815	25 YR	PH1 MIT A	2260.00	192.41	199.06		199.25	0.003192	4.41	995.80	422.34	0.35
MainRch	5815	25 YR	PH1 MIT B	2260.00	192.41	199.05		199.25	0.003205	4.41	994.08	422.08	0.35
MainRch	5718	25 YR	EX LIDAR	2350.00	191.26	199.65		199.75	0.001578	3.32	1578.15	645.63	0.25
MainRch	5718	25 YR	PH1 NON-MIT	2350.00	191.26	199.65		199.74	0.001580	3.32	1577.50	645.60	0.25
MainRch	5718	25 YR	PH1 MIT A	2350.00	191.26	198.75		198.95	0.003751	4.55	1024.86	534.27	0.37
MainRch	5718	25 YR	PH1 MIT B	2350.00	191.26	198.74		198.95	0.003780	4.56	1021.34	533.27	0.37
MainRch	5506	25 YR	EX LIDAR	2350.00	191.47	199.21		199.37	0.003322	4.72	1359.72	637.25	0.35
MainRch	5506	25 YR	PH1 NON-MIT	2350.00	191.47	199.21		199.37	0.003330	4.73	1358.51	637.20	0.35
MainRch	5506	25 YR	PH1 MIT A	2350.00	191.47	198.40		198.47	0.002081	3.37	1418.63	609.70	0.27
MainRch	5506	25 YR	PH1 MIT B	2350.00	191.47	198.39		198.46	0.002112	3.38	1411.53	609.32	0.27
MainRch	5389	25 YR	EX LIDAR	2420.00	191.23	199.02		199.09	0.001970	3.67	1784.45	680.97	0.27
MainRch	5389	25 YR	PH1 NON-MIT	2420.00	191.23	199.02		199.09	0.001975	3.67	1782.81	680.82	0.27
MainRch	5389	25 YR	PH1 MIT A	2420.00	191.23	198.31		198.34	0.000817	2.17	2160.21	747.92	0.17
MainRch	5389	25 YR	PH1 MIT B	2420.00	191.23	198.30		198.33	0.000828	2.18	2150.54	747.66	0.17
MainRch	5010	25 YR	EX LIDAR	2420.00	190.42	198.46		198.52	0.001542	3.10	1900.87	701.11	0.24
MainRch	5010	25 YR	PH1 NON-MIT	2420.00	190.42	198.46		198.52	0.001549	3.11	1897.62	700.97	0.24
MainRch	5010	25 YR	PH1 MIT A	2420.00	190.42	198.10		198.12	0.000728	2.03	2150.25	684.87	0.16
MainRch	5010	25 YR	PH1 MIT B	2420.00	190.42	198.08		198.11	0.000740	2.04	2139.17	684.41	0.16
MainRch	4892	25 YR	EX LIDAR	2420.00	189.08	198.33		198.39	0.001386	3.27	1946.05	674.36	0.23
MainRch	4892	25 YR	PH1 NON-MIT	2420.00	189.08	198.32		198.38	0.001394	3.28	1942.41	674.28	0.23
MainRch	4892	25 YR	PH1 MIT A	2420.00	189.08	198.04		198.07	0.000618	2.12	2199.81	669.84	0.15
MainRch	4892	25 YR	PH1 MIT B	2420.00	189.08	198.02		198.05	0.000628	2.13	2188.38	669.57	0.15
MainRch	4634	25 YR	EX LIDAR	2420.00	188.83	198.06		198.13	0.001300	3.35	1793.12	539.96	0.23
MainRch	4634	25 YR	PH1 NON-MIT	2420.00	188.83	198.05		198.12	0.001307	3.36	1789.38	539.65	0.23
MainRch	4634	25 YR	PH1 MIT A	2420.00	188.83	197.87		197.92	0.000981	2.86	1693.65	525.23	0.20
MainRch	4634	25 YR	PH1 MIT B	2420.00	188.83	197.85		197.90	0.000998	2.88	1683.21	524.09	0.20
MainRch	4422	25 YR	EX LIDAR	2420.00	189.40	197.68		197.84	0.003069	4.57	1201.28	410.14	0.34
MainRch	4422	25 YR	PH1 NON-MIT	2420.00	189.40	197.67		197.83	0.003097	4.58	1197.22	409.74	0.34

HEC-RAS River: LwrMillRun Reach: MainRch Profile: 25 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
MainRch	4422	25 YR	PH1 MIT A	2420.00	189.40	197.61		197.72	0.002272	3.89	1168.89	406.90	0.29
MainRch	4422	25 YR	PH1 MIT B	2420.00	189.40	197.58		197.69	0.002328	3.93	1158.37	405.84	0.30
MainRch	4218	25 YR	EX LIDAR	2420.00	188.91	196.73		197.10	0.004507	6.09	938.43	451.74	0.42
MainRch	4218	25 YR	PH1 NON-MIT	2420.00	188.91	196.74		197.10	0.004378	6.01	917.56	415.09	0.42
MainRch	4218	25 YR	PH1 MIT A	2420.00	188.91	196.73		197.10	0.004412	6.03	914.26	414.99	0.42
MainRch	4218	25 YR	PH1 MIT B	2420.00	188.91	196.63		197.04	0.004856	6.26	873.96	413.77	0.44
MainRch	4108	25 YR	EX LIDAR	2420.00	188.39	196.67		196.76	0.001591	3.55	1618.68	552.30	0.25
MainRch	4108	25 YR	PH1 NON-MIT	2420.00	188.39	196.68		196.77	0.001578	3.54	1623.85	552.58	0.25
MainRch	4108	25 YR	PH1 MIT A	2420.00	188.39	196.67		196.76	0.001578	3.54	1610.10	530.84	0.25
MainRch	4108	25 YR	PH1 MIT B	2420.00	188.39	196.57		196.67	0.001712	3.64	1563.90	548.73	0.26
MainRch	4062	25 YR	EX LIDAR	2420.00	188.04	196.65		196.70	0.001736	3.13	1735.18	557.55	0.25
MainRch	4062	25 YR	PH1 NON-MIT	2420.00	188.04	196.66		196.71	0.001720	3.12	1740.50	557.86	0.25
MainRch	4062	25 YR	PH1 MIT A	2420.00	188.04	196.65		196.70	0.001723	3.12	1732.90	546.48	0.25
MainRch	4062	25 YR	PH1 MIT B	2420.00	188.04	196.54		196.60	0.001894	3.22	1678.32	554.33	0.26
MainRch	3891	25 YR	EX LIDAR	2477.00	188.44	196.57		196.61	0.001604	2.87	1817.62	554.62	0.24
MainRch	3891	25 YR	PH1 NON-MIT	2477.00	188.44	196.58		196.62	0.001589	2.86	1823.36	554.99	0.23
MainRch	3891	25 YR	PH1 MIT A	2477.00	188.44	196.57		196.61	0.001604	2.87	1817.63	554.62	0.24
MainRch	3891	25 YR	PH1 MIT B	2477.00	188.44	196.45		196.50	0.001782	2.98	1755.36	550.60	0.25
MainRch	3642	25 YR	EX LIDAR	2477.00	187.53	196.41		196.49	0.001506	3.61	1589.16	414.72	0.24
MainRch	3642	25 YR	PH1 NON-MIT	2477.00	187.53	196.42		196.50	0.001493	3.59	1573.99	413.73	0.24
MainRch	3642	25 YR	PH1 MIT A	2477.00	187.53	196.41		196.49	0.001506	3.61	1569.17	414.72	0.24
MainRch	3642	25 YR	PH1 MIT B	2477.00	187.53	196.29		196.37	0.001589	3.66	1518.32	410.69	0.24
MainRch	3511	25 YR	EX LIDAR	2477.00	188.16	196.30		196.39	0.001810	3.40	1341.35	316.26	0.26
MainRch	3511	25 YR	PH1 NON-MIT	2477.00	188.16	196.32		196.40	0.001795	3.39	1345.31	316.52	0.26
MainRch	3511	25 YR	PH1 MIT A	2477.00	188.16	196.30		196.39	0.001810	3.40	1341.35	316.26	0.26
MainRch	3511	25 YR	PH1 MIT B	2477.00	188.16	196.17		196.26	0.001974	3.49	1299.18	313.31	0.27
MainRch	3074	25 YR	EX LIDAR	2477.00	188.03	195.18		195.48	0.006348	6.50	953.29	387.16	0.49
MainRch	3074	25 YR	PH1 NON-MIT	2477.00	188.03	195.28		195.55	0.005561	6.16	982.40	369.79	0.46
MainRch	3074	25 YR	PH1 MIT A	2477.00	188.03	195.18		195.48	0.006348	6.50	953.30	387.16	0.49
MainRch	3074	25 YR	PH1 MIT B	2477.00	188.03	195.17		195.41	0.004978	5.75	942.19	367.31	0.43
MainRch	2907	25 YR	EX LIDAR	2477.00	187.07	195.05		195.09	0.000984	2.61	1956.27	715.38	0.20
MainRch	2907	25 YR	PH1 NON-MIT	2477.00	187.07	195.10		195.16	0.001105	2.78	1600.01	491.92	0.21
MainRch	2907	25 YR	PH1 MIT A	2477.00	187.07	195.09		195.09	0.000984	2.61	1956.28	715.38	0.20
MainRch	2907	25 YR	PH1 MIT B	2477.00	187.07	194.99		195.04	0.001081	2.71	1544.63	490.61	0.20
MainRch	2787	25 YR	EX LIDAR	2477.00	187.14	194.90		194.98	0.001581	3.43	1784.45	801.11	0.25

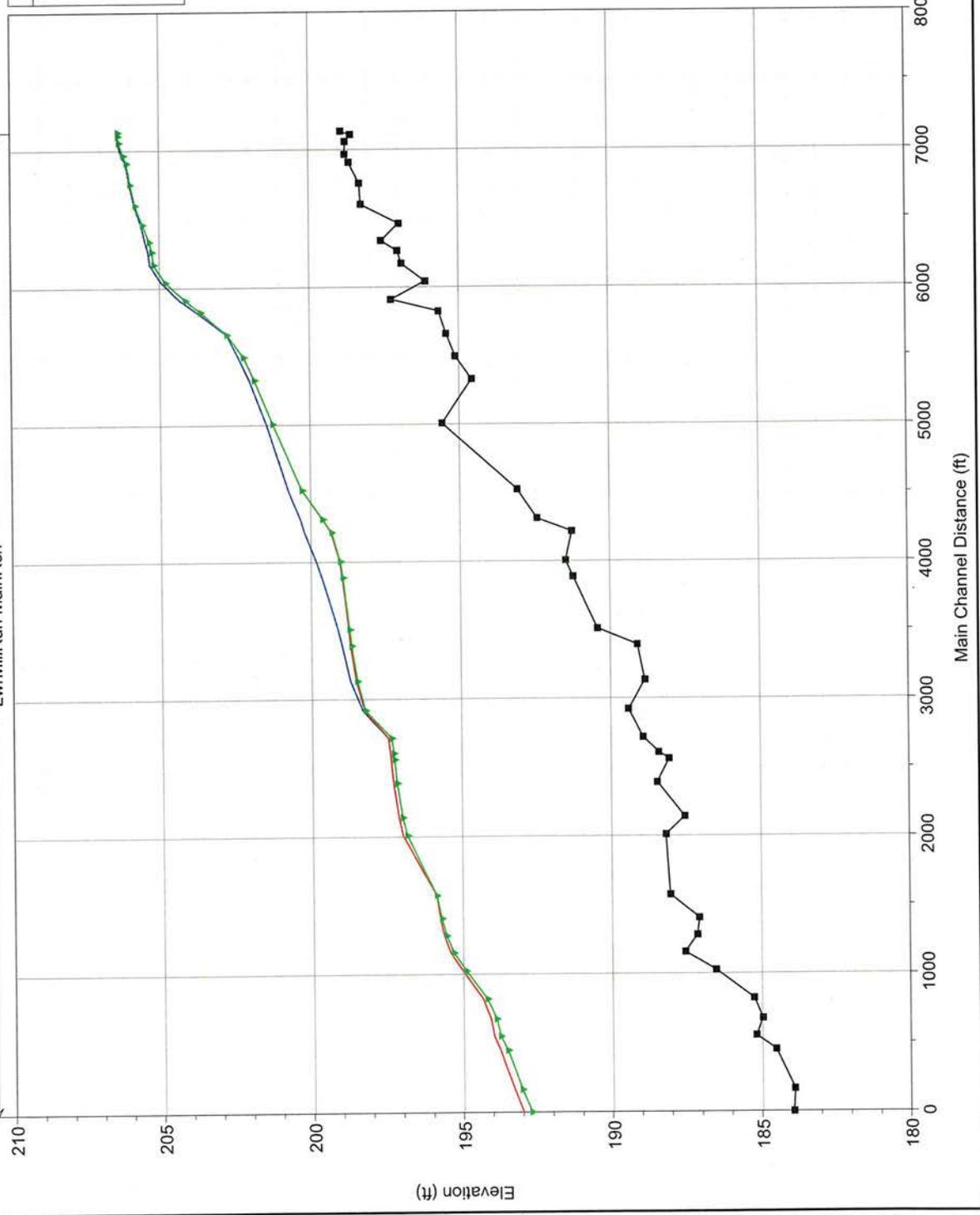
HEC-RAS River LwrMillRun Reach: MainRch Profile: 25 YR (Continued)

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
MainRch	2787	25 YR	PH1 NON-MIT	2477.00	187.14	194.95		195.03	0.001696	3.56	1512.00	453.98	0.26
MainRch	2787	25 YR	PH1 MIT A	2477.00	187.14	194.90		194.98	0.001581	3.43	1794.34	797.19	0.25
MainRch	2787	25 YR	PH1 MIT B	2477.00	187.14	194.83		194.91	0.001796	3.62	1456.87	452.47	0.26
MainRch	2659	25 YR	EX LIDAR	2477.00	187.54	194.70		194.80	0.002329	4.08	1444.37	546.95	0.30
MainRch	2659	25 YR	PH1 NON-MIT	2477.00	187.54	194.72		194.84	0.002604	4.32	1226.06	359.11	0.32
MainRch	2659	25 YR	PH1 MIT A	2477.00	187.54	194.70		194.80	0.002329	4.08	1444.37	546.95	0.30
MainRch	2659	25 YR	PH1 MIT B	2477.00	187.54	194.60		194.71	0.002600	4.26	1181.73	358.32	0.32
MainRch	2528	25 YR	EX LIDAR	2477.00	186.52	194.27		194.45	0.002902	4.65	1189.88	460.51	0.34
MainRch	2528	25 YR	PH1 NON-MIT	2477.00	186.52	194.26		194.47	0.003053	4.76	997.42	288.22	0.35
MainRch	2528	25 YR	PH1 MIT A	2477.00	186.52	194.27		194.45	0.002902	4.65	1189.88	460.51	0.34
MainRch	2528	25 YR	PH1 MIT B	2477.00	186.52	194.20		194.37	0.002607	4.37	980.08	287.54	0.32
MainRch	2324	25 YR	EX LIDAR	2477.00	185.25	193.64		193.92	0.003581	4.93	794.67	247.01	0.37
MainRch	2324	25 YR	PH1 NON-MIT	2477.00	185.25	193.64		193.92	0.003581	4.93	794.64	247.00	0.37
MainRch	2324	25 YR	PH1 MIT A	2477.00	185.25	193.64		193.92	0.003581	4.93	794.67	247.01	0.37
MainRch	2324	25 YR	PH1 MIT B	2477.00	185.25	193.55		193.84	0.003818	5.03	772.44	244.08	0.38
MainRch	2178	25 YR	EX LIDAR	2477.00	184.96	193.36		193.44	0.001569	3.42	1594.62	509.33	0.25
MainRch	2178	25 YR	PH1 NON-MIT	2477.00	184.96	193.36		193.43	0.001570	3.42	1594.52	509.33	0.25
MainRch	2178	25 YR	PH1 MIT A	2477.00	184.96	193.36		193.44	0.001569	3.42	1594.62	509.33	0.25
MainRch	2178	25 YR	PH1 MIT B	2477.00	184.96	193.23		193.31	0.001772	3.58	1528.63	507.94	0.26
MainRch	2053	25 YR	EX LIDAR	2477.00	185.18	193.23		193.32	0.002134	3.78	1472.98	538.19	0.28
MainRch	2053	25 YR	PH1 NON-MIT	2477.00	185.18	193.23		193.32	0.002135	3.78	1472.87	538.18	0.28
MainRch	2053	25 YR	PH1 MIT A	2477.00	185.18	193.23		193.32	0.002134	3.78	1472.98	538.19	0.28
MainRch	2053	25 YR	PH1 MIT B	2477.00	185.18	193.08		193.18	0.002483	4.00	1391.36	529.36	0.30
MainRch	1951	25 YR	EX LIDAR	2477.00	184.52	193.03		193.06	0.000722	2.16	2135.76	542.83	0.16
MainRch	1951	25 YR	PH1 NON-MIT	2477.00	184.52	193.03		193.06	0.000722	2.16	2135.62	542.82	0.16
MainRch	1951	25 YR	PH1 MIT A	2477.00	184.52	193.03		193.06	0.000722	2.16	2135.76	542.83	0.16
MainRch	1951	25 YR	PH1 MIT B	2477.00	184.52	192.85		192.88	0.000815	2.24	2039.10	537.24	0.17
MainRch	1666	25 YR	EX LIDAR	2477.00	183.90	192.59		192.74	0.001806	3.51	1138.76	381.30	0.27
MainRch	1666	25 YR	PH1 NON-MIT	2477.00	183.90	192.59		192.74	0.001807	3.51	1138.63	381.29	0.27
MainRch	1666	25 YR	PH1 MIT A	2477.00	183.90	192.59		192.74	0.001806	3.51	1138.76	381.30	0.27
MainRch	1666	25 YR	PH1 MIT B	2477.00	183.90	192.40		192.54	0.001848	3.47	1065.94	377.27	0.27
MainRch	1502	25 YR	EX LIDAR	2477.00	183.93	192.28		192.43	0.002201	4.12	1268.01	426.18	0.29
MainRch	1502	25 YR	PH1 NON-MIT	2477.00	183.93	192.28		192.43	0.002201	4.12	1267.79	426.17	0.29
MainRch	1502	25 YR	PH1 MIT A	2477.00	183.93	192.28		192.43	0.002201	4.12	1268.01	426.18	0.29
MainRch	1502	25 YR	PH1 MIT B	2477.00	183.93	192.08		192.23	0.002200	4.03	1186.42	422.67	0.29

MILL CREEK TRIB 4 Plan: 1) EX LIDAR 9/25/2018 2) PH1 MIT A 9/25/2018 3) PH1 MIT B 9/25/2018

LwrMillRun MainRch

Legend	
WS 100 YR - EX LIDAR	—
WS 100 YR - PH1 MIT A	—
WS 100 YR - PH1 MIT B	—
Ground	—■—



HEC-RAS River LwrMillRun Reach: MainRch 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
MainRch	8636	100 YR	EX LIDAR	1233.00	198.92	206.42		206.49	0.000584	2.32	809.44	306.87	0.17
MainRch	8636	100 YR	PH1 NON-MIT	1233.00	198.92	206.56		206.62	0.000523	2.23	853.07	317.84	0.16
MainRch	8636	100 YR	PH1 MIT A	1233.00	198.92	206.39		206.46	0.000602	2.35	798.07	305.90	0.17
MainRch	8636	100 YR	PH1 MIT B	1233.00	198.92	206.39		206.46	0.000602	2.35	798.07	305.90	0.17
MainRch	8610	100 YR	EX LIDAR	1233.00	198.60	206.42		206.47	0.000434	2.04	958.00	287.40	0.15
MainRch	8610	100 YR	PH1 NON-MIT	1233.00	198.60	206.56		206.61	0.000393	1.97	998.27	290.80	0.14
MainRch	8610	100 YR	PH1 MIT A	1233.00	198.60	206.39		206.44	0.000446	2.05	947.40	286.48	0.15
MainRch	8610	100 YR	PH1 MIT B	1233.00	198.60	206.39		206.44	0.000446	2.05	947.40	286.48	0.15
MainRch	8560	100 YR	EX LIDAR	1233.00	198.77	206.39		206.45	0.000556	2.07	831.32	265.32	0.15
MainRch	8560	100 YR	PH1 NON-MIT	1233.00	198.77	206.53		206.59	0.000501	1.99	869.30	267.92	0.14
MainRch	8560	100 YR	PH1 MIT A	1233.00	198.77	206.35		206.41	0.000572	2.09	821.26	264.66	0.15
MainRch	8560	100 YR	PH1 MIT B	1233.00	198.77	206.35		206.41	0.000572	2.09	821.26	264.66	0.15
MainRch	8468	100 YR	EX LIDAR	1233.00	198.78	206.27		206.36	0.001715	3.41	785.59	308.86	0.25
MainRch	8468	100 YR	PH1 NON-MIT	1233.00	198.78	206.43		206.51	0.001456	3.20	835.88	311.11	0.23
MainRch	8468	100 YR	PH1 MIT A	1233.00	198.78	206.21		206.32	0.001955	3.62	767.43	308.04	0.27
MainRch	8468	100 YR	PH1 MIT B	1233.00	198.78	206.21		206.32	0.001955	3.62	767.43	308.04	0.27
MainRch	8410	100 YR	EX LIDAR	1233.00	198.65	206.13		206.27	0.002239	4.05	728.42	322.21	0.29
MainRch	8410	100 YR	PH1 NON-MIT	1233.00	198.65	206.30		206.44	0.001961	3.86	755.02	309.36	0.27
MainRch	8410	100 YR	PH1 MIT A	1233.00	198.65	206.10		206.23	0.002036	3.85	693.40	301.32	0.28
MainRch	8410	100 YR	PH1 MIT B	1233.00	198.65	206.10		206.23	0.002036	3.85	693.40	301.32	0.28
MainRch	8257	100 YR	EX LIDAR	1233.00	198.31	206.00		206.06	0.001058	2.54	942.86	357.97	0.20
MainRch	8257	100 YR	PH1 NON-MIT	1233.00	198.31	206.20		206.25	0.000889	2.39	1000.15	348.38	0.18
MainRch	8257	100 YR	PH1 MIT A	1233.00	198.31	205.98		206.04	0.000998	2.46	924.35	342.44	0.19
MainRch	8257	100 YR	PH1 MIT B	1233.00	198.31	205.98		206.04	0.000998	2.46	924.35	342.44	0.19
MainRch	8104	100 YR	EX LIDAR	1233.00	198.26	205.83		205.89	0.001367	2.93	1072.56	463.87	0.22
MainRch	8104	100 YR	PH1 NON-MIT	1233.00	198.26	206.03		206.10	0.001412	3.05	933.48	332.13	0.23
MainRch	8104	100 YR	PH1 MIT A	1233.00	198.26	205.81		205.87	0.001432	2.99	859.68	327.91	0.23
MainRch	8104	100 YR	PH1 MIT B	1233.00	198.26	205.81		205.87	0.001432	2.99	859.68	327.91	0.23
MainRch	7964	100 YR	EX LIDAR	1233.00	196.99	205.62		205.71	0.001505	3.47	924.63	385.73	0.24
MainRch	7964	100 YR	PH1 NON-MIT	1233.00	196.99	205.75		205.88	0.001556	3.90	666.16	238.06	0.27
MainRch	7964	100 YR	PH1 MIT A	1233.00	196.99	205.57		205.68	0.001548	3.50	655.33	233.35	0.24
MainRch	7964	100 YR	PH1 MIT B	1233.00	196.99	205.57		205.68	0.001548	3.50	655.33	233.35	0.24
MainRch	7840	100 YR	EX LIDAR	1233.00	197.58	205.48		205.55	0.001348	2.85	956.11	390.77	0.22
MainRch	7840	100 YR	PH1 NON-MIT	1233.00	197.58	205.53		205.65	0.001955	3.45	654.26	217.03	0.27
MainRch	7840	100 YR	PH1 MIT A	1233.00	197.58	205.34		205.47	0.002109	3.50	613.32	214.62	0.28
MainRch	7840	100 YR	PH1 MIT B	1233.00	197.58	205.34		205.47	0.002109	3.50	613.32	214.62	0.28

HEC-RAS River: LwrMillRun Reach: MainRch 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
MainRch	7766	100 YR	EX LIDAR	1233.00	197.04	205.39		205.45	0.001198	2.74	982.95	388.89		0.21
MainRch	7766	100 YR	PH1 NON-MIT	1233.00	197.04	205.45		205.52	0.001188	2.75	958.62	360.51		0.21
MainRch	7766	100 YR	PH1 MIT A	1233.00	197.04	205.28		205.32	0.001301	2.80	888.79	340.29		0.22
MainRch	7766	100 YR	PH1 MIT B	1233.00	197.04	205.26		205.32	0.001301	2.80	888.79	340.29		0.22
MainRch	7674	100 YR	EX LIDAR	1233.00	196.91	205.33		205.36	0.000627	2.13	1378.72	478.78		0.15
MainRch	7674	100 YR	PH1 NON-MIT	1233.00	196.91	205.40		205.43	0.000584	2.07	1415.14	477.70		0.15
MainRch	7674	100 YR	PH1 MIT A	1233.00	196.91	205.19		205.23	0.000701	2.22	1314.90	473.40		0.16
MainRch	7674	100 YR	PH1 MIT B	1233.00	196.91	205.19		205.23	0.000701	2.22	1314.89	473.40		0.16
MainRch	7544	100 YR	EX LIDAR	2380.00	196.12	204.94		205.12	0.002919	4.48	1095.31	376.49		0.34
MainRch	7544	100 YR	PH1 NON-MIT	2380.00	196.12	205.05		205.21	0.002598	4.29	1121.64	350.09		0.32
MainRch	7544	100 YR	PH1 MIT A	2380.00	196.12	204.80		204.98	0.002914	4.41	1036.73	345.35		0.33
MainRch	7544	100 YR	PH1 MIT B	2380.00	196.12	204.80		204.98	0.002914	4.41	1036.73	345.35		0.33
MainRch	7412	100 YR	EX LIDAR	2450.00	197.26	204.33		204.63	0.005081	5.93	921.11	351.03		0.44
MainRch	7412	100 YR	PH1 NON-MIT	2450.00	197.26	204.45		204.76	0.004903	5.91	830.11	247.19		0.44
MainRch	7412	100 YR	PH1 MIT A	2450.00	197.26	204.14		204.46	0.005644	6.11	752.61	245.39		0.46
MainRch	7412	100 YR	PH1 MIT B	2450.00	197.26	204.14		204.46	0.005644	6.11	752.61	245.39		0.46
MainRch	7325	100 YR	EX LIDAR	2450.00	195.68	203.76		204.12	0.006575	6.32	835.64	356.56		0.49
MainRch	7325	100 YR	PH1 NON-MIT	2450.00	195.68	203.85		204.25	0.006804	6.51	727.30	240.40		0.50
MainRch	7325	100 YR	PH1 MIT A	2450.00	195.68	203.64		203.96	0.005897	5.89	678.28	230.53		0.47
MainRch	7325	100 YR	PH1 MIT B	2450.00	195.68	203.64		203.96	0.005897	5.89	678.28	230.53		0.47
MainRch	7162	100 YR	EX LIDAR	2560.00	195.42	202.77		203.09	0.006094	6.16	1056.78	574.16		0.47
MainRch	7162	100 YR	PH1 NON-MIT	2560.00	195.42	202.99		203.27	0.005092	5.79	1057.10	447.16		0.43
MainRch	7162	100 YR	PH1 MIT A	2560.00	195.42	202.76		203.03	0.005423	5.81	954.01	441.92		0.44
MainRch	7162	100 YR	PH1 MIT B	2560.00	195.42	202.76		203.03	0.005424	5.81	953.96	441.91		0.44
MainRch	6997	100 YR	EX LIDAR	2560.00	195.12	202.39		202.48	0.002606	3.88	1788.88	855.26		0.31
MainRch	6997	100 YR	PH1 NON-MIT	2560.00	195.12	202.40		202.60	0.004499	5.10	1141.67	457.28		0.41
MainRch	6997	100 YR	PH1 MIT A	2560.00	195.12	202.21		202.38	0.004121	4.76	1053.82	452.76		0.39
MainRch	6997	100 YR	PH1 MIT B	2560.00	195.12	202.21		202.38	0.004122	4.76	1053.69	452.75		0.39
MainRch	6830	100 YR	EX LIDAR	2600.00	194.57	202.02		202.07	0.002077	3.26	2054.40	875.89		0.27
MainRch	6830	100 YR	PH1 NON-MIT	2600.00	194.57	202.02		202.08	0.002077	3.26	2054.65	875.90		0.27
MainRch	6830	100 YR	PH1 MIT A	2600.00	194.57	201.85	200.32	201.90	0.001856	3.01	1907.62	871.87		0.26
MainRch	6830	100 YR	PH1 MIT B	2600.00	194.57	201.85	200.32	201.90	0.001857	3.01	1907.22	871.86		0.26
MainRch	6509	100 YR	EX LIDAR	2725.00	195.57	201.46		201.52	0.002475	3.56	2018.91	862.95		0.30
MainRch	6509	100 YR	PH1 NON-MIT	2725.00	195.57	201.46		201.52	0.002473	3.56	2019.46	862.96		0.30
MainRch	6509	100 YR	PH1 MIT A	2725.00	195.57	201.25		201.32	0.002929	3.80	1840.33	859.03		0.32

HEC-RAS River: LwrMillRun Reach: MainRch 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
MainRch	6509	100 YR	PH1 MIT B	2725.00	195.57	201.25		201.32	0.002934	3.81	1839.31	859.01	0.32
MainRch	6026	100 YR	EX LIDAR	2980.00	193.07	200.75		200.80	0.001584	3.19	2199.50	663.36	0.24
MainRch	6026	100 YR	PH1 NON-MIT	2980.00	193.07	200.75		200.80	0.001582	3.19	2200.46	663.38	0.24
MainRch	6026	100 YR	PH1 MIT A	2980.00	193.07	200.28		200.35	0.002376	3.68	1893.91	657.63	0.29
MainRch	6026	100 YR	PH1 MIT B	2980.00	193.07	200.28		200.35	0.002388	3.69	1890.69	657.57	0.29
MainRch	5815	100 YR	EX LIDAR	2980.00	192.41	200.34		200.47	0.001851	3.91	1600.65	510.14	0.28
MainRch	5815	100 YR	PH1 NON-MIT	2980.00	192.41	200.34		200.47	0.001848	3.90	1601.70	510.29	0.27
MainRch	5815	100 YR	PH1 MIT A	2980.00	192.41	199.61		199.82	0.003303	4.80	1242.70	488.89	0.36
MainRch	5815	100 YR	PH1 MIT B	2980.00	192.41	199.60		199.81	0.003334	4.82	1237.92	488.49	0.36
MainRch	5718	100 YR	EX LIDAR	3090.00	191.26	200.20		200.31	0.001646	3.61	1940.42	665.11	0.26
MainRch	5718	100 YR	PH1 NON-MIT	3090.00	191.26	200.20		200.31	0.001643	3.60	1941.98	665.20	0.26
MainRch	5718	100 YR	PH1 MIT A	3090.00	191.26	199.32		199.52	0.003470	4.72	1366.29	636.38	0.36
MainRch	5718	100 YR	PH1 MIT B	3090.00	191.26	199.30		199.51	0.003528	4.75	1356.90	635.74	0.36
MainRch	5506	100 YR	EX LIDAR	3090.00	191.47	199.82		199.96	0.002913	4.74	1751.95	660.19	0.34
MainRch	5506	100 YR	PH1 NON-MIT	3090.00	191.47	199.82		199.96	0.002902	4.73	1754.40	660.30	0.34
MainRch	5506	100 YR	PH1 MIT A	3090.00	191.47	199.04		199.10	0.001734	3.34	1813.27	631.71	0.25
MainRch	5506	100 YR	PH1 MIT B	3090.00	191.47	199.02		199.08	0.001772	3.37	1799.87	631.01	0.26
MainRch	5389	100 YR	EX LIDAR	3190.00	191.23	199.63		199.70	0.001916	3.87	2215.46	726.64	0.27
MainRch	5389	100 YR	PH1 NON-MIT	3190.00	191.23	199.64		199.71	0.001908	3.86	2218.71	726.95	0.27
MainRch	5389	100 YR	PH1 MIT A	3190.00	191.23	198.96		198.99	0.000765	2.27	2647.73	766.60	0.17
MainRch	5389	100 YR	PH1 MIT B	3190.00	191.23	198.94		198.96	0.000781	2.29	2630.16	764.97	0.17
MainRch	5010	100 YR	EX LIDAR	3190.00	190.42	199.10		199.17	0.001454	3.25	2358.77	728.22	0.24
MainRch	5010	100 YR	PH1 NON-MIT	3190.00	190.42	199.11		199.17	0.001446	3.25	2364.02	728.83	0.24
MainRch	5010	100 YR	PH1 MIT A	3190.00	190.42	198.75		198.78	0.000714	2.19	2605.90	711.30	0.16
MainRch	5010	100 YR	PH1 MIT B	3190.00	190.42	198.72		198.75	0.000730	2.20	2586.34	710.28	0.17
MainRch	4892	100 YR	EX LIDAR	3190.00	189.08	198.98		199.04	0.001332	3.42	2389.53	687.91	0.23
MainRch	4892	100 YR	PH1 NON-MIT	3190.00	189.08	198.99		199.05	0.001323	3.41	2395.10	688.14	0.23
MainRch	4892	100 YR	PH1 MIT A	3190.00	189.08	198.69		198.72	0.000613	2.26	2640.90	680.18	0.15
MainRch	4892	100 YR	PH1 MIT B	3190.00	189.08	198.67		198.70	0.000627	2.28	2621.32	679.62	0.15
MainRch	4634	100 YR	EX LIDAR	3190.00	188.83	198.70		198.78	0.001372	3.66	2152.19	567.12	0.24
MainRch	4634	100 YR	PH1 NON-MIT	3190.00	188.83	198.71		198.79	0.001362	3.65	2157.95	567.35	0.24
MainRch	4634	100 YR	PH1 MIT A	3190.00	188.83	198.52		198.58	0.001016	3.10	2049.09	562.89	0.20
MainRch	4634	100 YR	PH1 MIT B	3190.00	188.83	198.49		198.55	0.001042	3.13	2030.46	561.57	0.21
MainRch	4422	100 YR	EX LIDAR	3190.00	189.40	198.32		198.49	0.003111	4.94	1469.48	432.98	0.35
MainRch	4422	100 YR	PH1 NON-MIT	3190.00	189.40	198.33		198.50	0.003076	4.92	1473.57	433.41	0.35

HEC-RAS River: LwrnMillRun Reach: MainRch Profile: 100 YR (Continued)

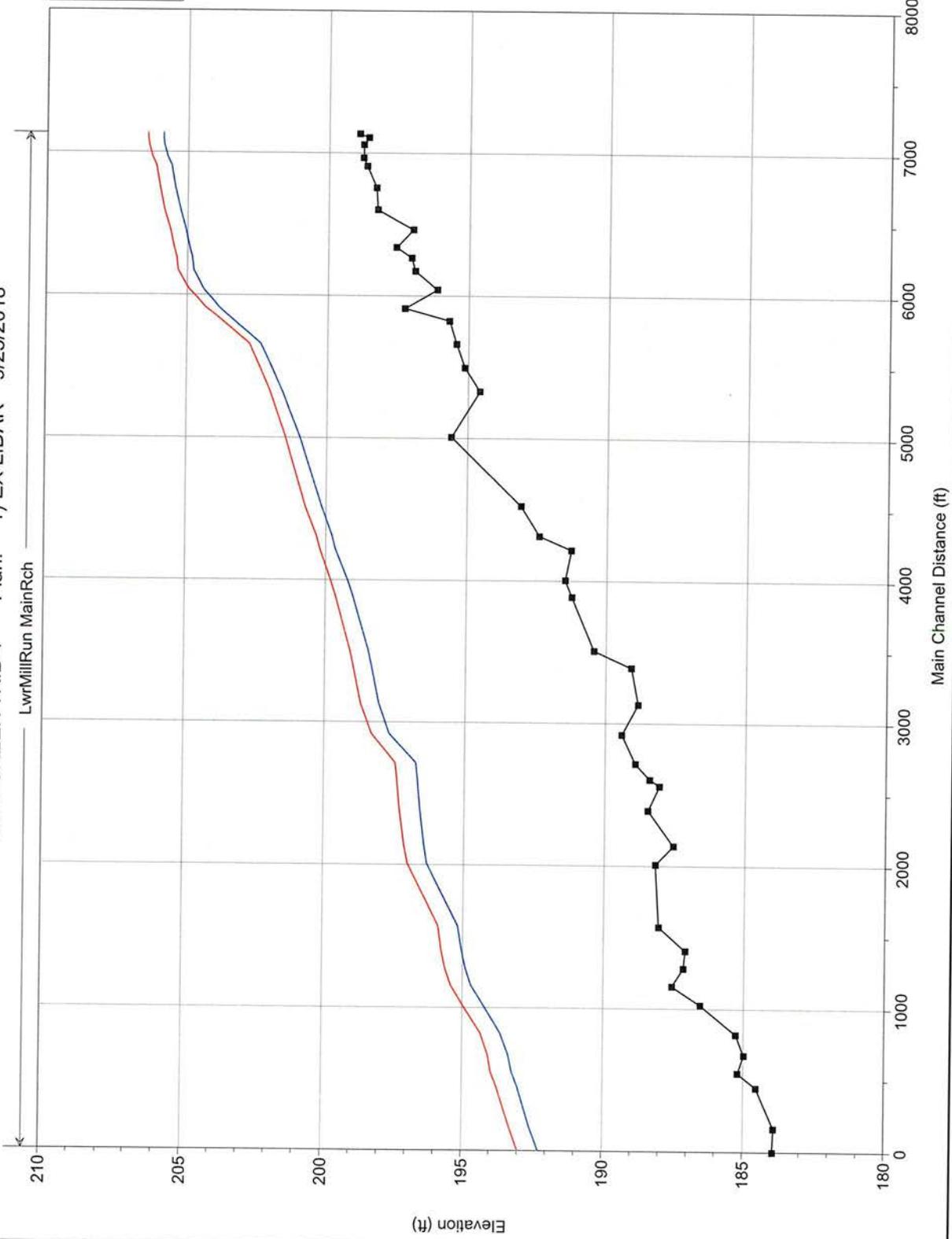
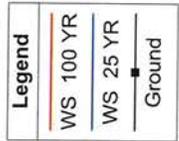
Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chml (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
MainRch	4422	100 YR	PH1 MIT A	3190.00	189.40	198.26	198.38	0.002209	4.14	1442.00	431.03	0.29	
MainRch	4422	100 YR	PH1 MIT B	3190.00	189.40	198.21	198.34	0.002288	4.19	1424.04	429.75	0.30	
MainRch	4218	100 YR	EX LIDAR	3190.00	188.91	197.46	197.79	0.004029	6.19	1291.18	505.96	0.41	
MainRch	4218	100 YR	PH1 NON-MIT	3190.00	188.91	197.49	197.82	0.003916	6.12	1247.60	454.46	0.40	
MainRch	4218	100 YR	PH1 MIT A	3190.00	188.91	197.45	197.79	0.004034	6.19	1231.66	453.18	0.41	
MainRch	4218	100 YR	PH1 MIT B	3190.00	188.91	197.34	197.72	0.004432	6.42	1182.41	450.17	0.43	
MainRch	4108	100 YR	EX LIDAR	3190.00	188.39	197.39	197.48	0.001513	3.72	2025.04	573.56	0.25	
MainRch	4108	100 YR	PH1 NON-MIT	3190.00	188.39	197.42	197.52	0.001471	3.68	2045.92	574.64	0.25	
MainRch	4108	100 YR	PH1 MIT A	3190.00	188.39	197.39	197.48	0.001510	3.72	1997.11	542.63	0.25	
MainRch	4108	100 YR	PH1 MIT B	3190.00	188.39	197.28	197.38	0.001613	3.80	1962.50	570.33	0.26	
MainRch	4062	100 YR	EX LIDAR	3190.00	188.04	197.37	197.43	0.001618	3.31	2149.72	587.84	0.25	
MainRch	4062	100 YR	PH1 NON-MIT	3190.00	188.04	197.41	197.46	0.001570	3.28	2171.47	588.84	0.24	
MainRch	4062	100 YR	PH1 MIT A	3190.00	188.04	197.37	197.43	0.001604	3.30	2132.82	560.40	0.24	
MainRch	4062	100 YR	PH1 MIT B	3190.00	188.04	197.26	197.32	0.001740	3.39	2084.31	584.83	0.25	
MainRch	3891	100 YR	EX LIDAR	3300.00	188.44	197.29	197.35	0.001543	3.11	2231.69	580.94	0.24	
MainRch	3891	100 YR	PH1 NON-MIT	3300.00	188.44	197.33	197.38	0.001496	3.07	2254.53	582.33	0.23	
MainRch	3891	100 YR	PH1 MIT A	3300.00	188.44	197.29	197.35	0.001543	3.11	2231.49	580.93	0.24	
MainRch	3891	100 YR	PH1 MIT B	3300.00	188.44	197.17	197.23	0.001697	3.21	2161.72	577.17	0.25	
MainRch	3642	100 YR	EX LIDAR	3300.00	187.53	197.13	197.22	0.001687	4.07	1879.25	450.84	0.26	
MainRch	3642	100 YR	PH1 NON-MIT	3300.00	187.53	197.17	197.26	0.001621	4.00	1889.36	427.79	0.25	
MainRch	3642	100 YR	PH1 MIT A	3300.00	187.53	197.13	197.22	0.001682	4.06	1878.89	446.90	0.26	
MainRch	3642	100 YR	PH1 MIT B	3300.00	187.53	197.00	197.09	0.001752	4.10	1814.90	424.49	0.26	
MainRch	3511	100 YR	EX LIDAR	3300.00	188.16	196.99	197.10	0.002074	3.95	1569.27	347.97	0.28	
MainRch	3511	100 YR	PH1 NON-MIT	3300.00	188.16	197.04	197.15	0.002017	3.91	1585.86	350.40	0.28	
MainRch	3511	100 YR	PH1 MIT A	3300.00	188.16	196.99	197.10	0.002074	3.95	1569.19	347.96	0.28	
MainRch	3511	100 YR	PH1 MIT B	3300.00	188.16	196.85	196.97	0.002237	4.03	1520.53	342.18	0.29	
MainRch	3074	100 YR	EX LIDAR	3300.00	188.03	195.88	196.17	0.005869	6.76	1236.88	426.74	0.48	
MainRch	3074	100 YR	PH1 NON-MIT	3300.00	188.03	196.03	196.29	0.005041	6.37	1273.60	405.33	0.44	
MainRch	3074	100 YR	PH1 MIT A	3300.00	188.03	195.88	196.17	0.005873	6.76	1236.57	426.71	0.48	
MainRch	3074	100 YR	PH1 MIT B	3300.00	188.03	195.88	196.11	0.004514	5.93	1210.73	393.89	0.42	
MainRch	2907	100 YR	EX LIDAR	3300.00	187.07	195.77	195.81	0.000888	2.69	2481.91	749.33	0.19	
MainRch	2907	100 YR	PH1 NON-MIT	3300.00	187.07	195.87	195.93	0.001019	2.91	1984.40	508.10	0.20	
MainRch	2907	100 YR	PH1 MIT A	3300.00	187.07	195.77	195.81	0.000888	2.69	2482.11	749.35	0.19	
MainRch	2907	100 YR	PH1 MIT B	3300.00	187.07	195.71	195.77	0.001019	2.86	1901.61	501.28	0.20	
MainRch	2787	100 YR	EX LIDAR	3300.00	187.14	195.64	195.71	0.001471	3.57	2401.94	894.65	0.24	

HEC-RAS River LwnMillRun Reach: MainRch Profile: 100 YR (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Chl W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Val Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
MainRch	2787	100 YR	PH1 NON-MIT	3300.00	187.14	195.72	195.81	0.001732	3.90	1869.83	489.21	0.26	
MainRch	2787	100 YR	PH1 MIT A	3300.00	187.14	195.64	195.71	0.001474	3.57	2390.23	870.56	0.24	
MainRch	2787	100 YR	PH1 MIT B	3300.00	187.14	195.55	195.64	0.001795	3.91	1787.36	472.59	0.27	
MainRch	2659	100 YR	EX LIDAR	3300.00	187.54	195.42	195.53	0.002334	4.42	1874.36	633.62	0.31	
MainRch	2659	100 YR	PH1 NON-MIT	3300.00	187.54	195.48	195.61	0.002685	4.78	1502.29	382.05	0.33	
MainRch	2659	100 YR	PH1 MIT A	3300.00	187.54	195.42	195.53	0.002334	4.42	1874.36	633.62	0.31	
MainRch	2659	100 YR	PH1 MIT B	3300.00	187.54	195.32	195.44	0.002551	4.57	1441.76	365.85	0.32	
MainRch	2528	100 YR	EX LIDAR	3300.00	186.52	195.01	195.20	0.002725	4.88	1549.63	501.91	0.33	
MainRch	2528	100 YR	PH1 NON-MIT	3300.00	186.52	194.99	195.23	0.003163	5.24	1211.23	296.89	0.36	
MainRch	2528	100 YR	PH1 MIT A	3300.00	186.52	195.01	195.20	0.002725	4.88	1549.63	501.91	0.33	
MainRch	2528	100 YR	PH1 MIT B	3300.00	186.52	194.91	195.10	0.002683	4.79	1185.61	295.84	0.33	
MainRch	2324	100 YR	EX LIDAR	3300.00	185.25	194.34	194.67	0.003818	5.51	974.50	288.25	0.39	
MainRch	2324	100 YR	PH1 NON-MIT	3300.00	185.25	194.33	194.66	0.003838	5.52	972.49	288.05	0.39	
MainRch	2324	100 YR	PH1 MIT A	3300.00	185.25	194.34	194.67	0.003818	5.51	974.50	288.25	0.39	
MainRch	2324	100 YR	PH1 MIT B	3300.00	185.25	194.20	194.55	0.004185	5.88	936.58	284.35	0.41	
MainRch	2178	100 YR	EX LIDAR	3300.00	184.96	194.09	194.16	0.001516	3.62	1966.24	528.53	0.25	
MainRch	2178	100 YR	PH1 NON-MIT	3300.00	184.96	194.08	194.15	0.001528	3.63	1964.09	528.28	0.25	
MainRch	2178	100 YR	PH1 MIT A	3300.00	184.96	194.09	194.16	0.001516	3.62	1966.24	528.53	0.25	
MainRch	2178	100 YR	PH1 MIT B	3300.00	184.96	193.90	193.98	0.001752	3.82	1870.19	523.54	0.26	
MainRch	2053	100 YR	EX LIDAR	3300.00	185.18	193.98	194.06	0.001852	3.83	1880.09	553.60	0.27	
MainRch	2053	100 YR	PH1 NON-MIT	3300.00	185.18	193.97	194.05	0.001870	3.84	1874.08	553.38	0.27	
MainRch	2053	100 YR	PH1 MIT A	3300.00	185.18	193.98	194.06	0.001852	3.83	1880.09	553.60	0.27	
MainRch	2053	100 YR	PH1 MIT B	3300.00	185.18	193.76	193.86	0.002234	4.11	1762.65	549.35	0.29	
MainRch	1951	100 YR	EX LIDAR	3300.00	184.52	193.77	193.80	0.000758	2.41	2543.56	557.56	0.17	
MainRch	1951	100 YR	PH1 NON-MIT	3300.00	184.52	193.76	193.79	0.000764	2.41	2536.53	557.30	0.17	
MainRch	1951	100 YR	PH1 MIT A	3300.00	184.52	193.77	193.80	0.000758	2.41	2543.56	557.56	0.17	
MainRch	1951	100 YR	PH1 MIT B	3300.00	184.52	193.52	193.56	0.000873	2.52	2407.47	552.55	0.18	
MainRch	1666	100 YR	EX LIDAR	3300.00	183.90	193.31	193.48	0.001870	3.88	1415.28	395.40	0.28	
MainRch	1666	100 YR	PH1 NON-MIT	3300.00	183.90	193.29	193.46	0.001893	3.90	1408.40	395.07	0.28	
MainRch	1666	100 YR	PH1 MIT A	3300.00	183.90	193.31	193.48	0.001870	3.88	1415.28	395.40	0.28	
MainRch	1666	100 YR	PH1 MIT B	3300.00	183.90	193.05	193.21	0.001912	3.81	1313.75	390.72	0.28	
MainRch	1502	100 YR	EX LIDAR	3300.00	183.93	193.00	193.16	0.002203	4.44	1579.97	441.41	0.30	
MainRch	1502	100 YR	PH1 NON-MIT	3300.00	183.93	192.98	193.15	0.002200	4.43	1566.56	428.42	0.30	
MainRch	1502	100 YR	PH1 MIT A	3300.00	183.93	193.00	193.16	0.002203	4.44	1579.96	441.41	0.30	
MainRch	1502	100 YR	PH1 MIT B	3300.00	183.93	192.74	192.89	0.002201	4.32	1464.50	428.78	0.30	

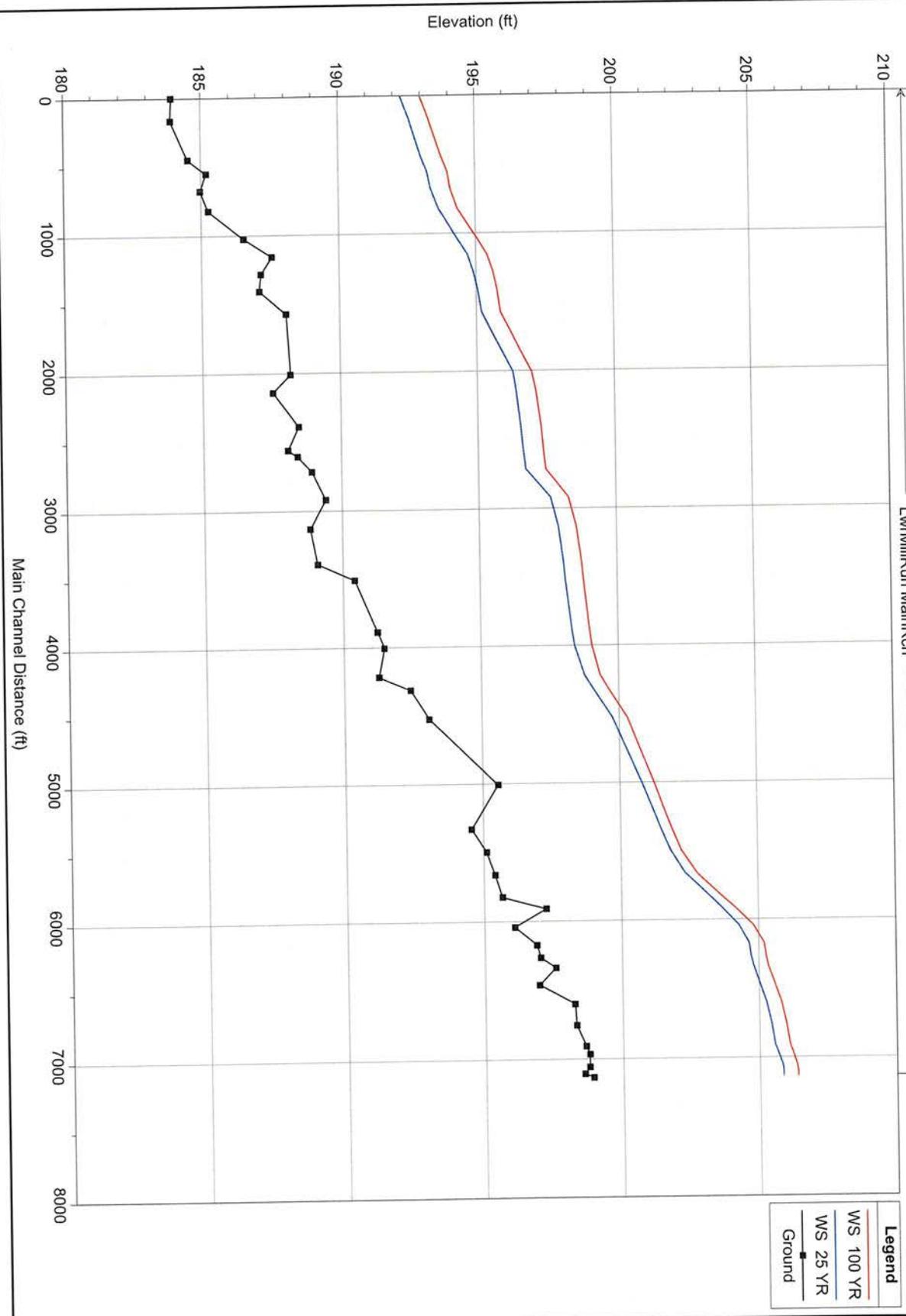
MILL CREEK TRIB 4 Plan: 1) EX LIDAR 9/25/2018

LwrMillRun MainRch



MILL CREEK TRIB 4 Plan: 1) PH1 MIT A 9/25/2018

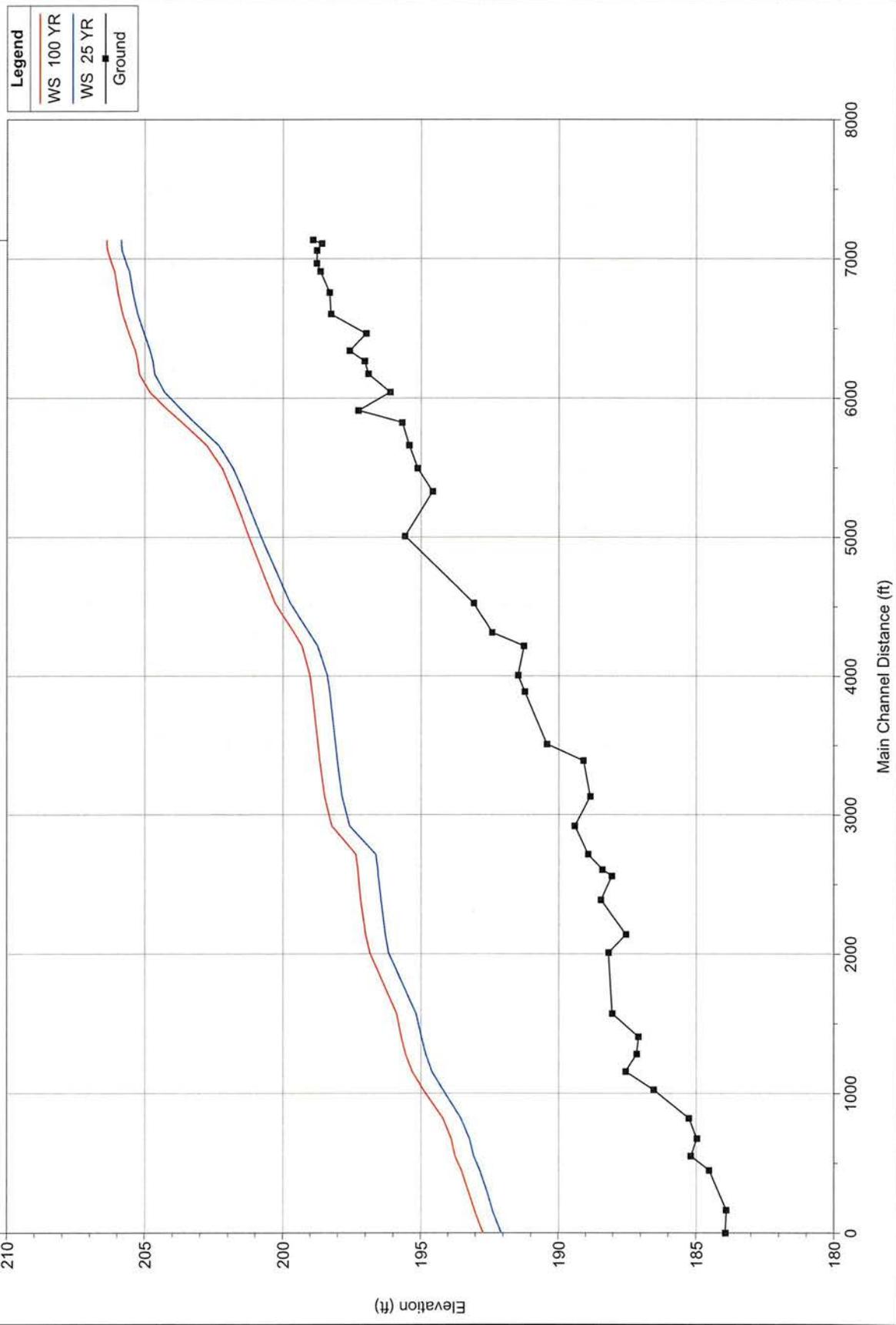
LvrMillRun MainRech



Legend	
—	WS 100 YR
—	WS 25 YR
■	Ground

MILL CREEK TRIB 4 Plan: PH1 MIT B 9/25/2018

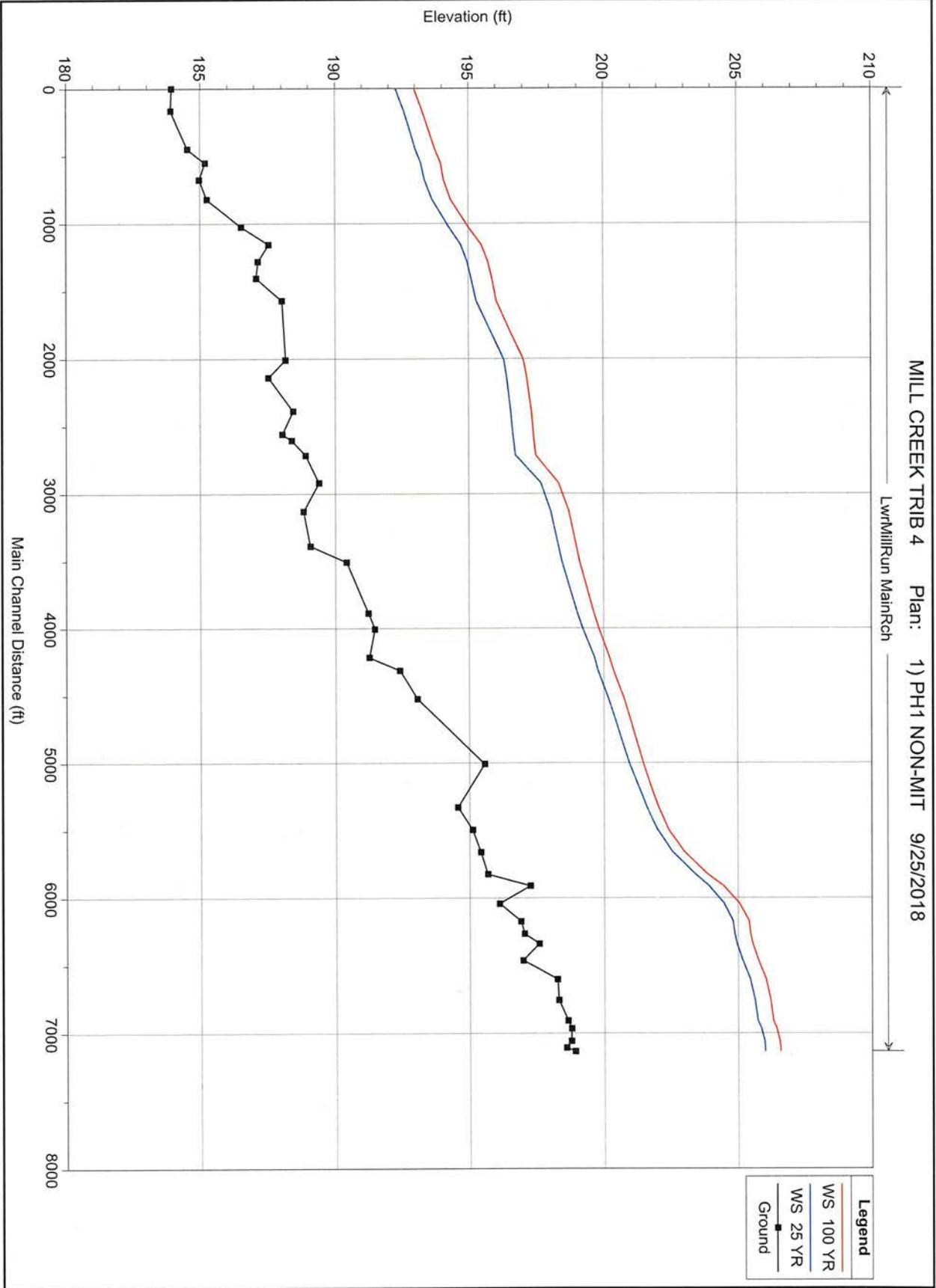
LwrMillRun MainRch



Legend	
WS 100 YR	(Red line)
WS 25 YR	(Blue line)
Ground	(Black line with square markers)

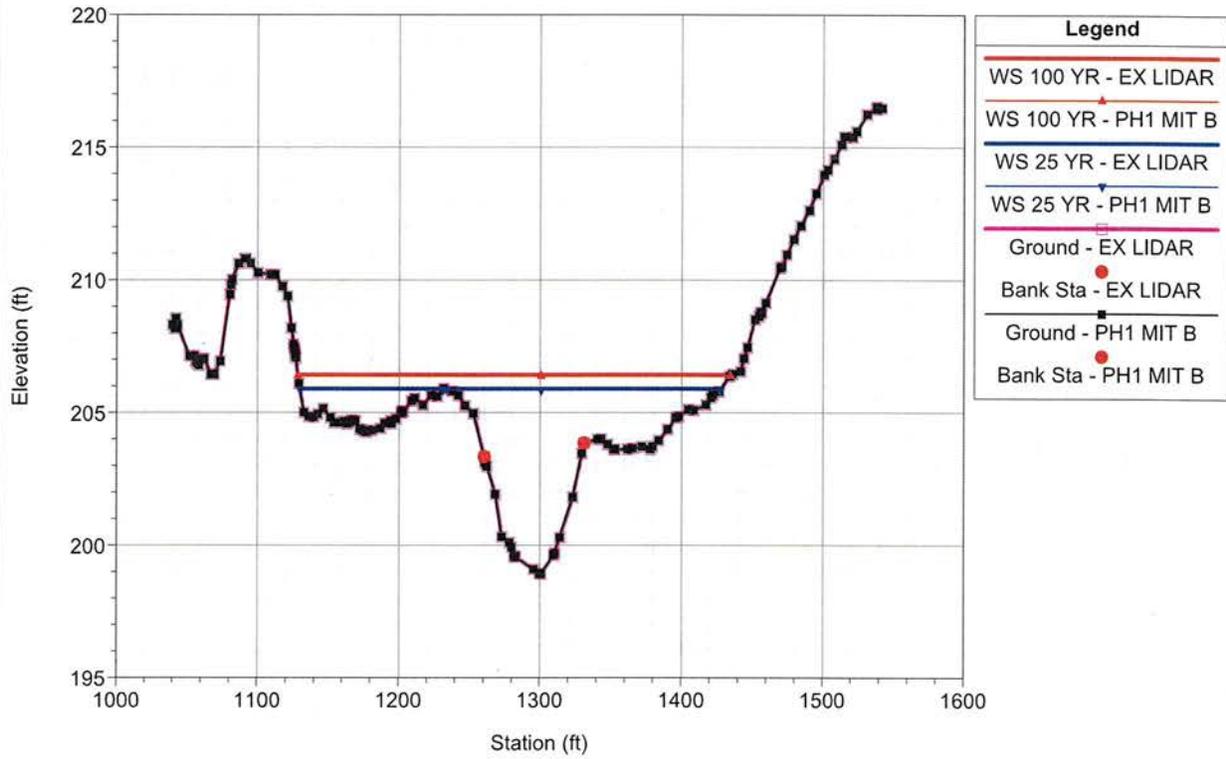
MILL CREEK TRIB 4 Plan: 1) PH1 NON-MIT 9/25/2018

LvrMillRun MainRch

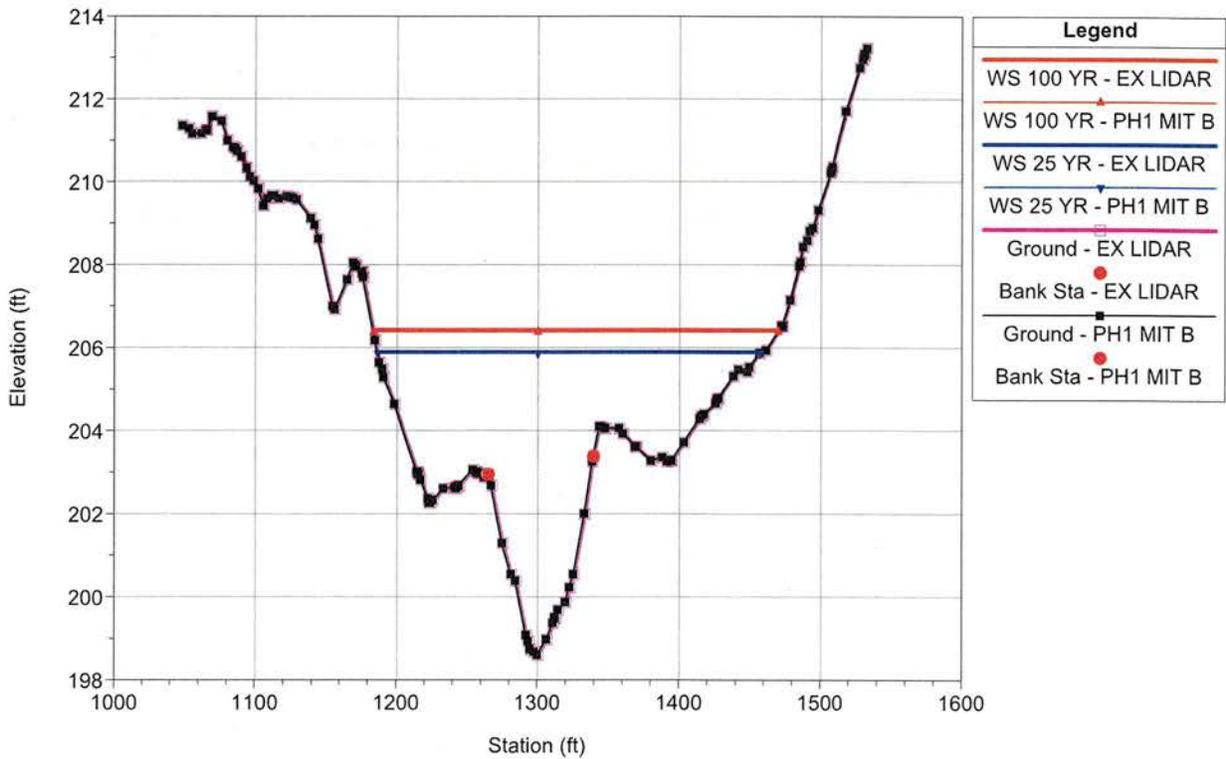


Legend	
—	WS 100 YR
—	WS 25 YR
■	Ground

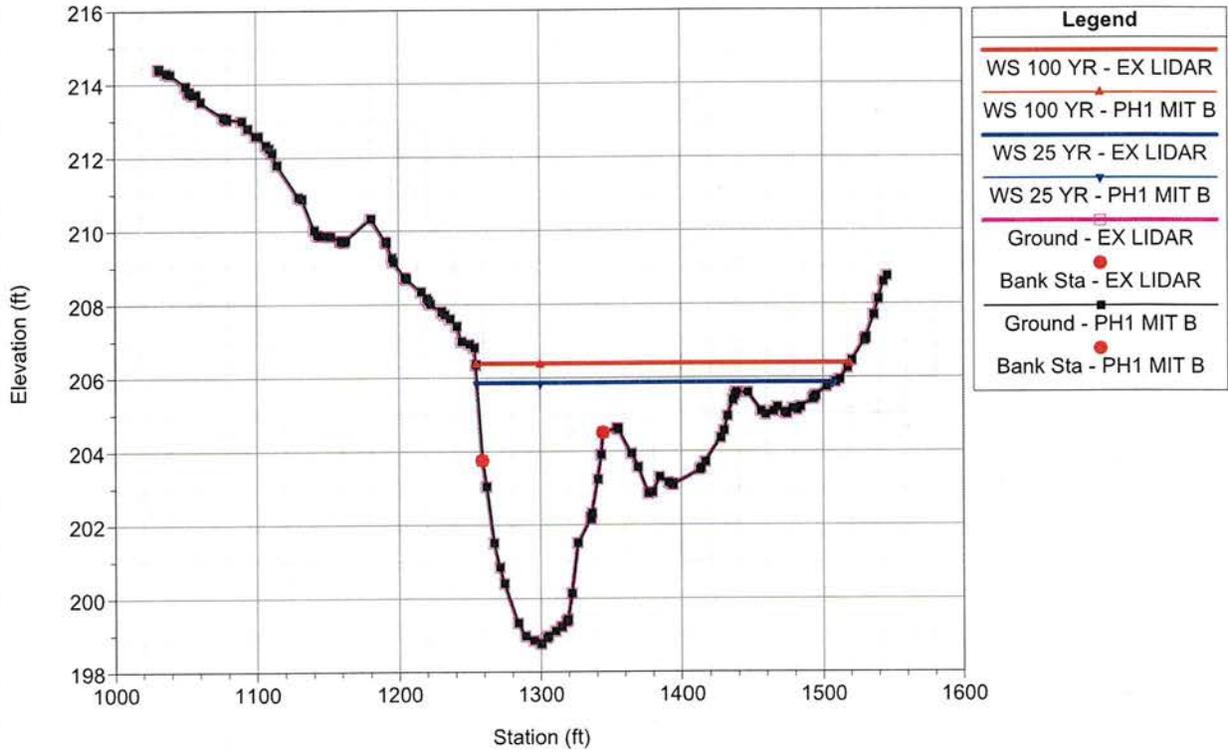
MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 8636



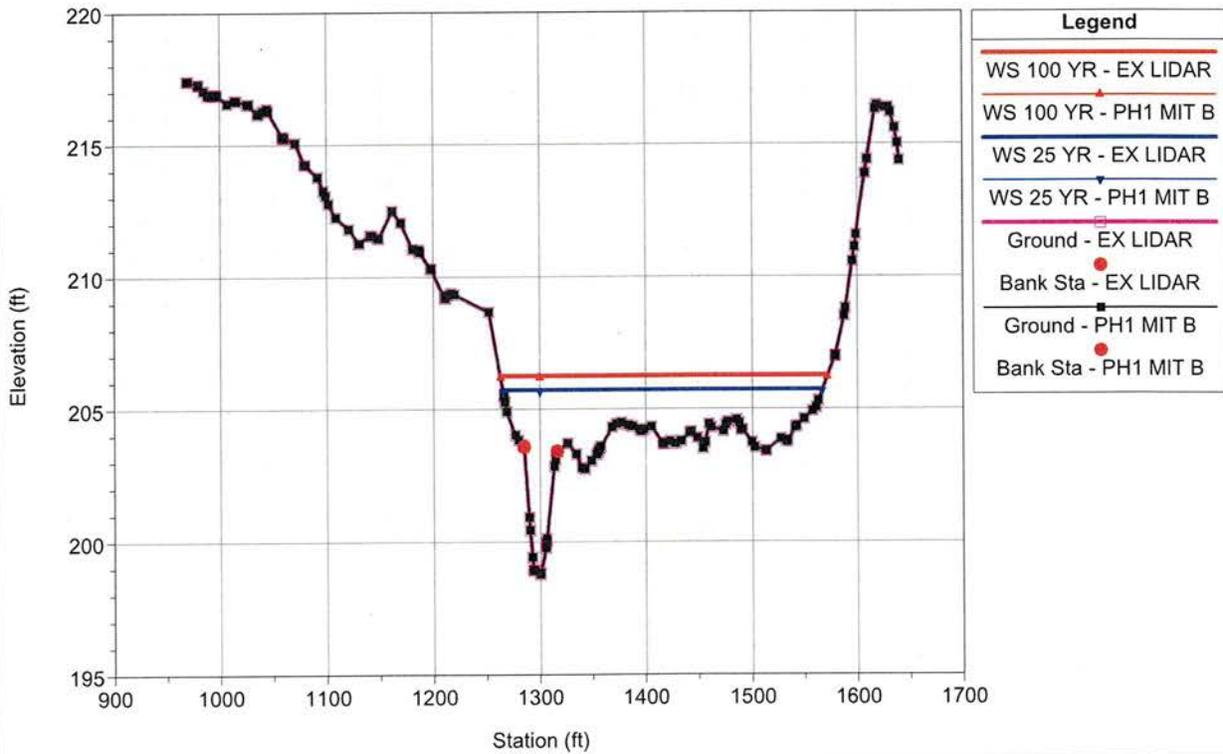
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RS = 8610



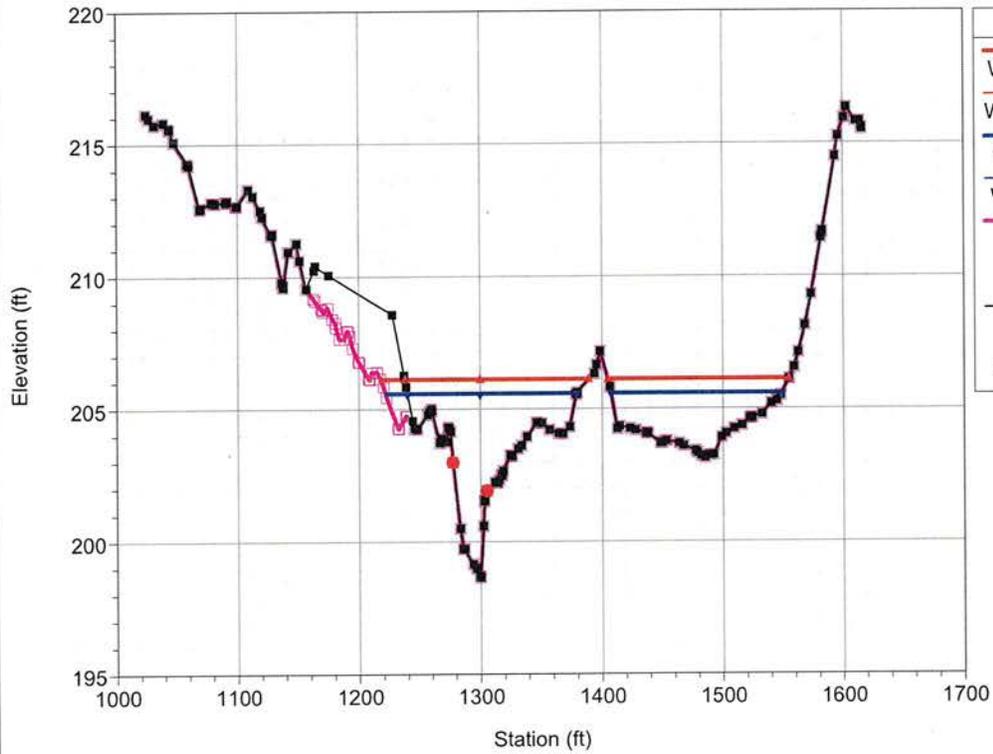
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RS = 8560



MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 8468

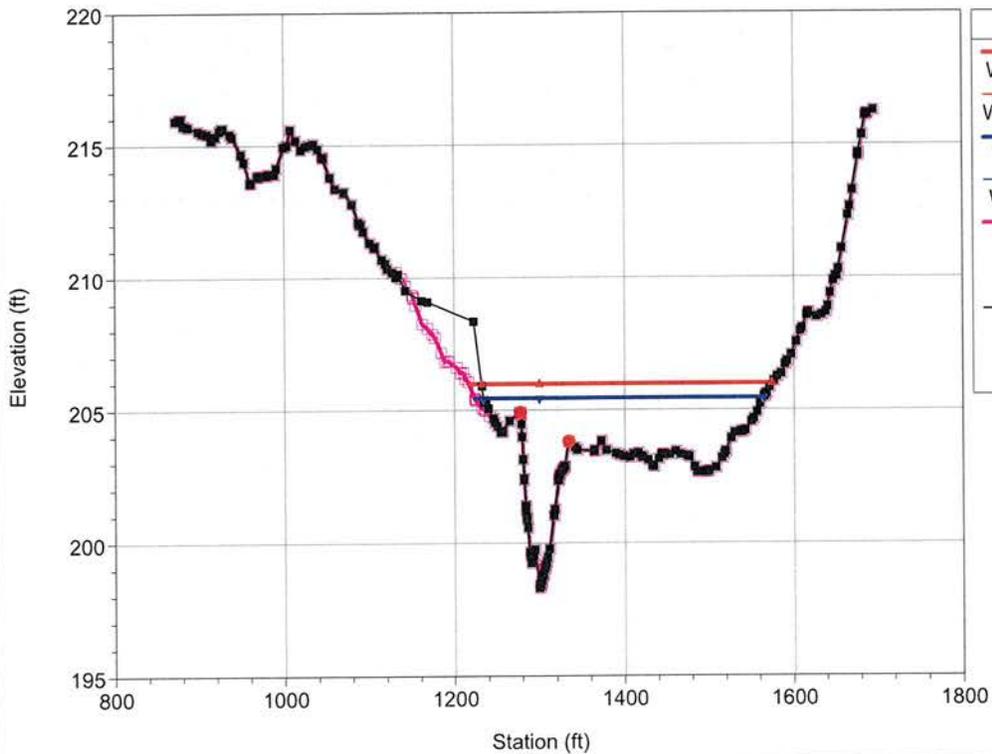


MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 8410



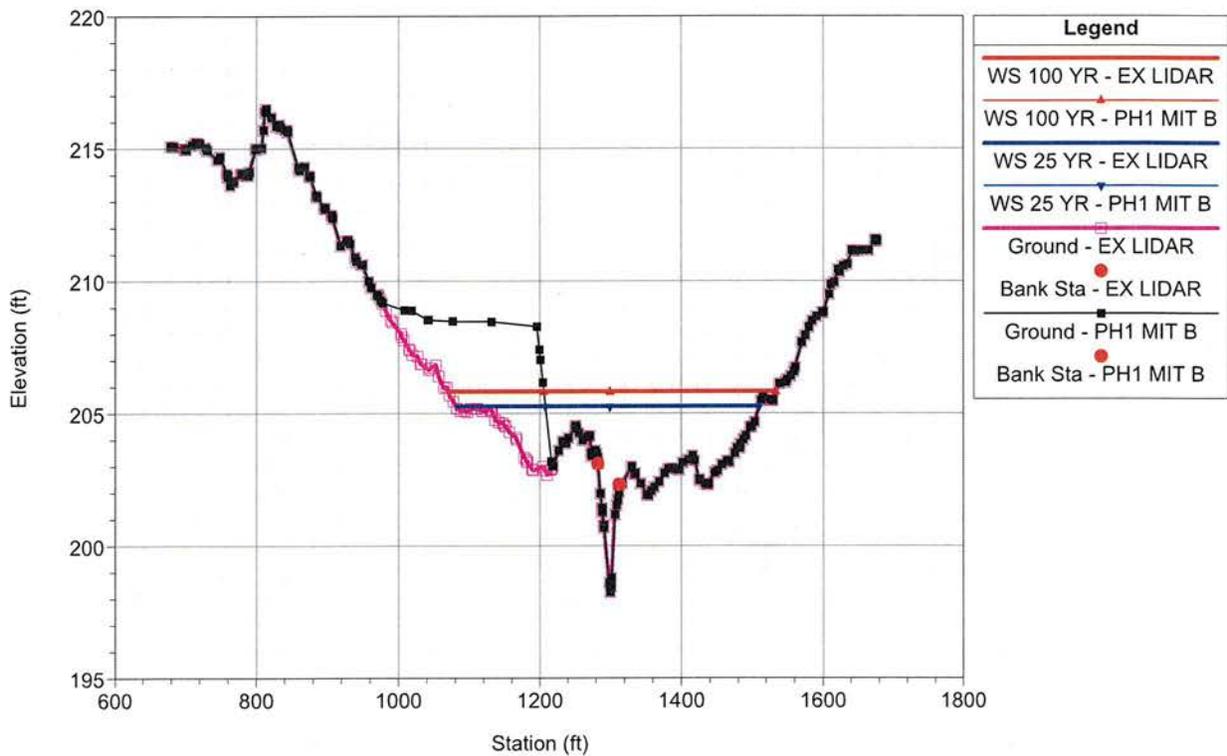
Legend	
WS 100 YR - EX LIDAR	▲
WS 100 YR - PH1 MIT B	▲
WS 25 YR - EX LIDAR	▼
WS 25 YR - PH1 MIT B	▼
Ground - EX LIDAR	■
Bank Sta - EX LIDAR	●
Ground - PH1 MIT B	■
Bank Sta - PH1 MIT B	●

MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 8257

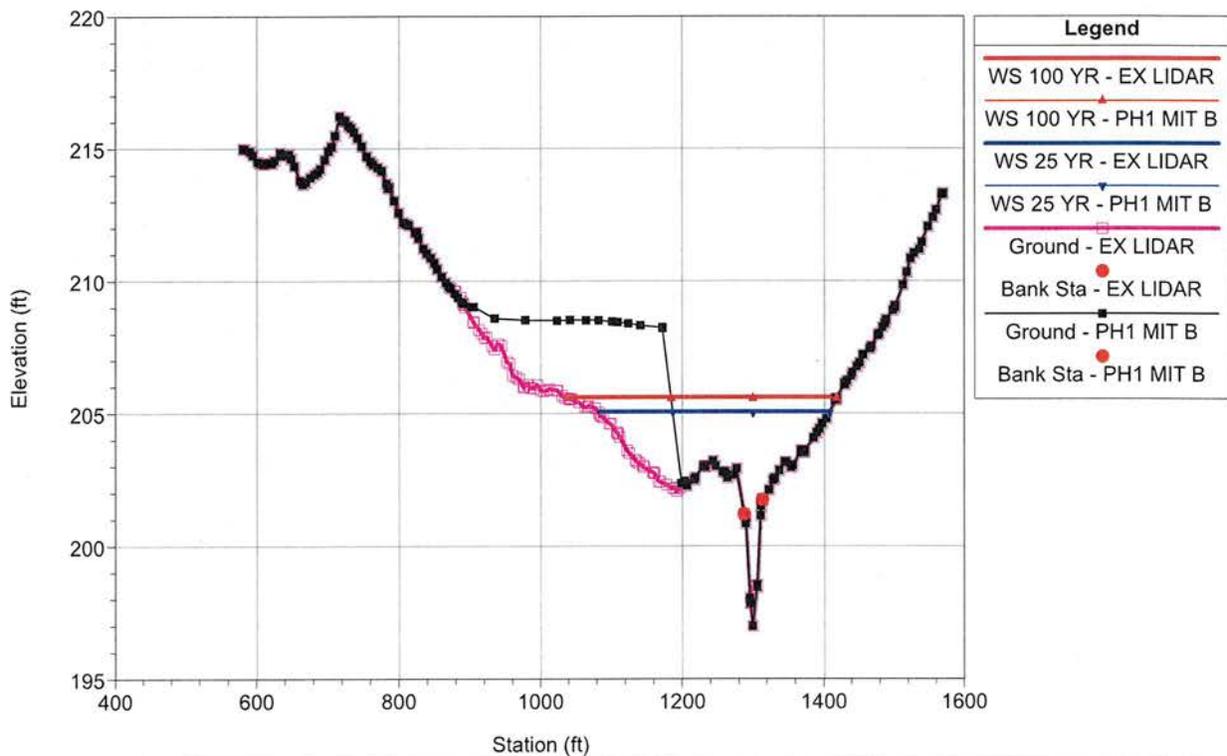


Legend	
WS 100 YR - EX LIDAR	▲
WS 100 YR - PH1 MIT B	▲
WS 25 YR - EX LIDAR	▼
WS 25 YR - PH1 MIT B	▼
Ground - EX LIDAR	■
Bank Sta - EX LIDAR	●
Ground - PH1 MIT B	■
Bank Sta - PH1 MIT B	●

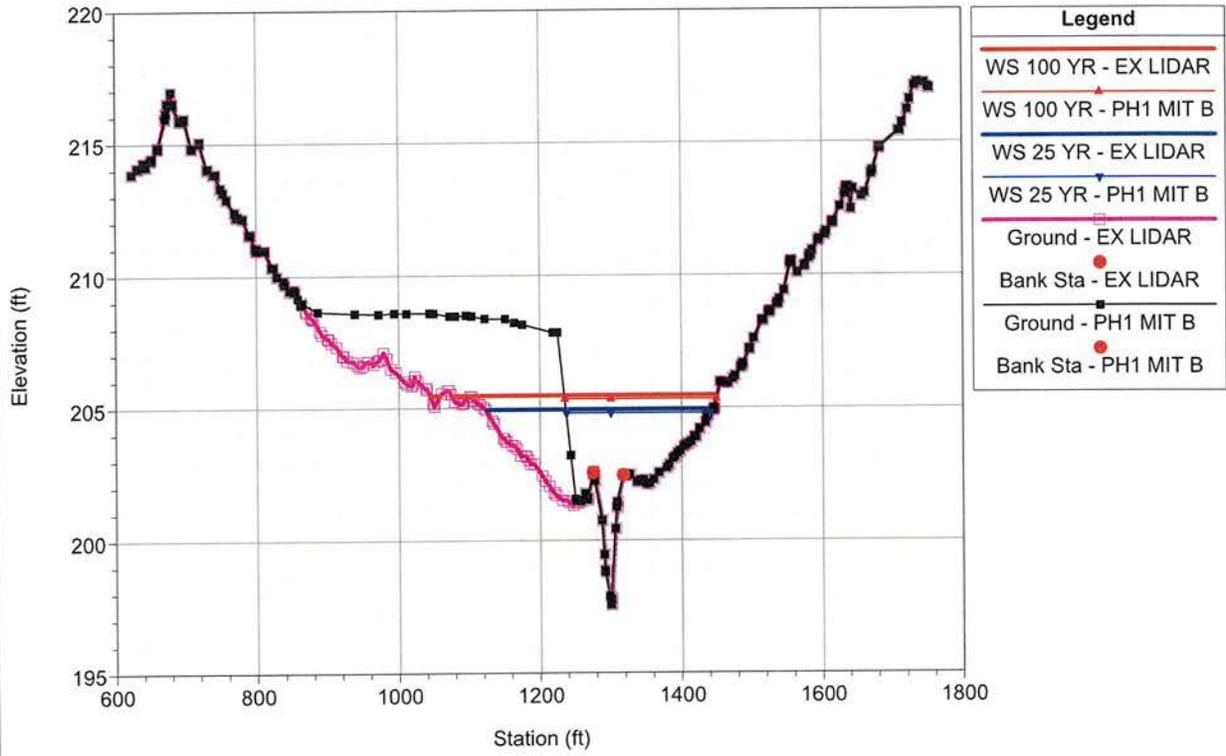
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RS = 8104



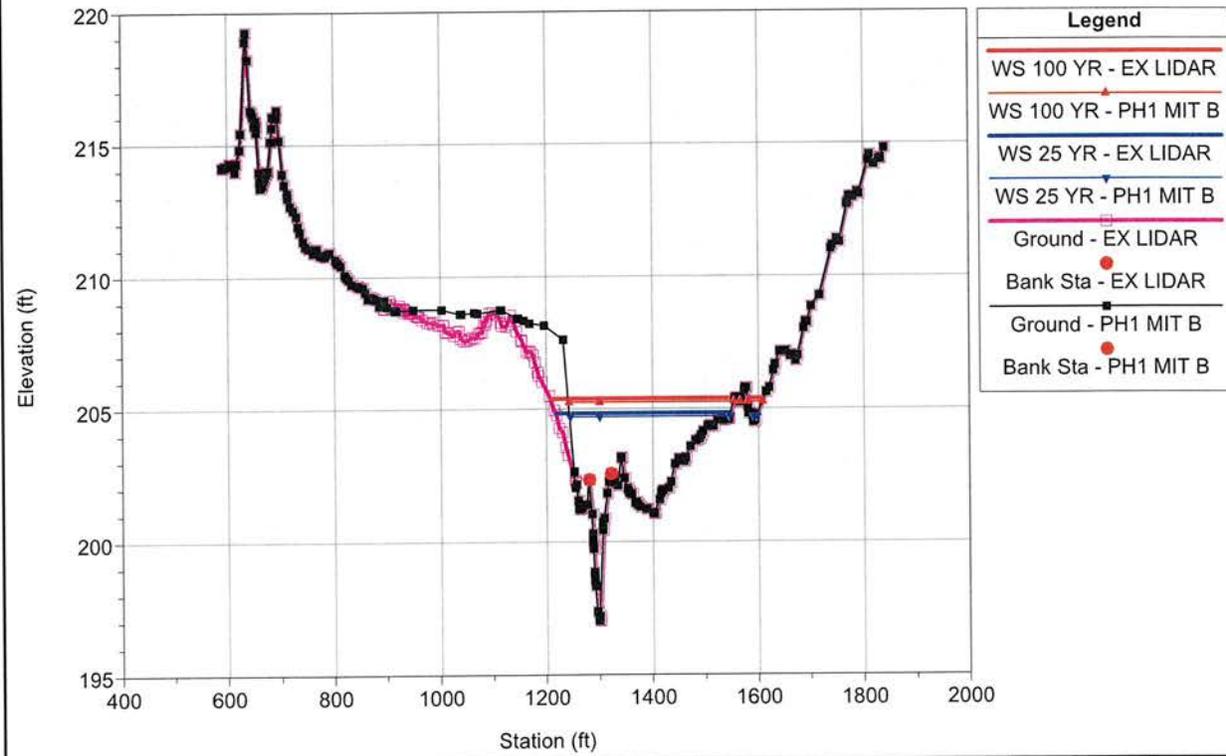
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RS = 7964



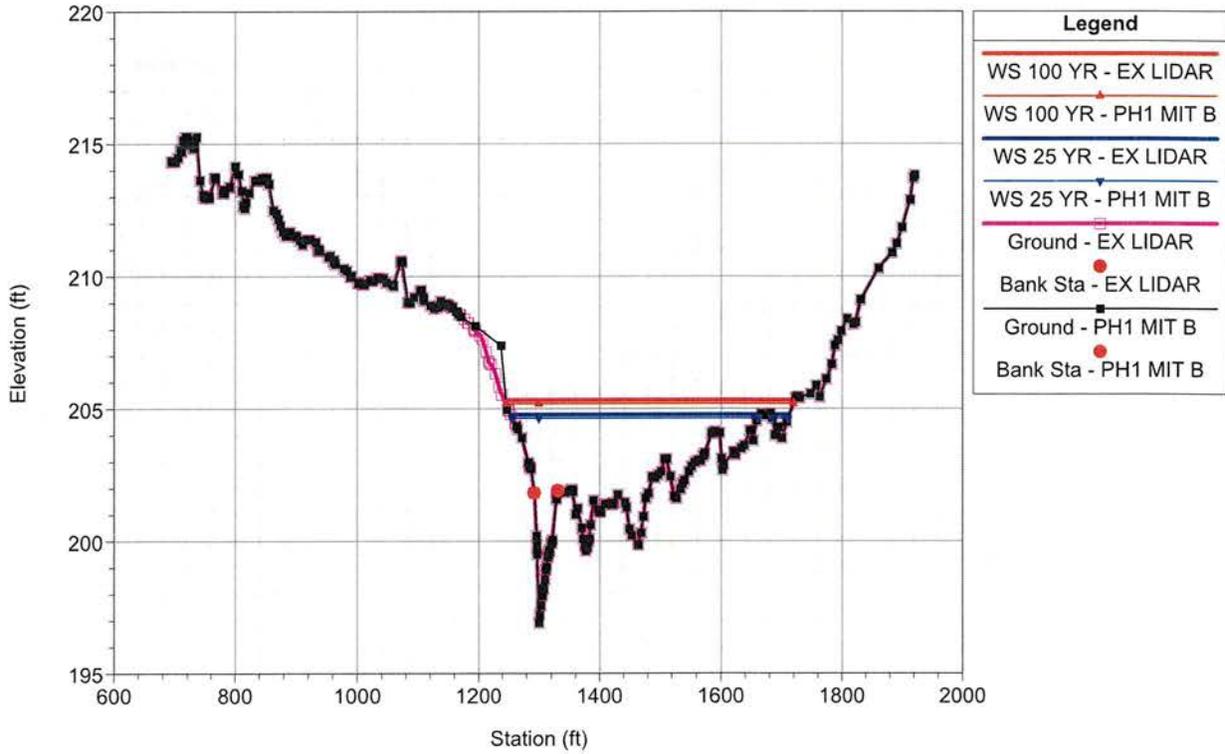
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RS = 7840



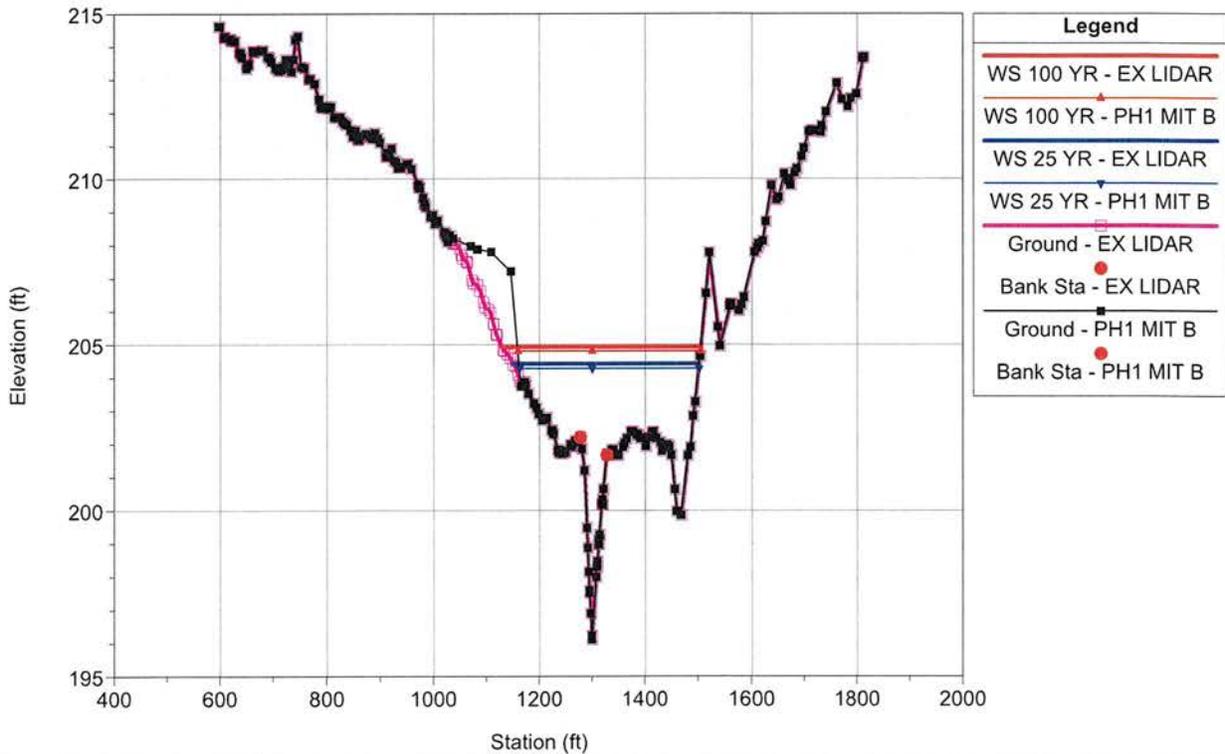
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RS = 7766



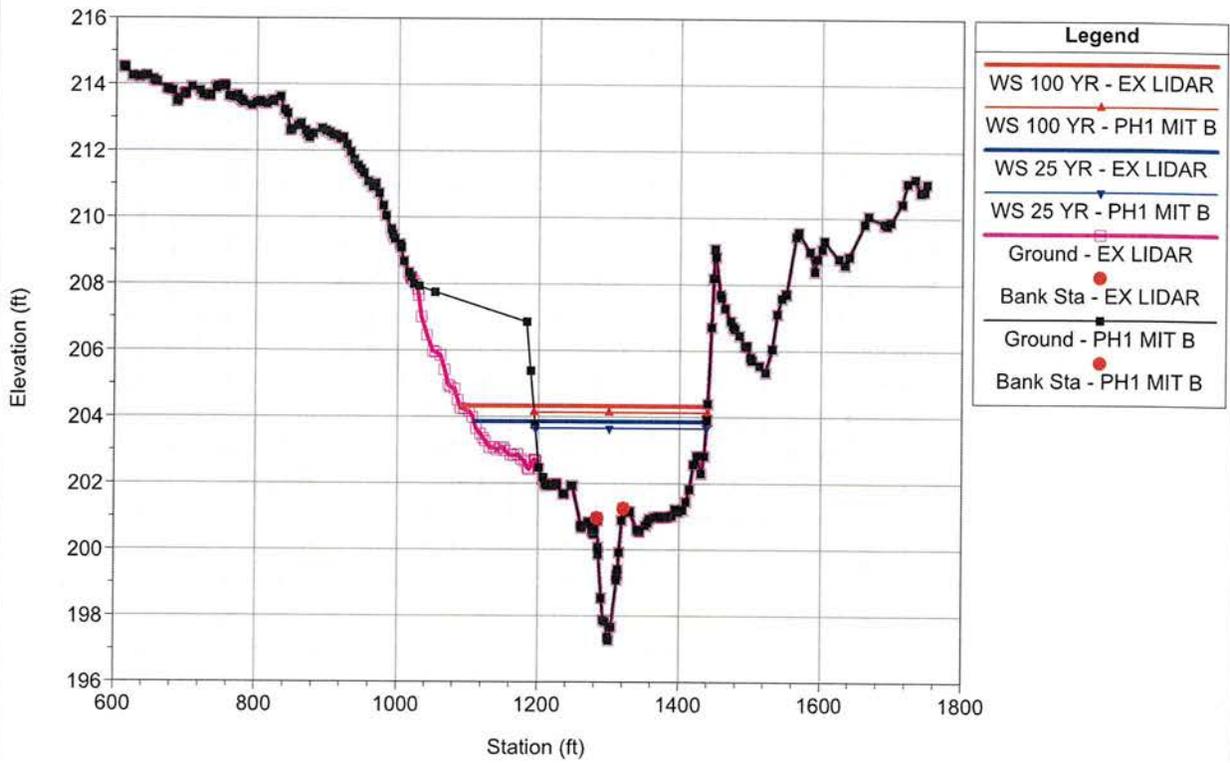
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RS = 7674



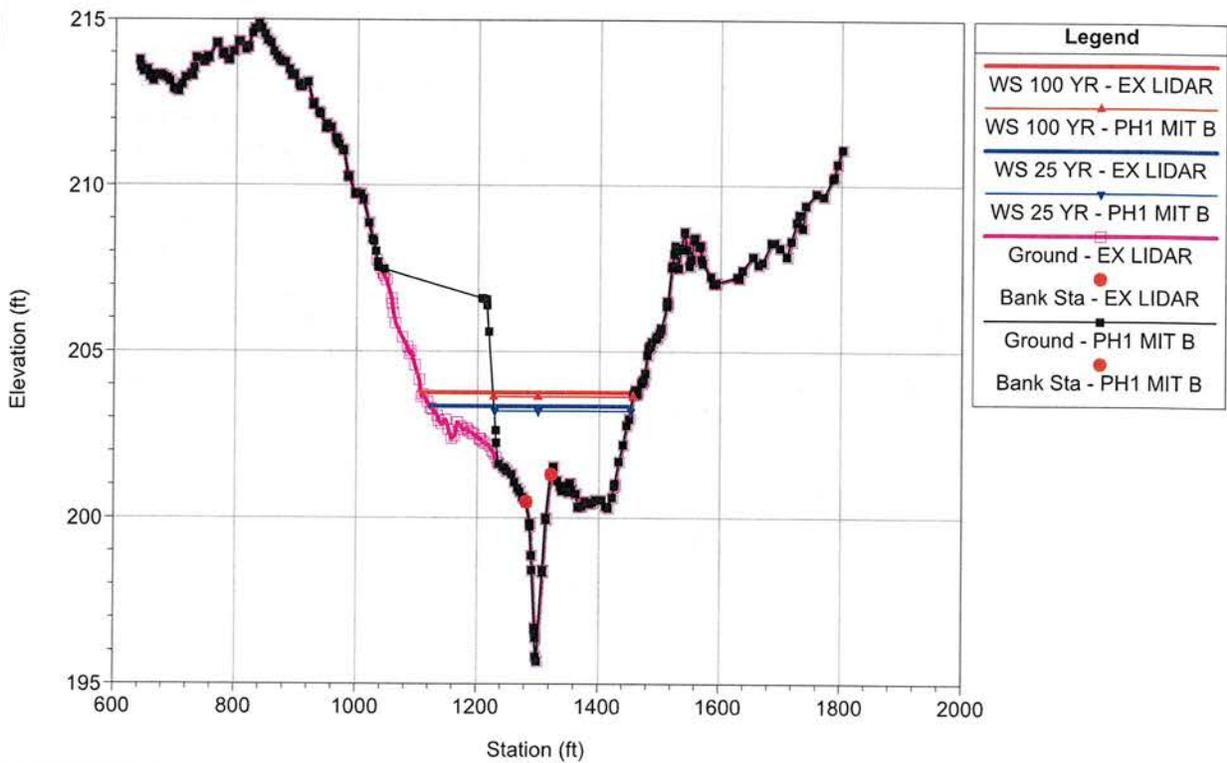
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RS = 7544



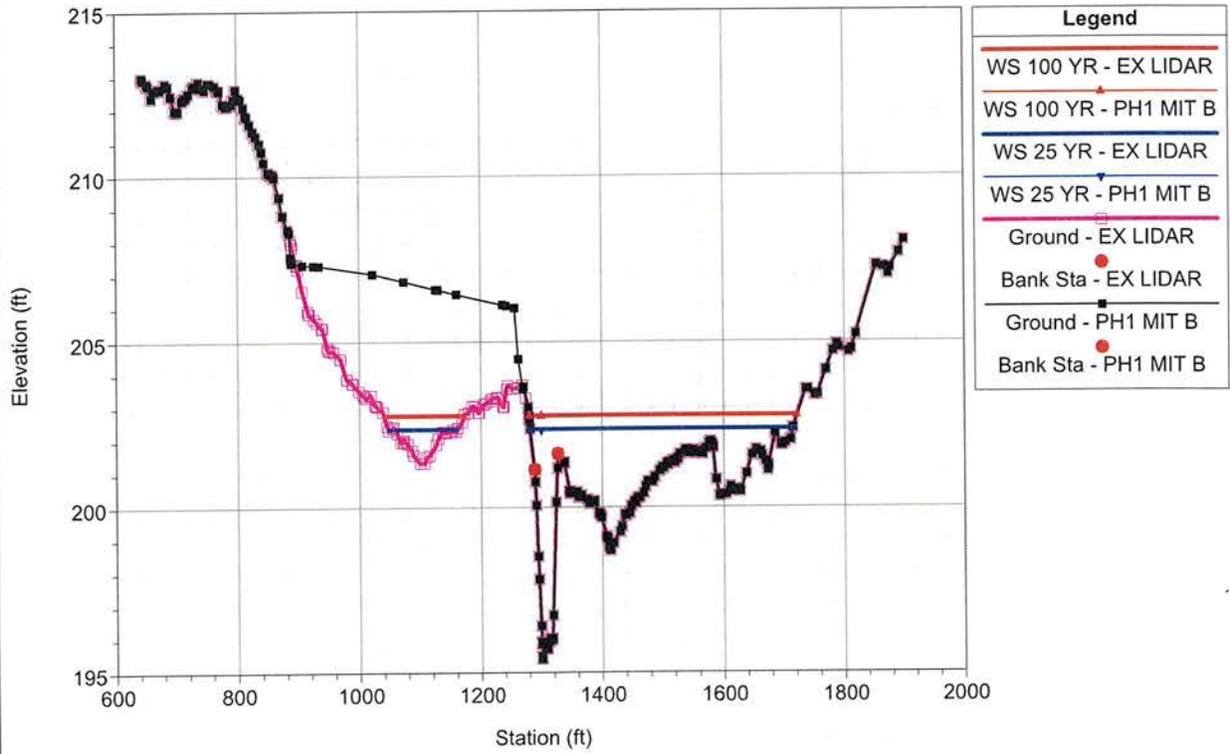
MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 7412



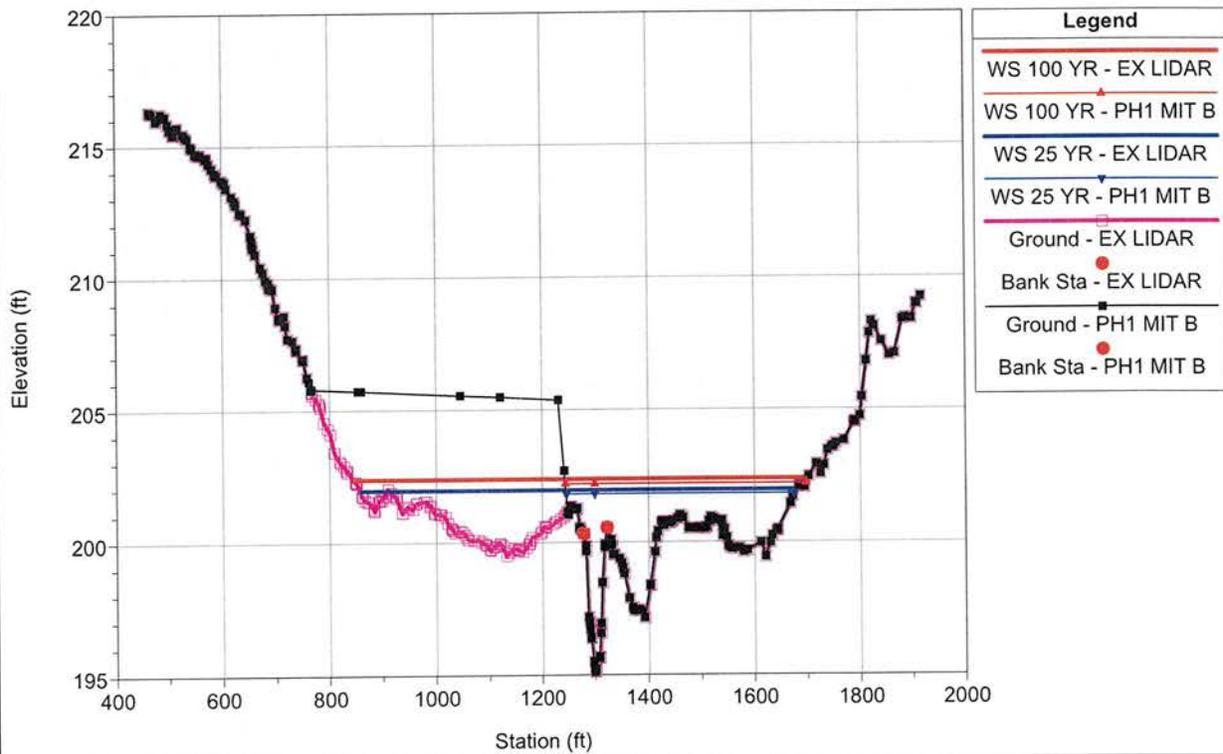
MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 7325



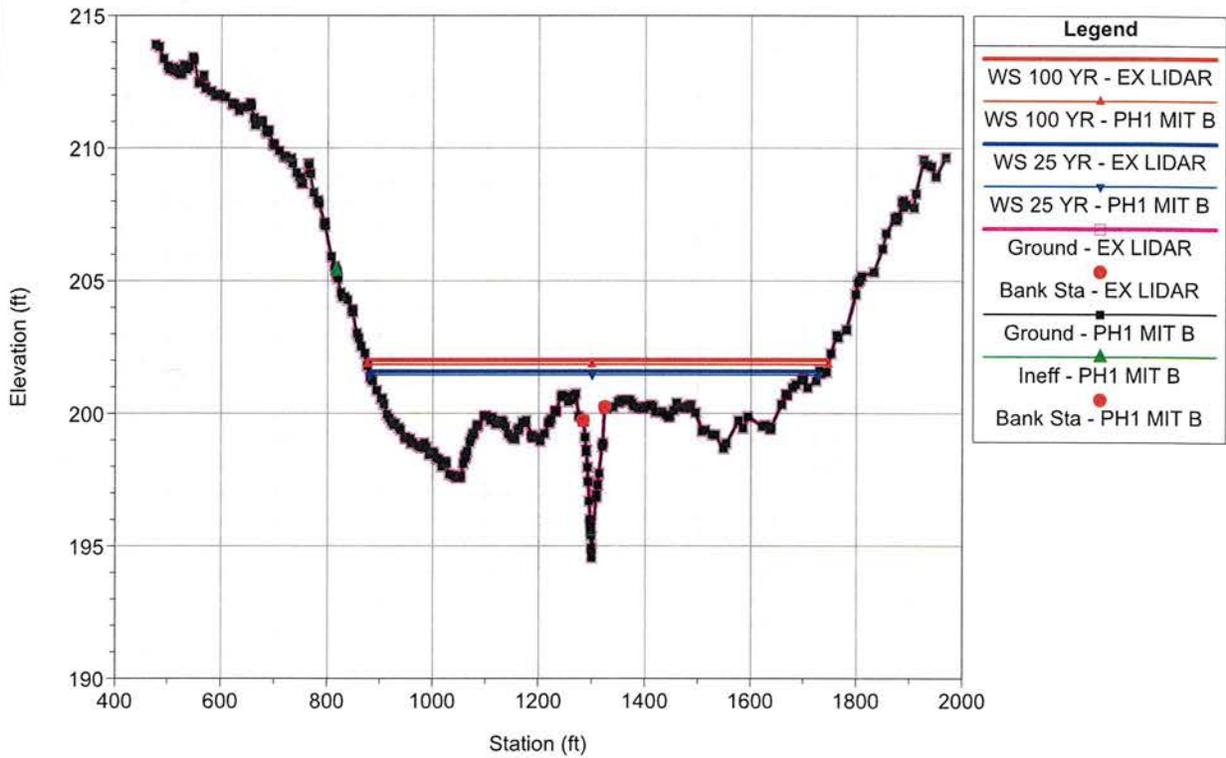
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RS = 7162



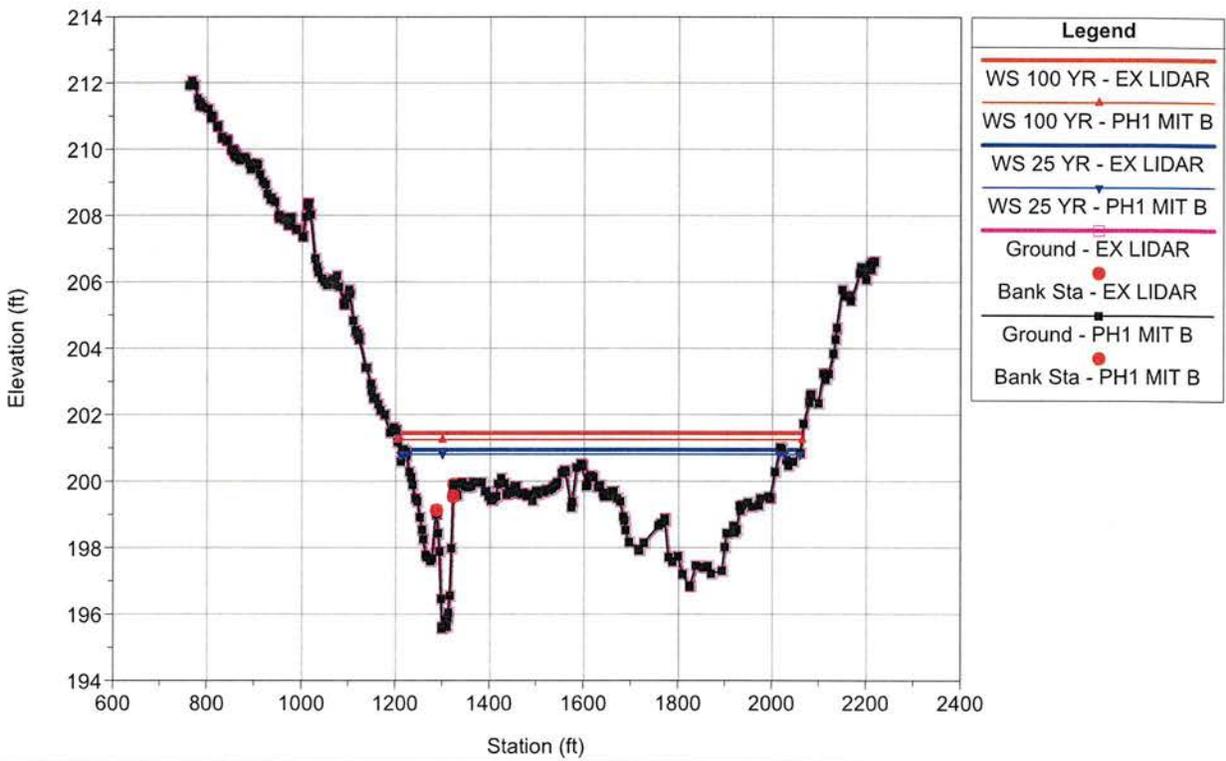
MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 6997



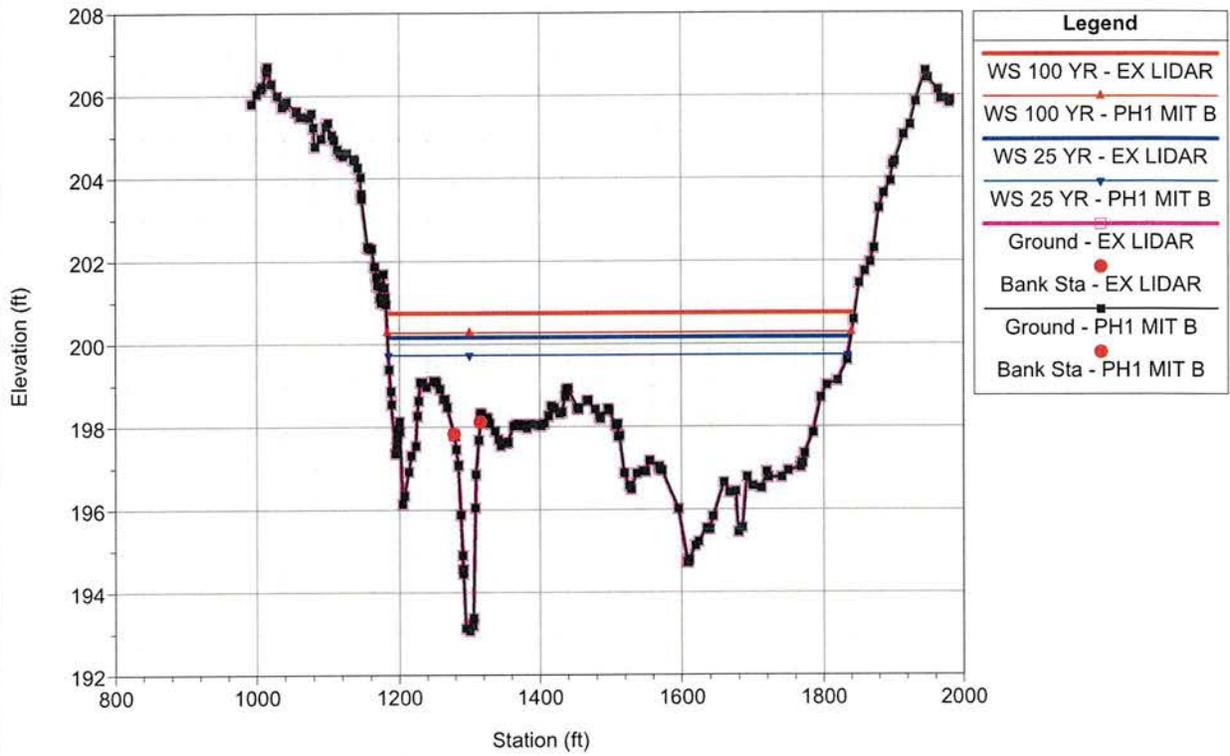
MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 6830



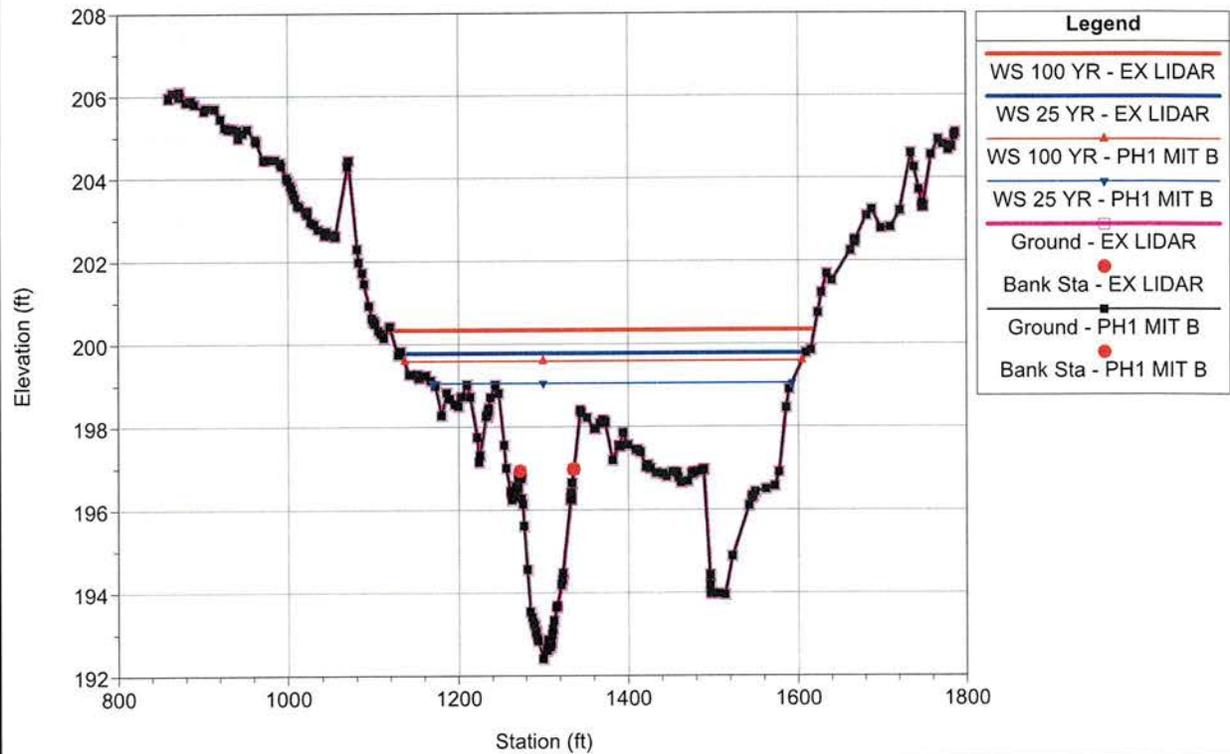
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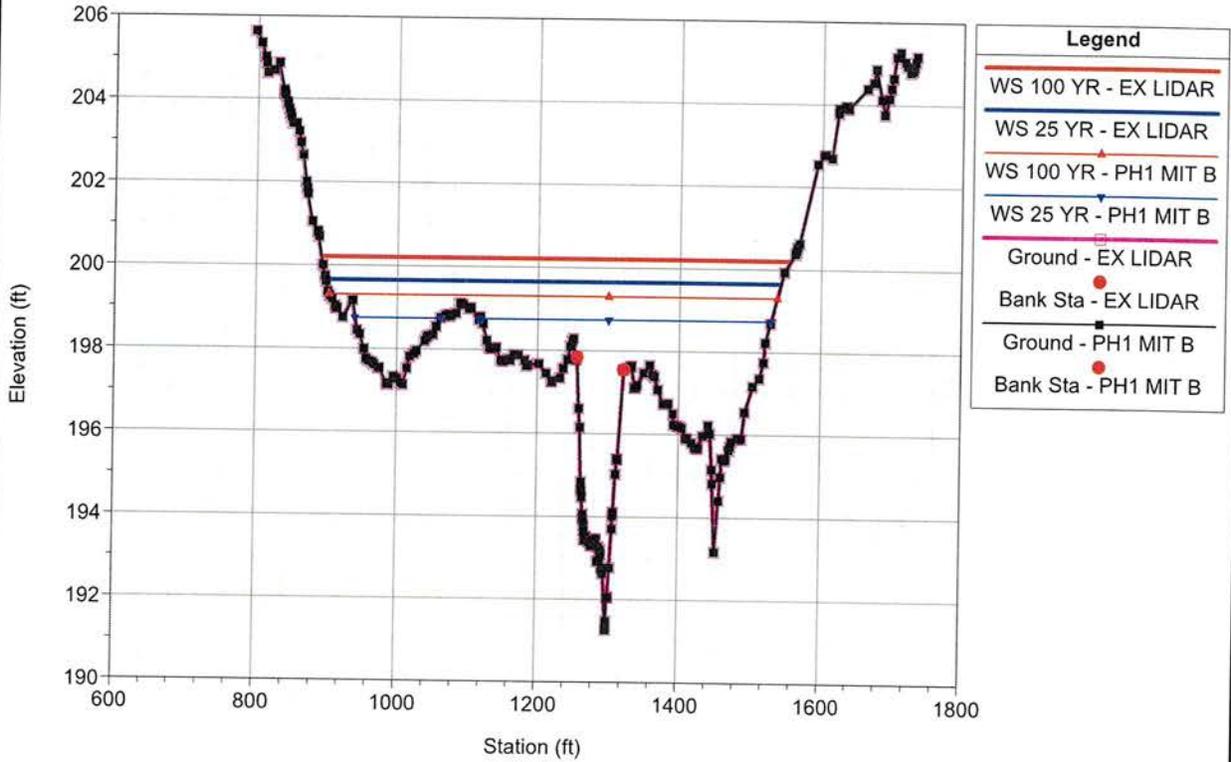
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RS = 6026



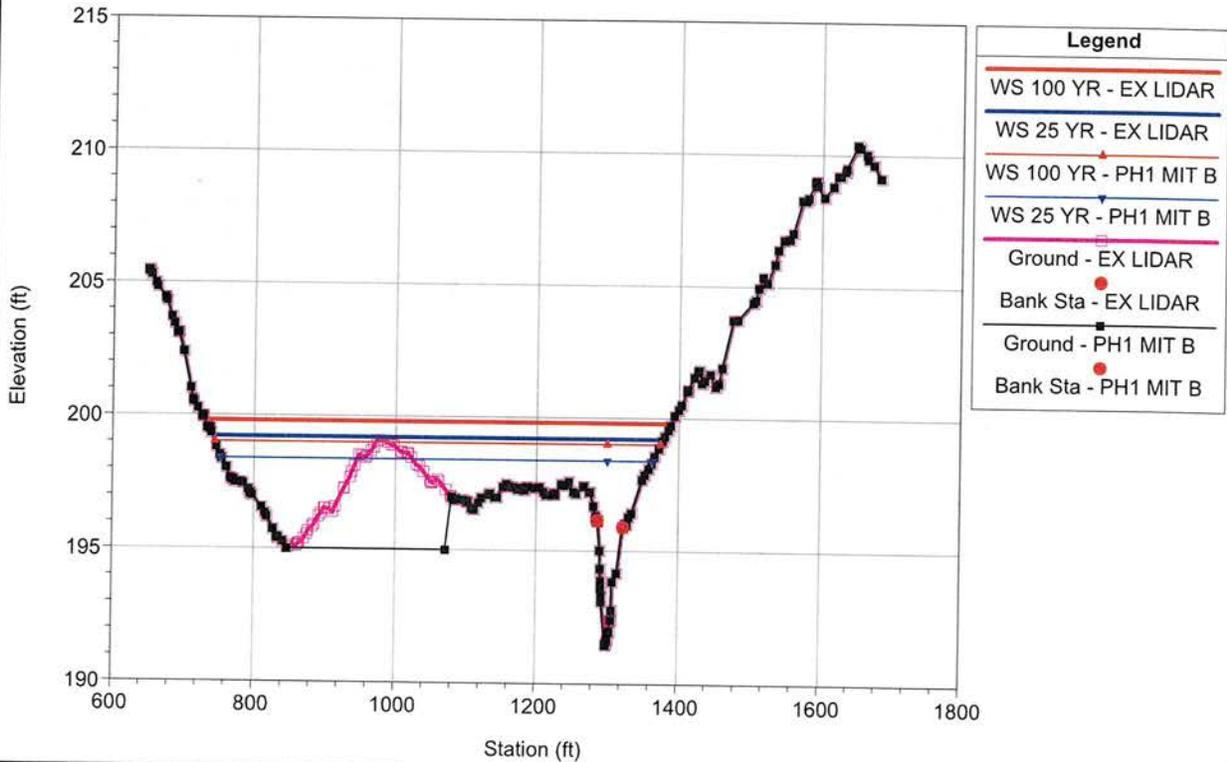
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RS = 5815



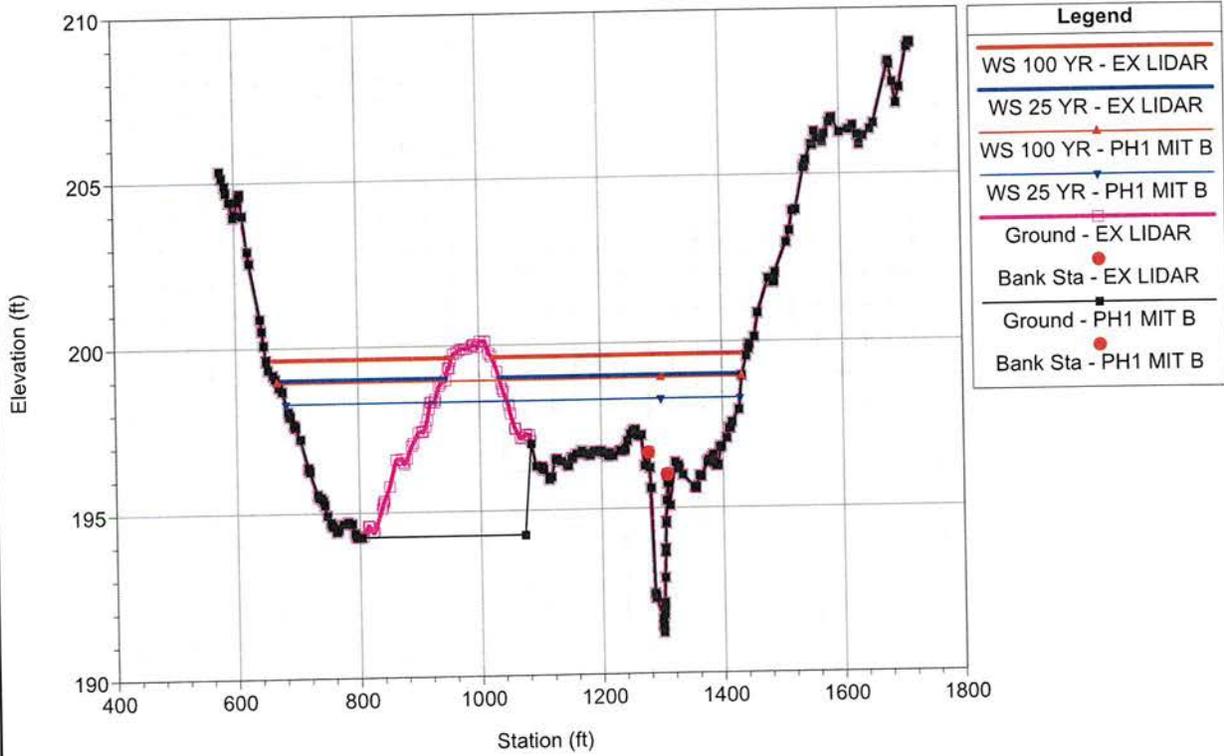
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RS = 5718



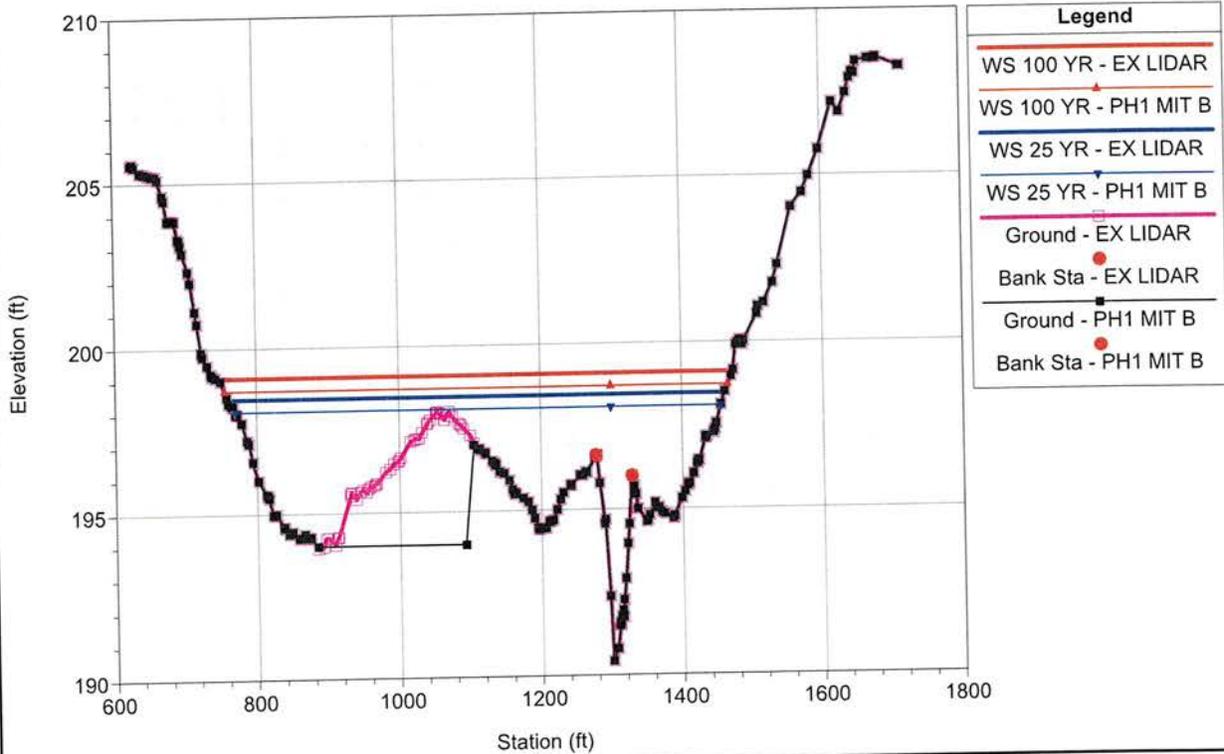
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RS = 5506



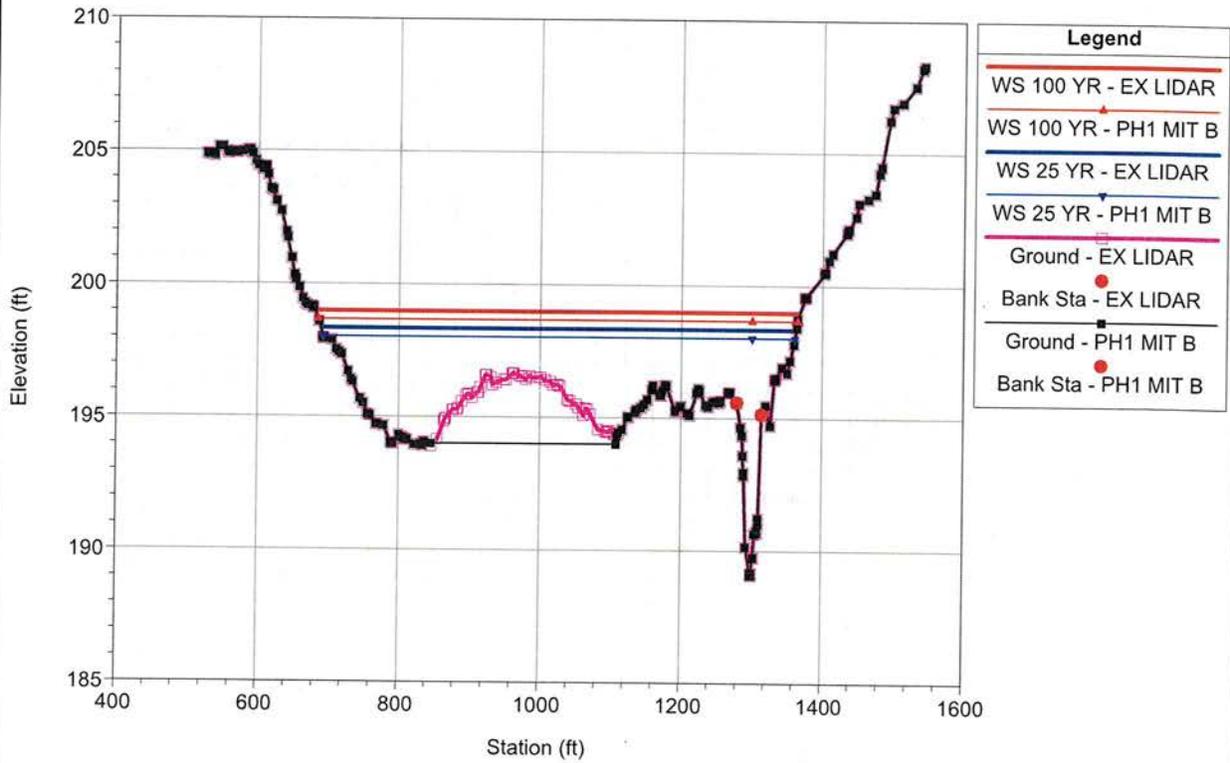
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RS = 5389



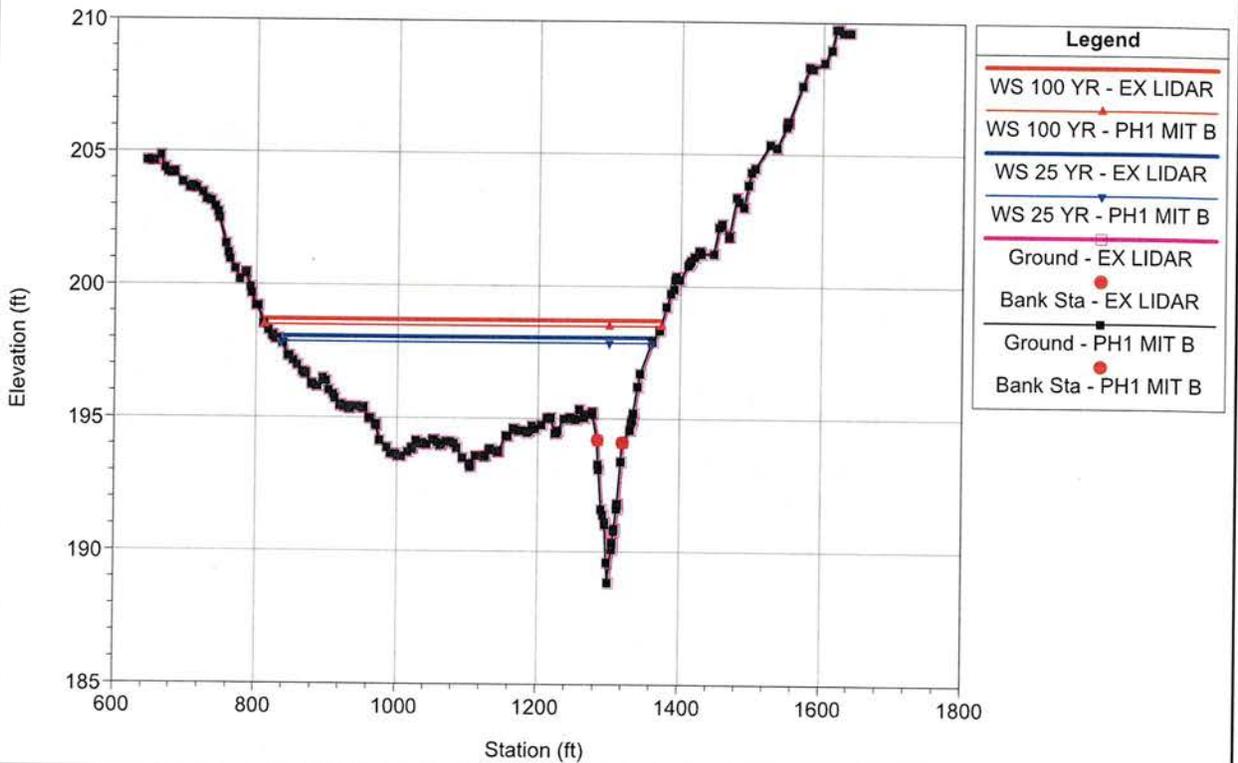
MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 5010



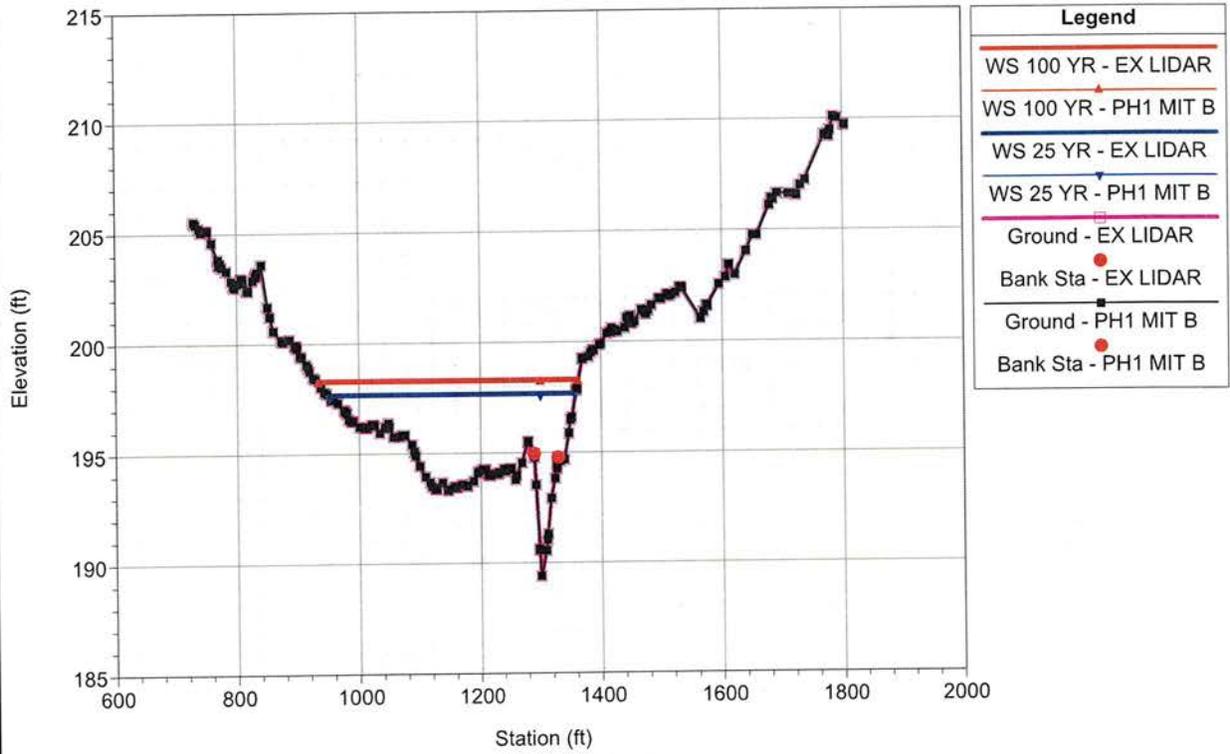
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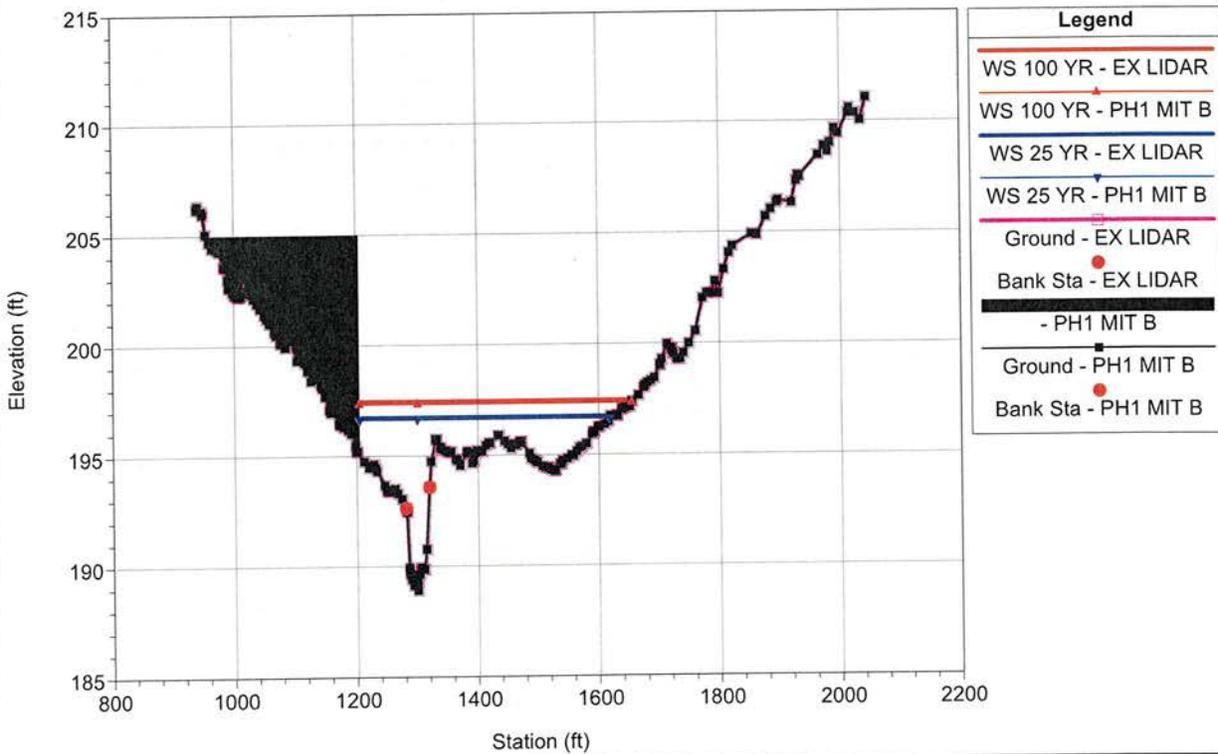
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RS = 4634



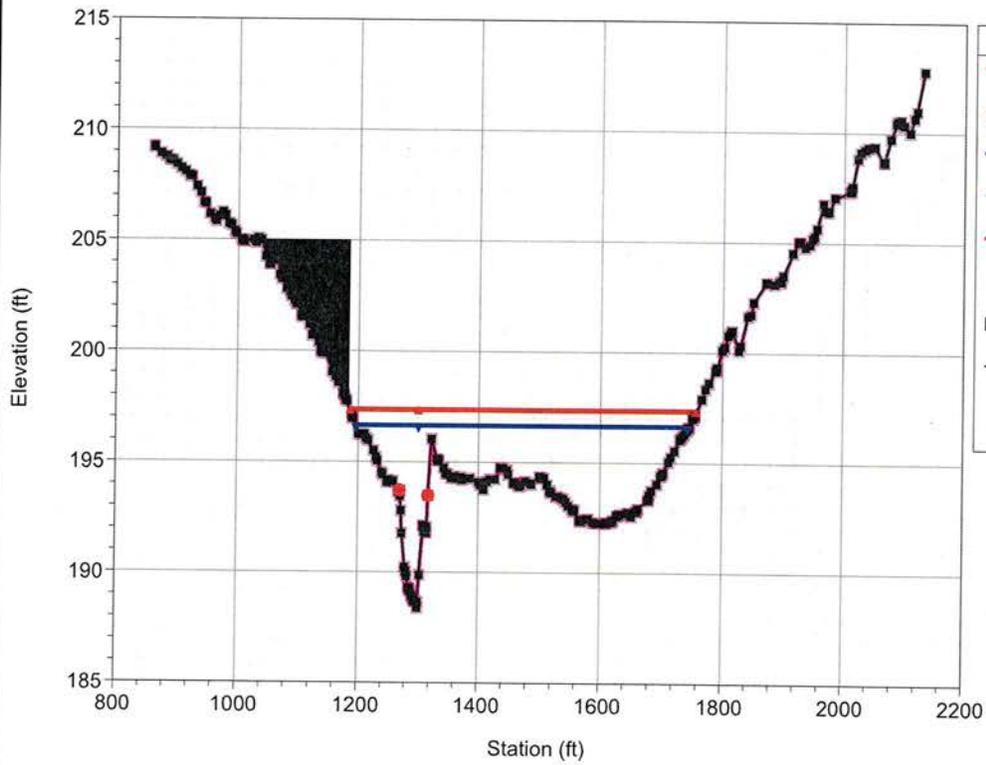
MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 4422



MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 4218

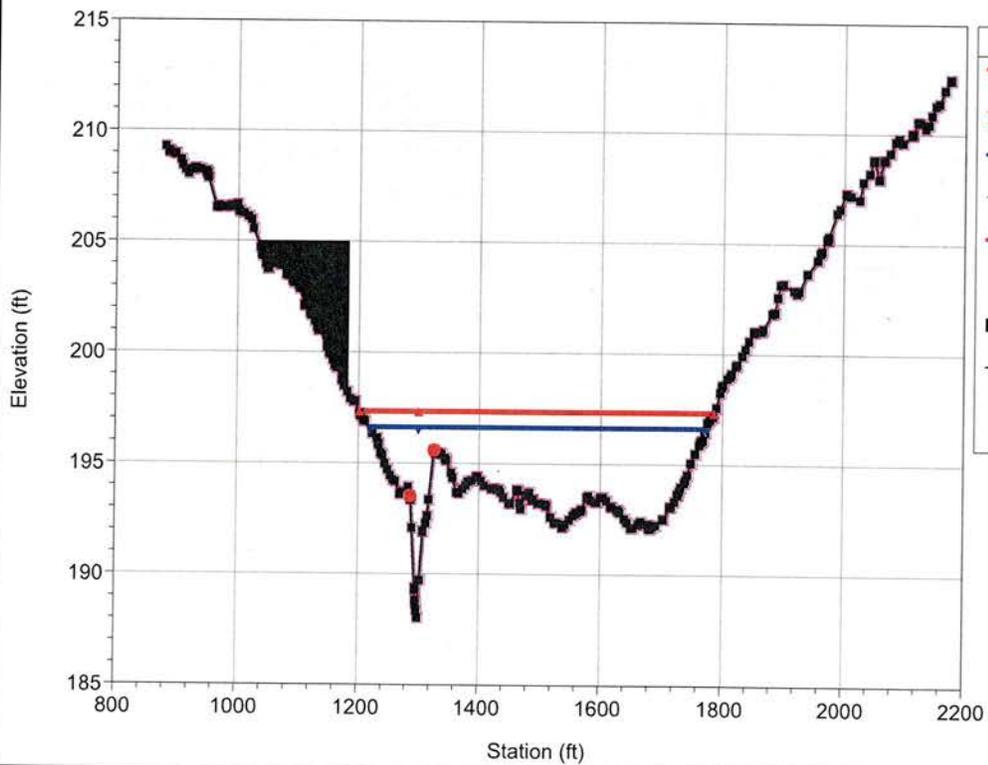


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RS = 4108



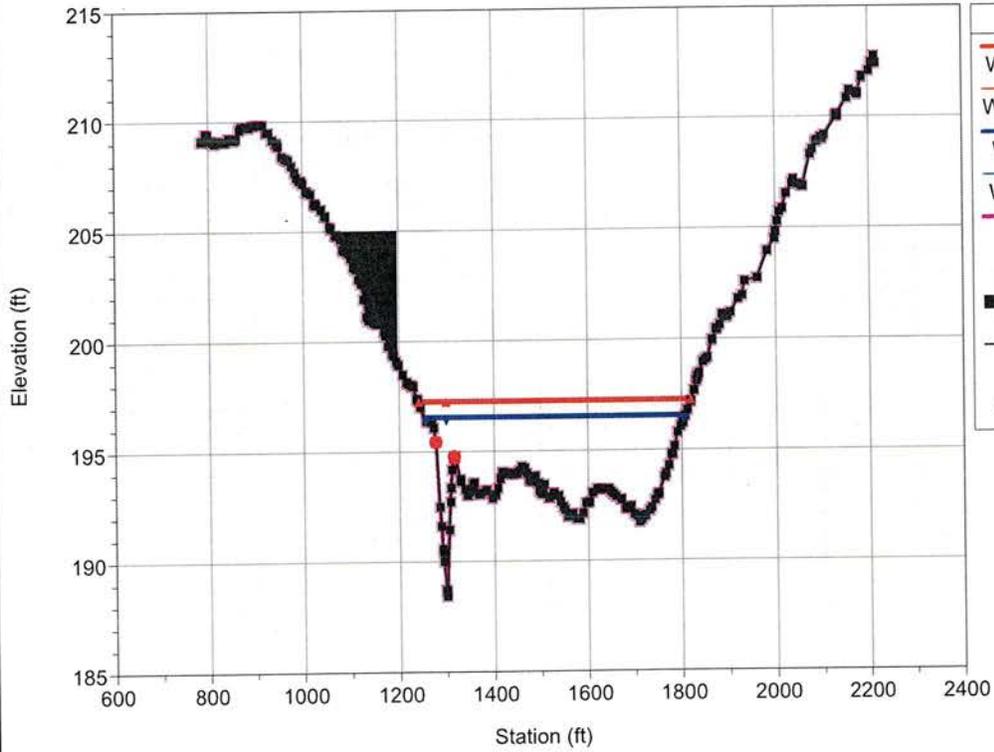
Legend	
WS 100 YR - EX LIDAR	— (Red line)
WS 100 YR - PH1 MIT B	— (Red line with triangle)
WS 25 YR - EX LIDAR	— (Blue line)
WS 25 YR - PH1 MIT B	— (Blue line with triangle)
Ground - EX LIDAR	— (Black line with square)
Bank Sta - EX LIDAR	• (Red dot)
- PH1 MIT B	— (Black line with square)
Ground - PH1 MIT B	— (Black line with square)
Bank Sta - PH1 MIT B	• (Red dot)

MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 4062



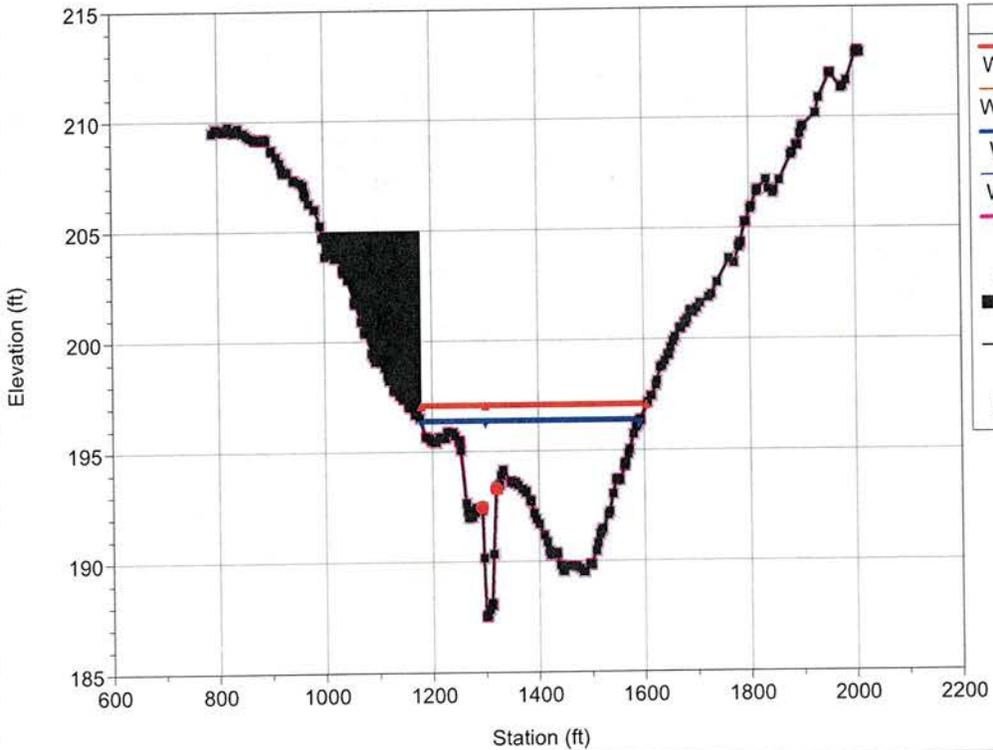
Legend	
WS 100 YR - EX LIDAR	— (Red line)
WS 100 YR - PH1 MIT B	— (Red line with triangle)
WS 25 YR - EX LIDAR	— (Blue line)
WS 25 YR - PH1 MIT B	— (Blue line with triangle)
Ground - EX LIDAR	— (Black line with square)
Bank Sta - EX LIDAR	• (Red dot)
- PH1 MIT B	— (Black line with square)
Ground - PH1 MIT B	— (Black line with square)
Bank Sta - PH1 MIT B	• (Red dot)

MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 3891



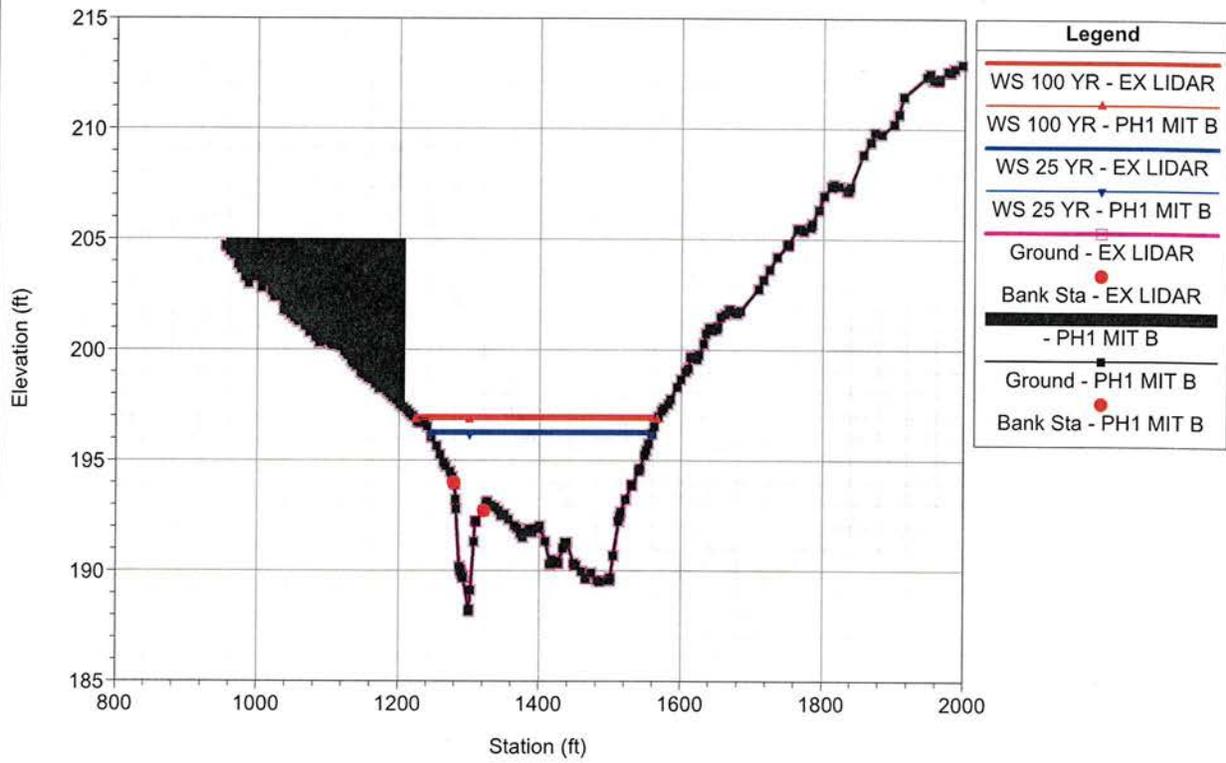
Legend	
—▲—	WS 100 YR - EX LIDAR
—▲—	WS 100 YR - PH1 MIT B
—▼—	WS 25 YR - EX LIDAR
—▼—	WS 25 YR - PH1 MIT B
—■—	Ground - EX LIDAR
●	Bank Sta - EX LIDAR
■	- PH1 MIT B
—■—	Ground - PH1 MIT B
●	Bank Sta - PH1 MIT B

MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 3642

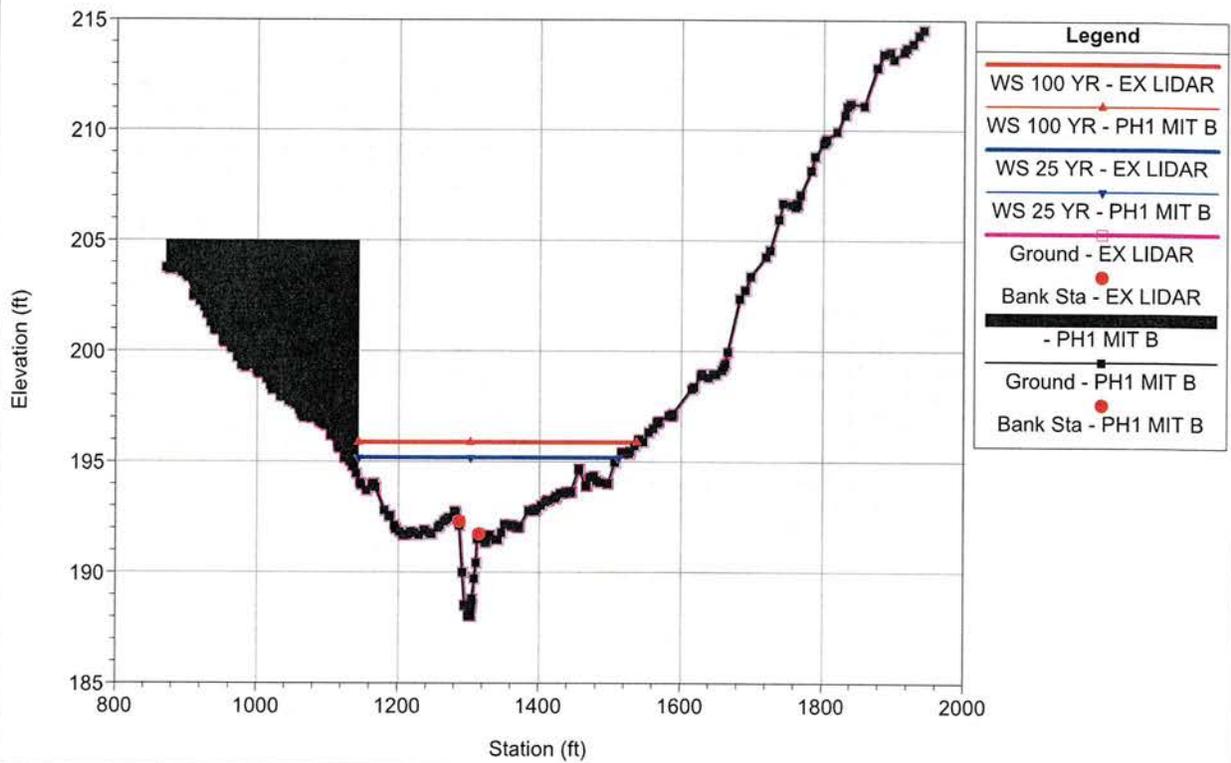


Legend	
—▲—	WS 100 YR - EX LIDAR
—▲—	WS 100 YR - PH1 MIT B
—▼—	WS 25 YR - EX LIDAR
—▼—	WS 25 YR - PH1 MIT B
—■—	Ground - EX LIDAR
●	Bank Sta - EX LIDAR
■	- PH1 MIT B
—■—	Ground - PH1 MIT B
●	Bank Sta - PH1 MIT B

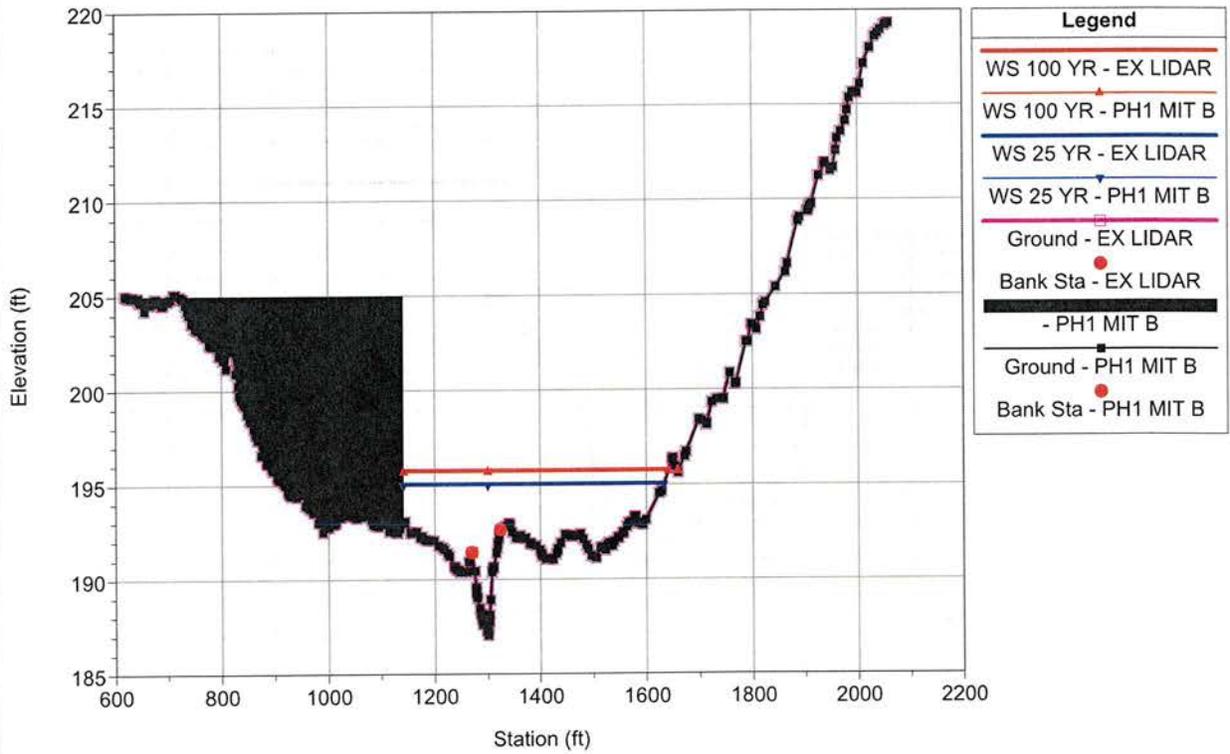
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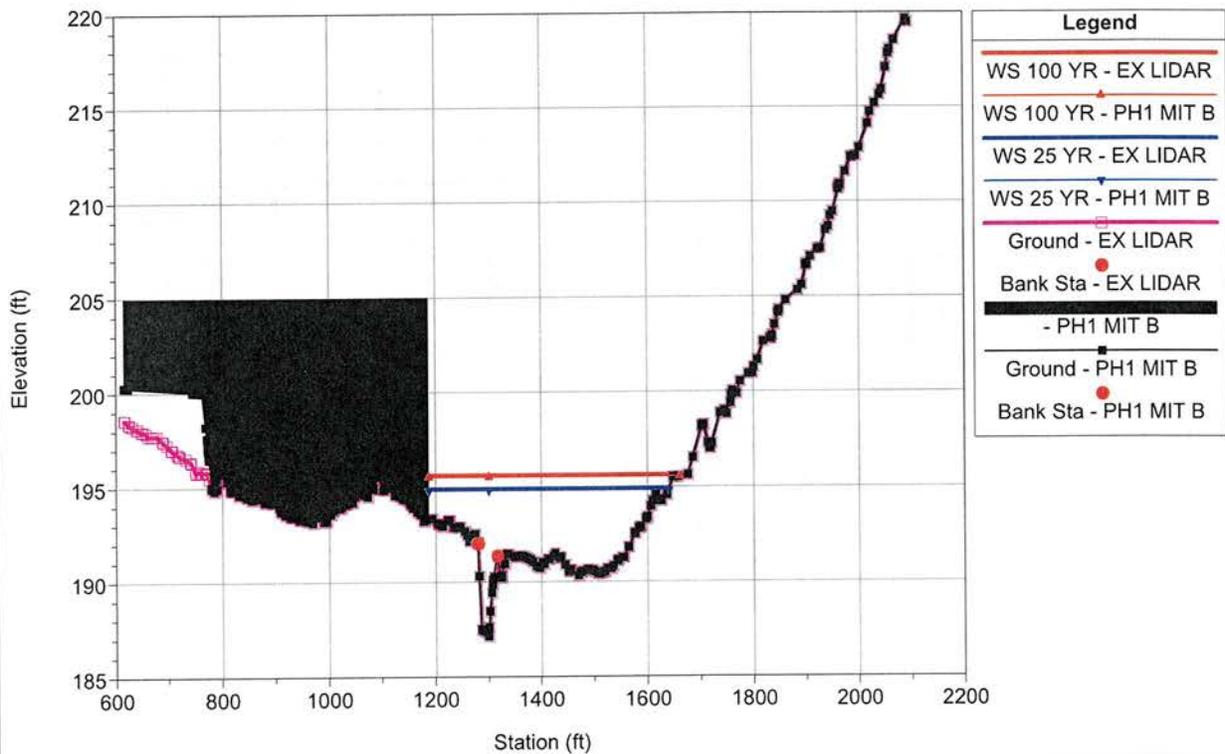
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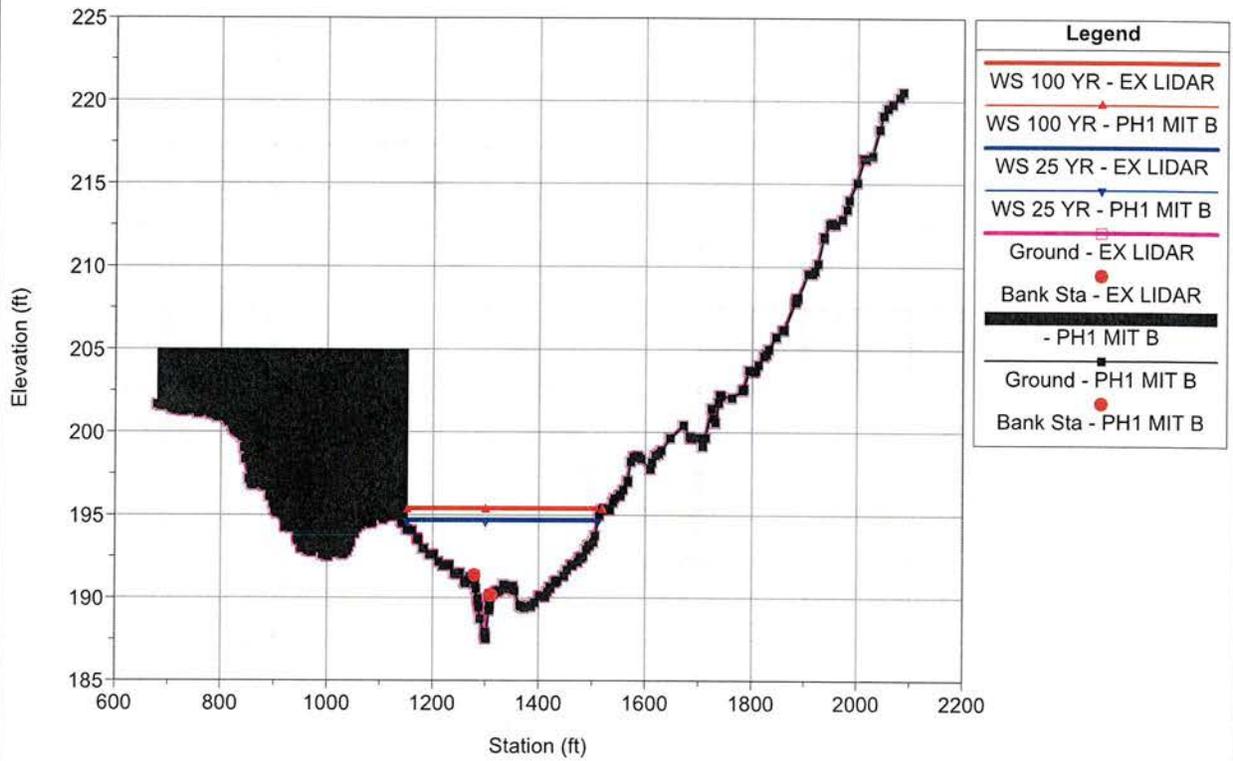
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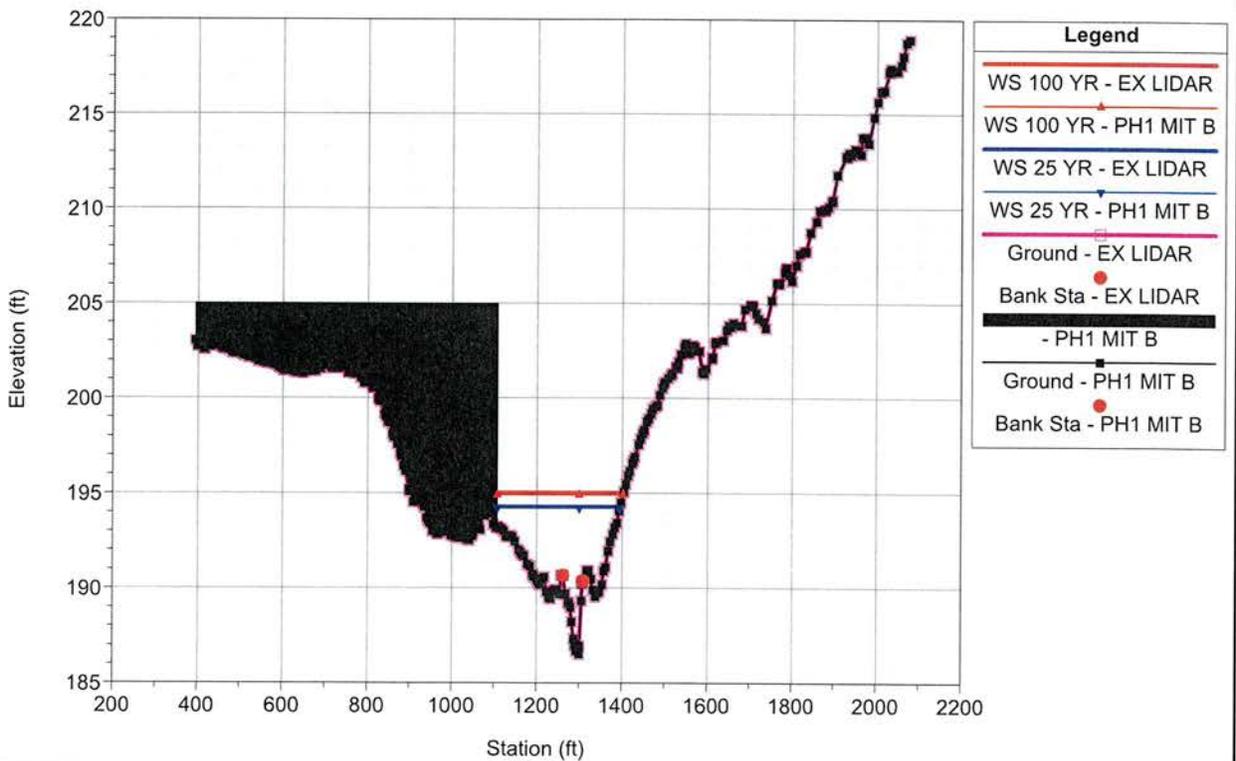
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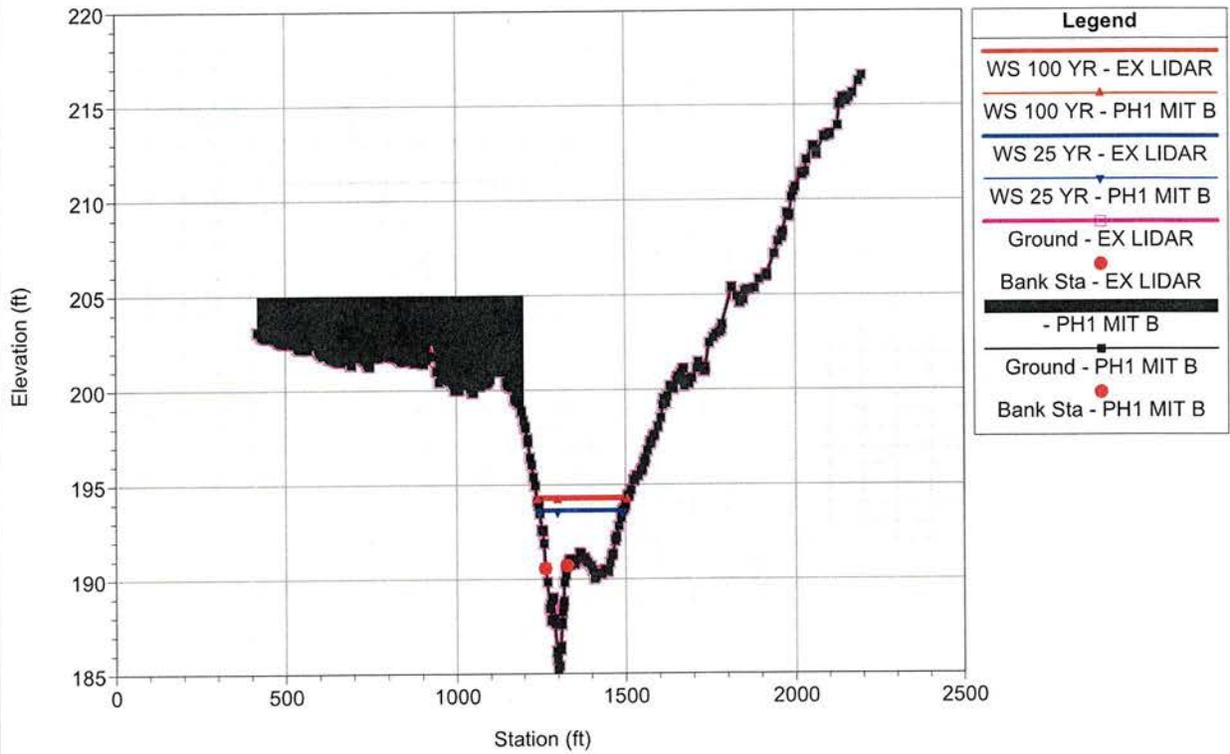
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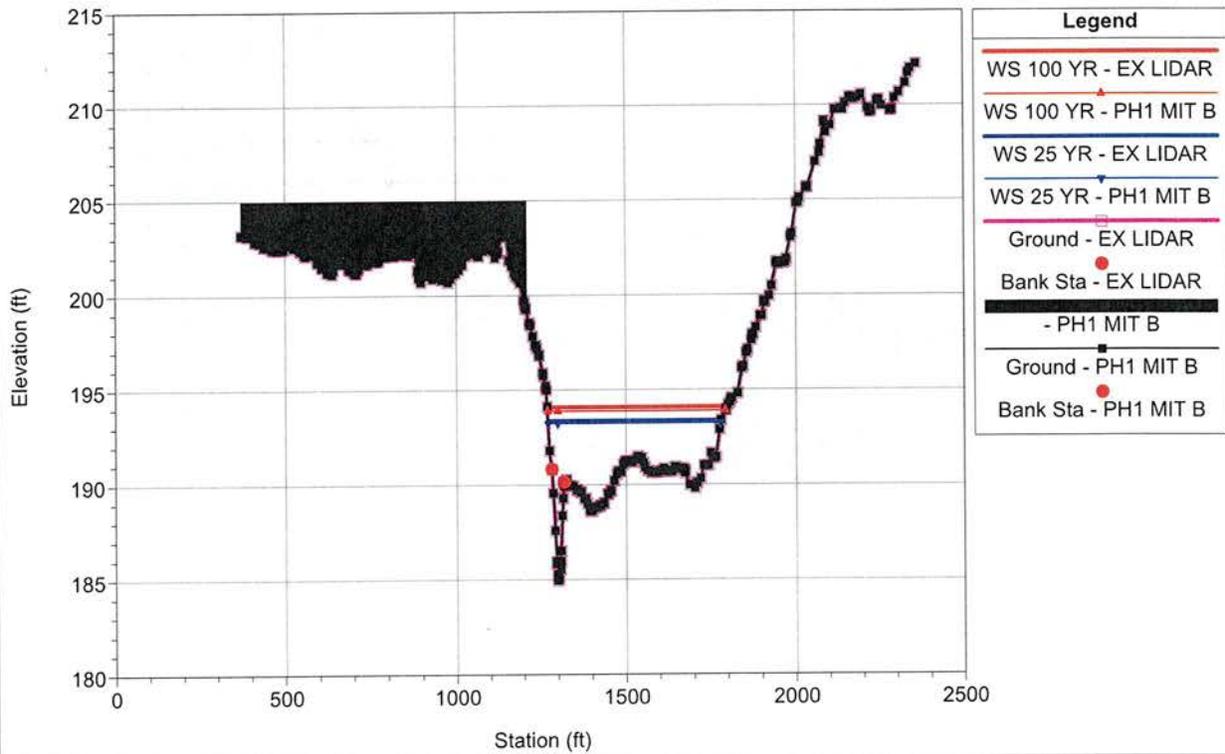
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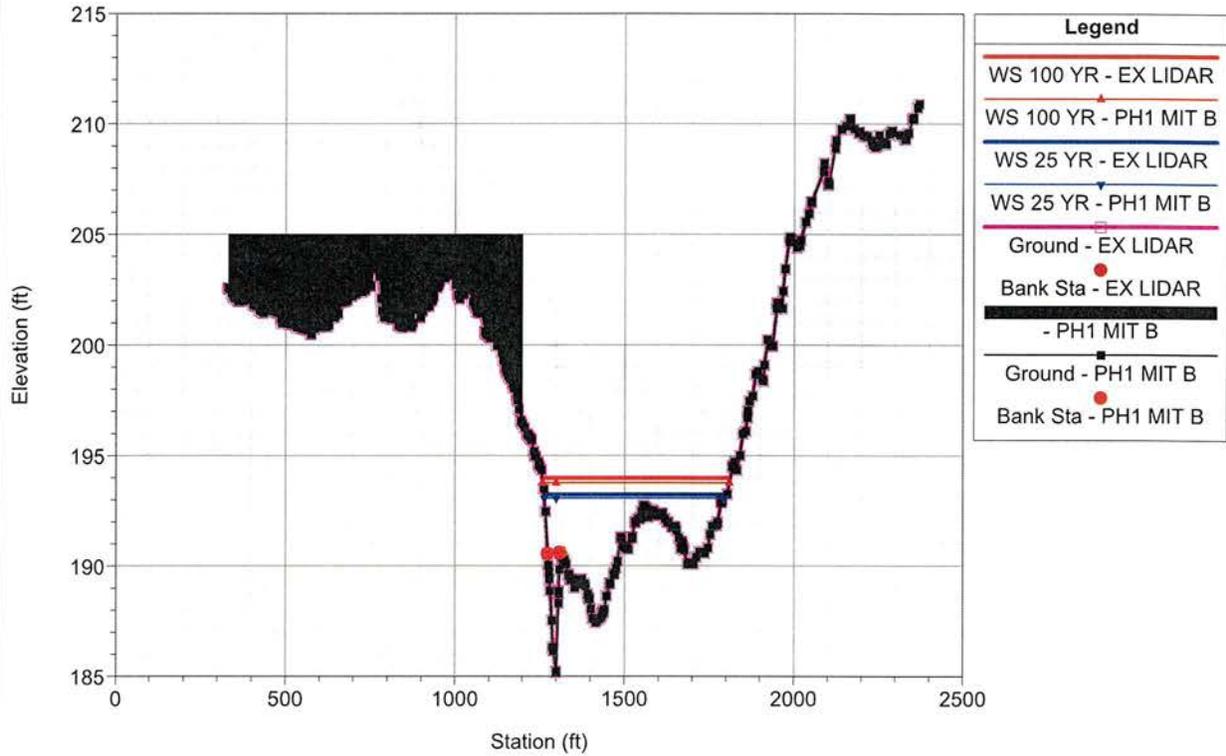
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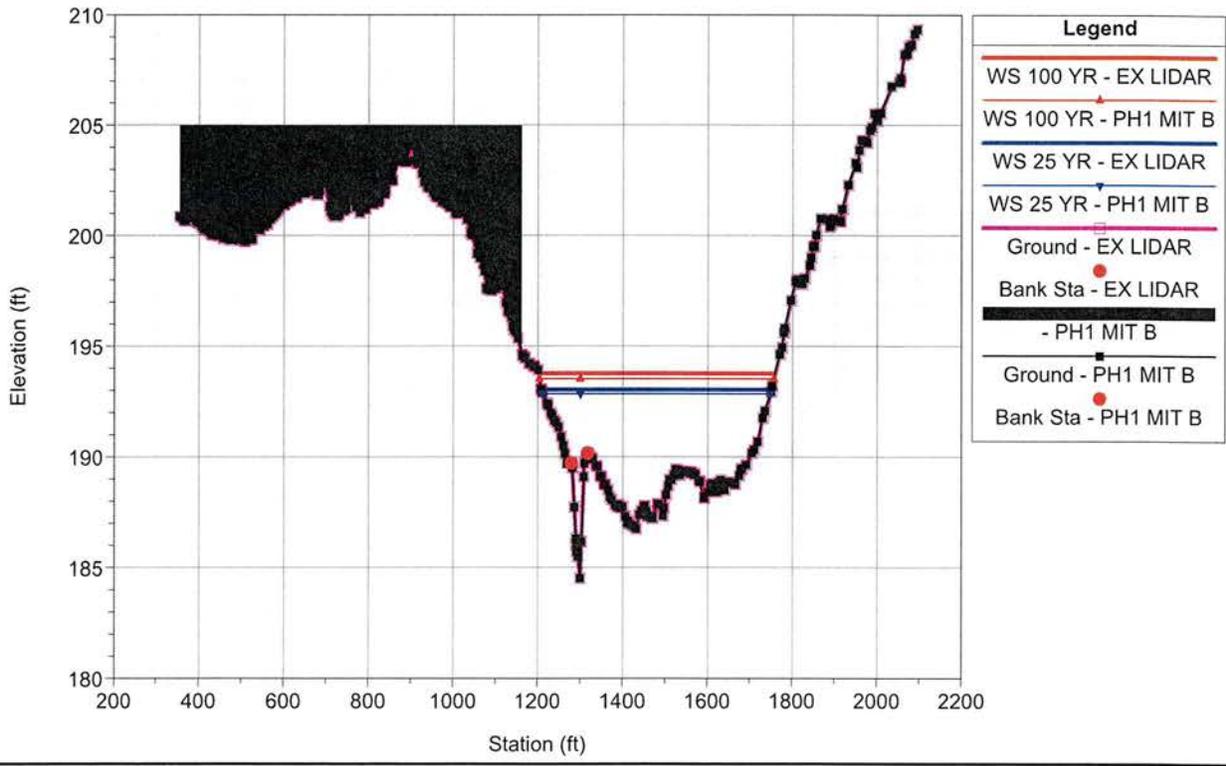
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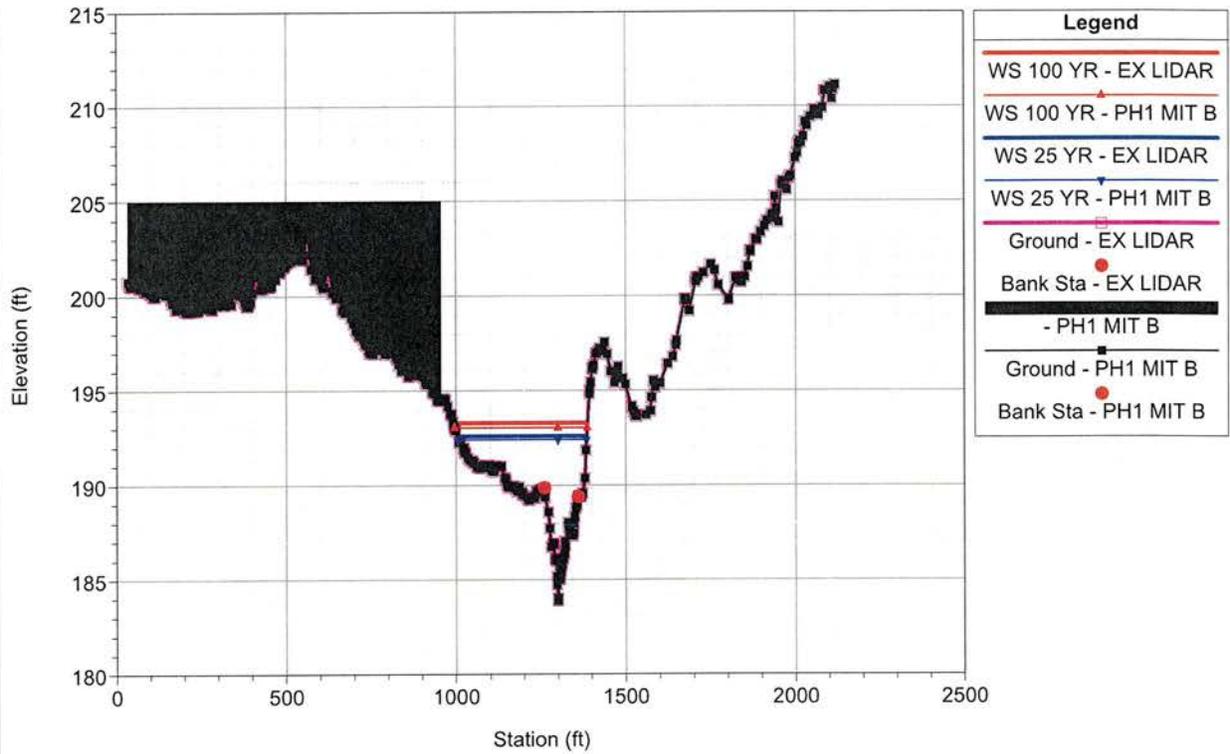
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RS = 2053



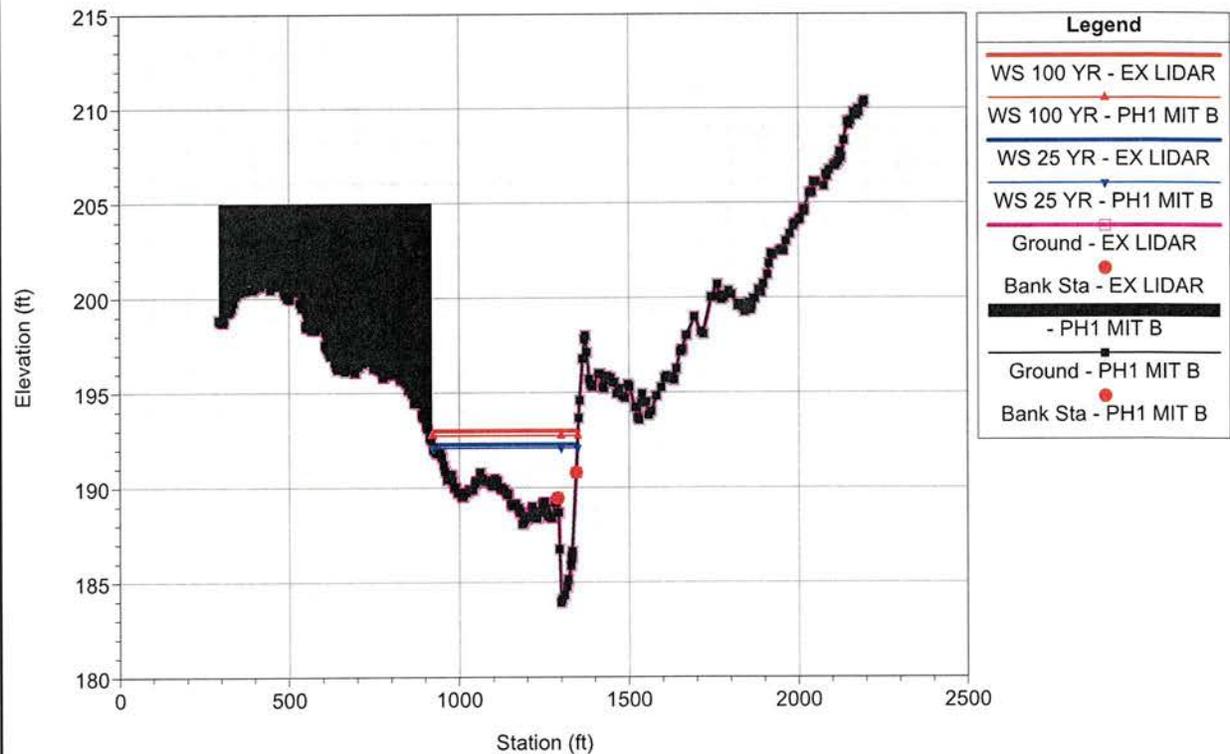
MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 1951



MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 1666



MILL CREEK TRIB 4 Plan: 1) PH1 MIT B 2) EX LIDAR
RS = 1502





Jeff Johnson, P.E.
County Engineer

August 22, 2020

Mr. Kevin T. Vogel, P.E.
Walter P. Moore and Associates, Inc.
1585 Sawdust Road, Suite 110
The Woodlands, TX 77380

Via Email: KVogel@walterpmoore.com

Re: Audubon Development
Phase 1 – Hydraulic Impact Analysis
Amendment Report

Dear Mr. Vogel:

We are in receipt of the above referenced amendment report dated August 6, 2020. The amendment modifies the analysis to accommodate changes to proposed landscape alterations on the site. The amendment also identifies the preferred mitigation plan and updates the plan based on the proposed changes. Based on the information provided, the revisions will result in no increase to the 100-year water surface elevation in the flood plain. This demonstrates compliance with County drainage criteria.

We will update the file with this information. Please feel free to contact me if you have any questions.

Sincerely,

A handwritten signature in blue ink that reads "Dan Wilds".

Dan Wilds, P.E.
Assistant County Engineer

cc: File



TECHNICAL MEMORANDUM



DATE: August 6, 2020

TO: Montgomery County Engineering Department

FROM: Kevin T. Vogel, P.E., CFM

RE: August 2020 Update to Hydraulic Impact Analysis – Audubon Development
Phase 1

Walter P. Moore and Associates, Inc.
(TBPE Firm Registration No. 1856)

The purpose of this memorandum is to provide technical support for modifications made to Phase 1 of the Audubon development, and concurrence with construction plans submitted for this portion of the development. Montgomery County approved the study in a letter dated August 27, 2019 (see attachment). A copy of this letter is attached. The approved study was entitled, Hydraulic Impact Analysis Study Audubon Development – Phase 1, dated August 15, 2019. The modifications made included the following:

- A recreational area located in the south-central portion of the development will be filled in Phase 1,
- A lake area will be preserved along Mill Creek Tributary No. 4 (Mill Run) and located in the eastern portion of Phase 1. This area was originally planned to be filled.
- The preferred mitigation plan (Plan A from the approved 2019 report) has been updated based upon the changes described above.

The following sections describe the process of updating the hydrologic and hydraulic models from the approved 2019 study, as well as summarizing the results obtained.

Hydrologic Updates

Based upon the planned modifications listed above, there was no need to update the hydrologic parameters used to compute Clark Unit Hydrograph variables (Time of Concentration and Storage Coefficients). However, the routing of upstream hydrographs through the channel will be directly affected. **Exhibit 1** illustrates the proposed updates in the flood plain fringes of Mill Run. Using the revised grading plan, the hydraulic model was updated to show the fill on the recreation site adjacent to the school site, and the fill/pond changes near the mouth of Mill Run. Updated Modified Puls routing data is shown in **Table 1** below. Detailed support data may be found in **Appendix A**. Figures 1-3 illustrate the changes to the routing data. As shown, the routing reaches containing the fill on the recreation site (Figures 1 & 2) have less volume, and the reach containing the pond area and less fill (Figure 3) now has more volume.

Table 1: 2020 Updated Routing Data for Proposed Conditions					
8636 to 7544		7544 to 5389		5389 to 1502	
Volume	Discharge	Volume	Discharge	Volume	Discharge
0	0	0	0	0	0
2.56	238	6.6	301	17.01	304
5.17	475	12.65	602	32.81	609
7.56	713	18.12	902	46.17	913
9.68	951	23.52	1203	58.28	1218
11.68	1189	28.77	1504	69.1	1522
13.55	1426	33.6	1805	78.71	1827
15.32	1664	38.11	2105	87.81	2131
17.01	1902	42.52	2406	96.58	2436
18.66	2139	46.51	2707	104.87	2740
20.23	2377	50.38	3008	112.81	3045
21.75	2615	54.24	3308	120.35	3349
23.26	2853	57.85	3609	127.71	3654
24.72	3090	61.42	3910	134.84	3958
26.19	3328	64.92	4211	141.9	4262
27.61	3566	68.37	4512	148.83	4567
28.97	3803	71.79	4812	155.71	4871
Subreaches=2		Subreaches=3		Subreaches=2	

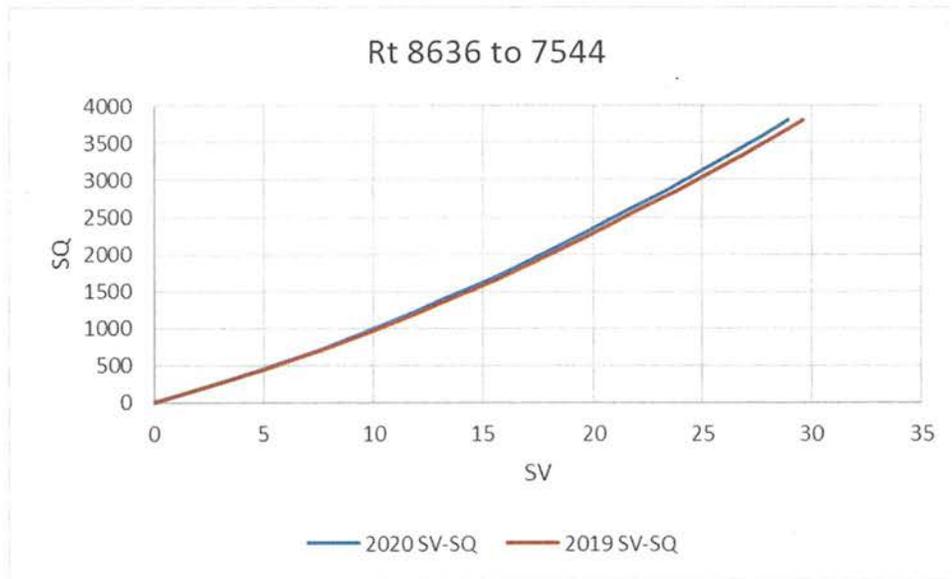


Figure 1: Routing Reach between River Station 86+36 to 75+44

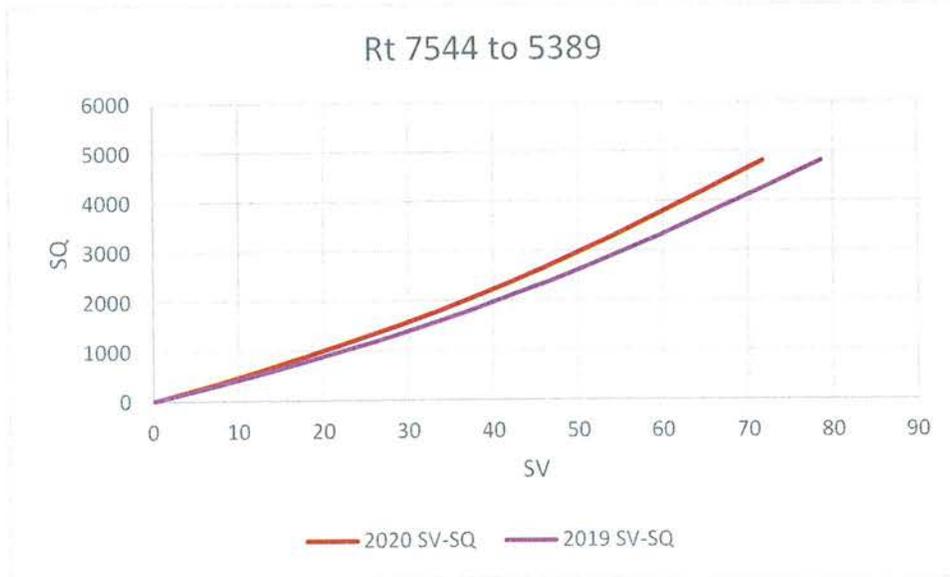


Figure 2: Routing Reach between River Station 75+44 to 53+89

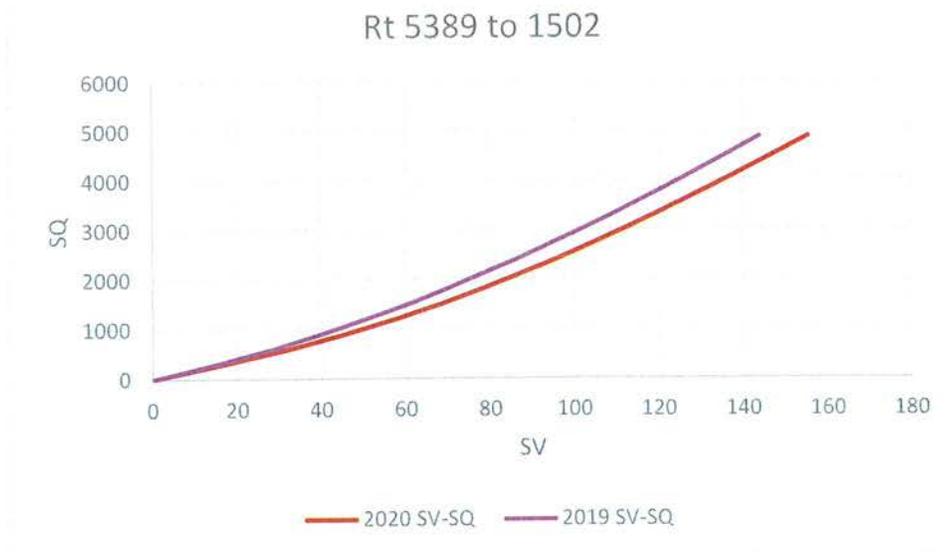


Figure 3: Routing Reach between River Station 53+89 to 15+02

Applying the updated routing data to the HEC-HMS model produced updated 25-year and 100-year peak flow rates along Mill Run. **Table 2** below summarizes the updated flow comparison between Existing and the Updated Proposed Conditions. In general, the proposed conditions flows are at or below existing conditions except for a 2 cfs increase at River Station 7544 for both the 25-year and 100-year storm events. This small increase to peak flows along Mill Run does not equate to increased water surface elevation along Mill Run as the hydraulic modeling results will show in the next section. The improvements downstream of River Station 7544 and the decreased flow rate downstream of this point produce water surface elevations equal to or lower than existing conditions.

Table 2: Hydrologic Results – Computation Points				
Computation Point	Existing 25-Year (cfs)	2020 Proposed 25-Year (cfs)	Existing 100-Year (cfs)	2020 Proposed 100-Year (cfs)
Lake	943	943	1233	1233
RS 7544	1823	1825	2376	2378
RS 5389	2384	2297	3125	3012
Mouth	2477	2317	3276	3058

Hydraulic Updates

Using the updated hydrologic results shown in **Table 2** above, revised flow files were applied to the updated hydraulic geometry file to produce new water surface elevations. In Montgomery County’s August 2019 approval letter, Mitigation Plan A was the preferred mitigation option since it involved less underbrush removal and hence less ongoing maintenance would be required. The results in **Table 3** below, illustrate the updates to the recreation site and revised fill and pond near the mouth of Mill Run, along with a modified Mitigation Plan A. As shown in **Table 3**, no adverse impacts to water surface elevations are created from the planned improvements. Cross-section comparisons may be found in **Appendix B**.

Table 3: Existing vs Mitigated A – 100-Yr						
HEC-RAS Station	FIS Cross Section	FIS (ft)	Existing	EX - FIS	Mitigated A	Existing vs. Mitigated
			(ft)	(ft)	(ft)	(ft)
	7084	208.6	---	---	---	---
8636		207.31	206.42	-0.89	206.35	-0.07
8610		207.29	206.42	-0.87	206.35	-0.07
8560		207.23	206.39	-0.84	206.31	-0.08
8468		206.98	206.27	-0.71	206.16	-0.11
8410		206.85	206.13	-0.72	206.04	-0.09
8257		206.39	206.00	-0.39	205.91	-0.09
8104		205.93	205.83	-0.10	205.73	-0.10
7964		205.84	205.62	-0.22	205.47	-0.15
7840		205.73	205.48	-0.25	205.25	-0.23
7766		205.40	205.39	-0.01	205.17	-0.22
7674		205.35	205.33	-0.02	205.10	-0.23
7544		205.02	204.94	-0.08	204.71	-0.23
7412		204.64	204.33	-0.31	204.11	-0.22
7325		204.35	203.76	-0.59	203.60	-0.16
7162		203.85	202.77	-1.08	202.76	-0.01
6997		203.43	202.39	-1.04	202.34	-0.05
6830		202.96	202.02	-0.94	201.88	-0.14
6509		202.38	201.46	-0.92	201.19	-0.27
6026		201.40	200.75	-0.65	200.34	-0.41
5815		200.93	200.34	-0.59	199.80	-0.54
5718		200.79	200.20	-0.59	199.58	-0.62
	4318	200.6	---	---	---	---
5506		200.51	199.82	-0.69	199.26	-0.56
5389		200.31	199.63	-0.68	199.15	-0.48
5010		200.13	199.10	-1.03	198.88	-0.22
4892		200.09	198.98	-1.11	198.80	-0.18
4634		199.99	198.70	-1.29	198.54	-0.16
4422		199.92	198.32	-1.60	198.14	-0.18
4218		199.80	197.46	-2.34	197.18	-0.28
4108		199.72	197.39	-2.33	197.11	-0.28
4062		199.69	197.37	-2.32	197.08	-0.29
3891		199.68	197.29	-2.39	197.00	-0.29
3642		199.51	197.13	-2.38	196.83	-0.30
3511		199.43	196.99	-2.44	196.70	-0.29
3074		199.20	195.88	-3.32	194.69	-1.19
2907		199.08	195.77	-3.31	194.91	-0.86
2787		198.99	195.64	-3.35	194.85	-0.79
2659		198.90	195.42	-3.48	194.78	-0.64
2528		198.80	195.01	-3.79	194.67	-0.34
2324		198.69	194.34	-4.35	194.13	-0.21
2178		198.57	194.09	-4.48	193.87	-0.22
2053		198.50	193.98	-4.52	193.76	-0.22
	1460	198.4	---	---	---	---
1951		197.86	193.77	-4.09	193.55	-0.22
1666		197.77	193.31	-4.46	193.11	-0.20
1502		197.00	193.00	-4.00	192.80	-0.20

* This is a best guess of the BFE at each of the identified cross-sections added to the model since the stream centerlines have different alignments and thus different reach lengths.

Table 4: Proposed vs. Mitigated A – 25-Yr			
HEC-RAS Station	Existing (ft)	Mitigated A (ft)	Existing vs. Mitigated (ft)
8636	205.89	205.83	-0.06
8610	205.89	205.84	-0.05
8560	205.87	205.81	-0.06
8468	205.73	205.64	-0.09
8410	205.59	205.52	-0.07
8257	205.45	205.39	-0.06
8104	205.27	205.19	-0.08
7964	205.06	204.94	-0.12
7840	204.93	204.73	-0.20
7766	204.83	204.64	-0.19
7674	204.78	204.58	-0.20
7544	204.42	204.20	-0.22
7412	203.86	203.63	-0.23
7325	203.35	203.17	-0.18
7162	202.36	202.35	-0.01
6997	201.97	201.96	-0.01
6830	201.59	201.49	-0.10
6509	200.94	200.74	-0.20
6026	200.16	199.78	-0.38
5815	199.78	199.22	-0.56
5718	199.65	199.00	-0.65
5506	199.21	198.63	-0.58
5389	199.02	198.52	-0.50
5010	198.46	198.25	-0.21
4892	198.33	198.17	-0.16
4634	198.06	197.93	-0.13
4422	197.68	197.56	-0.12
4218	196.73	196.55	-0.18
4108	196.67	196.50	-0.17
4062	196.65	196.47	-0.18
3891	196.57	196.39	-0.18
3642	196.41	196.24	-0.17
3511	196.3	196.13	-0.17
3074	195.18	194.12	-1.06
2907	195.05	194.25	-0.80
2787	194.9	194.18	-0.72
2659	194.7	194.10	-0.60
2528	194.27	193.99	-0.28
2324	193.64	193.49	-0.15
2178	193.36	193.20	-0.16
2053	193.23	193.07	-0.16
1951	193.03	192.87	-0.16
1666	192.59	192.44	-0.15
1502	192.28	192.12	-0.16

Conclusion

The purpose of this update was to modify the hydrologic and hydraulic models to match the latest grading plan for Phase 1 of the Audubon development and to document the effects of proposed changes to fill in the floodplain fringes of Tributary No. 4 to Mill Creek (Mill Run). No hydraulic impacts were noted along Mill Run. Appropriate mitigation measures in the form of under-brushing and slight regrading were identified to offset the impacts along Mill Run. It is our opinion that if the site improvements are constructed as identified, the project will cause no adverse impacts for storm events up to and including the 1% (100-year) AEP storm event. In other words, the planned

develop of *Audubon – Phase 1* and associated mitigation measures will have no adverse impact to the drainage on, from, or through adjacent properties.

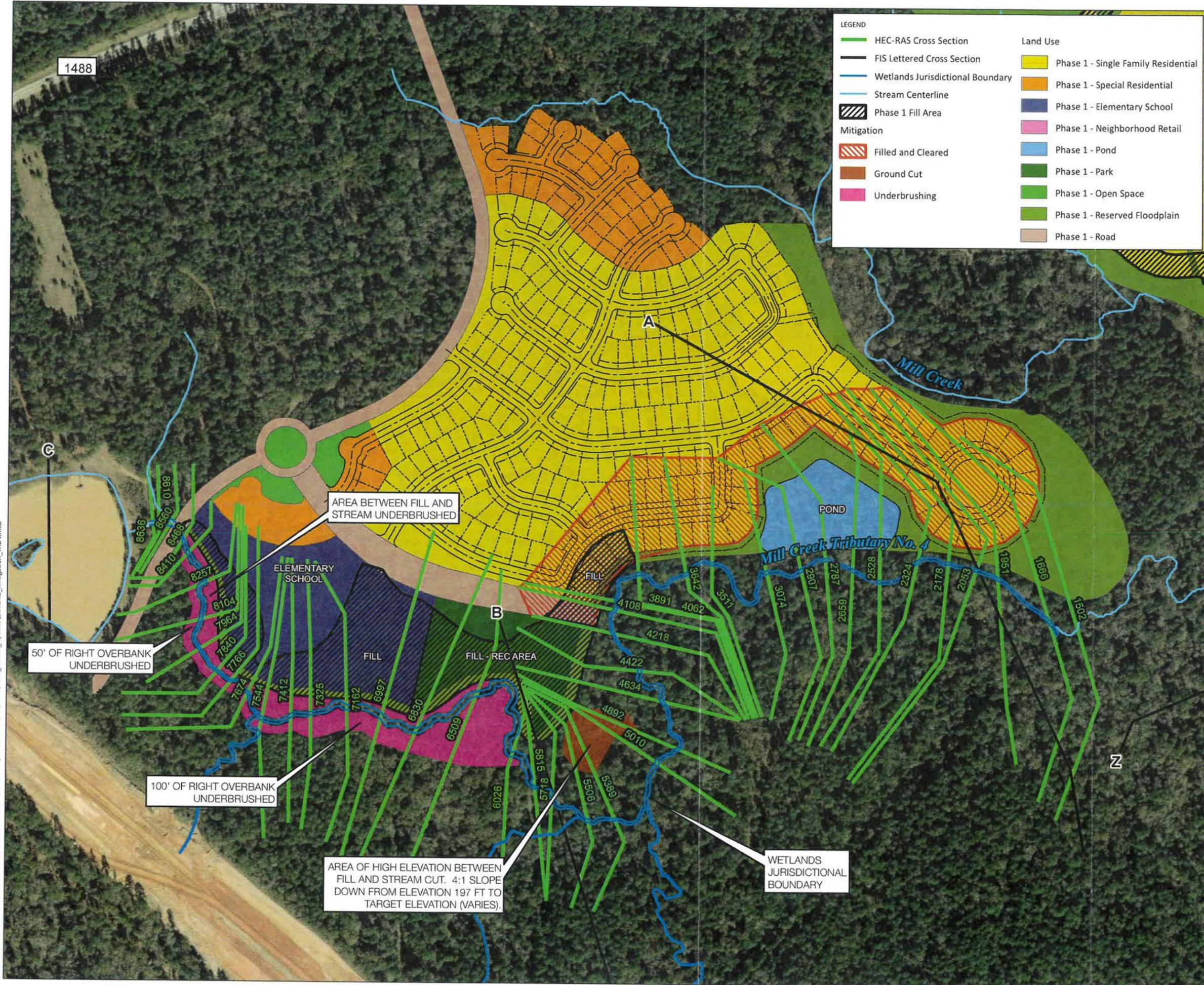
Attachments:

- Exhibit 1 – Mitigation Plan A Schematic**
- Appendix A – Montgomery County Approval Letter**
- Appendix B – Aug 2020 Routing Data & Flow File**
- Appendix C – HEC-RAS Cross-Section Comparison**

**Drainage Analysis
Audubon Magnolia
Development Phase 1**

LEGEND

 HEC-RAS Cross Section	Land Use
 FIS Lettered Cross Section	 Phase 1 - Single Family Residential
 Wetlands Jurisdictional Boundary	 Phase 1 - Special Residential
 Stream Centerline	 Phase 1 - Elementary School
 Phase 1 Fill Area	 Phase 1 - Neighborhood Retail
Mitigation	 Phase 1 - Pond
 Filled and Cleared	 Phase 1 - Park
 Ground Cut	 Phase 1 - Open Space
 Underbrushing	 Phase 1 - Reserved Floodplain
	 Phase 1 - Road



Coordinate System
Projection: State Plane NAD83 (Grid)
Zone: Texas Central
Units: Feet

PREPARED BY	M. Henze
REVIEWED BY	K. Vogel
DATE	4/2/2020
PROJECT NUMBER	H20-18011-00

EXHIBIT TITLE

**Mitigation Schematic
Mill Creek Tributary No. 4**

EXHIBIT NUMBER

1

Document Path: P:\H20\2018\18011.00 Audubon H&H Support\Design & Studies\GIS\MapXD\2020_March_Update\Exhibit1_Mitigation_Trib4.mxd

Appendix A – August 15, 2019 Montgomery County Approval Letter





Jeff Johnson, P.E.
COUNTY ENGINEER

MEMORANDUM

August 27, 2019

Kevin T. Vogel, P.E.
Walter P. Moore
1780 Hughes Landing Blvd, Suite 450
The Woodlands, TX 77380

Re: Hydraulics Impact Analysis Study
Audubon Development – Phase 1

Dear Mr. Vogel

We are in receipt of the above referenced Hydraulics Impact Analysis study dated August 15, 2019 for the Audubon Development – Phase 1. This study models the impacts to the Base Flood Elevation when area of fill are added in both Mill Creek and Mill Creek Tributary #4 Special Flood Hazard Areas. For Mill Creek Tributary #4, the study proposes two mitigation options. Please note, Montgomery County's mitigation preference is for Mill Creek Tributary 4 is option A because it involved less underbrush removal and hence less ongoing maintenance would be required. However, based on the analysis presented in this study, either option appears to demonstrate compliance with the Montgomery County Flood Plain Management Regulations and shows no adverse impact to the Base Flood Elevation for Mill Creek Tributary #4.

In addition, the analysis in this study appears to demonstrate compliance with the Montgomery County Flood Plain Management Regulations of no adverse impact on Mill Creek

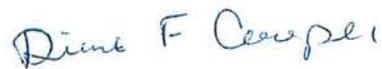
We will keep this letter on file.

Please note, the developer will be required to obtain a Floodplain Development Non-Structure Permit through the Montgomery County Permit Office prior to making landscape changes in the floodplain. Also, please include in your permit application, a maintenance plan for either option A or B of the proposed mitigation strategies. You will also need to demonstrate compliance with Section 404 (wetlands) requirements for work in the flood plain. Finally please provide an exhibit that shows the areas and sq. area of

fill coverage for both Mill Creek and Mill Creek Tributary #4 as well as the area and coverage area of excavation for the proposed regrading region in Mill Creek Tributary #4. Finally, please coordinate with the permit office on additional information needed with a permit application.

Please let me know if you have any further questions.

Sincerely-

A handwritten signature in blue ink that reads "Diane F. Cooper". The signature is written in a cursive style.

Diane Cooper, CFM
Floodplain Administrator

Appendix B – Aug 2020 Routing Data & Flow File

August 2020 Mill Run Routing Data

Mill Run

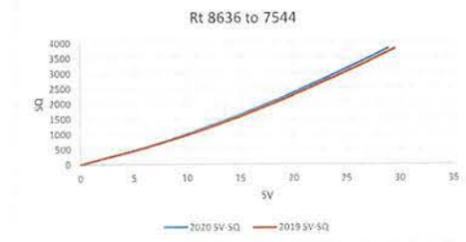
River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Volume (acre-ft)	Trvl Tme Avg (hrs)
8636	10%	123	198.92	202.75	26.17	1.24
8636	20%	247	198.92	203.84	50.63	1.22
8636	30%	370	198.92	204.4	71.85	1.17
8636	40%	493	198.92	204.82	91.48	1.12
8636	50%	617	198.92	205.15	109.55	1.08
8636	60%	740	198.92	205.44	125.86	1.03
8636	70%	863	198.92	205.7	141.24	0.99
8636	80%	987	198.92	205.94	156.11	0.96
8636	90%	1110	198.92	206.16	170.04	0.93
8636	100%	1233	198.92	206.38	183.42	0.9
8636	110%	1357	198.92	206.58	196.34	0.88
8636	120%	1480	198.92	206.77	208.82	0.86
8636	130%	1603	198.92	206.96	220.98	0.84
8636	140%	1727	198.92	207.14	233.01	0.82
8636	150%	1850	198.92	207.32	244.81	0.8
8636	160%	1973	198.92	207.48	256.47	0.79

Set all storage-discharge curves to the original name. Update the original SV-SQ with the new values

River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Volume (acre-ft)	Trvl Tme Avg (hrs)
7544	10%	238	196.12	201.29	23.61	1.03
7544	20%	475	196.12	202.25	45.46	1
7544	30%	713	196.12	202.78	64.29	0.94
7544	40%	951	196.12	203.17	81.8	0.9
7544	50%	1189	196.12	203.51	97.87	0.86
7544	60%	1426	196.12	203.8	112.31	0.82
7544	70%	1664	196.12	204.06	125.92	0.79
7544	80%	1902	196.12	204.31	139.1	0.77
7544	90%	2139	196.12	204.53	151.38	0.74
7544	100%	2377	196.12	204.74	163.19	0.72
7544	110%	2615	196.12	204.95	174.59	0.7
7544	120%	2853	196.12	205.14	185.56	0.68
7544	130%	3090	196.12	205.32	196.26	0.66
7544	140%	3328	196.12	205.5	206.82	0.65
7544	150%	3566	196.12	205.67	217.2	0.64
7544	160%	3803	196.12	205.84	227.5	0.63

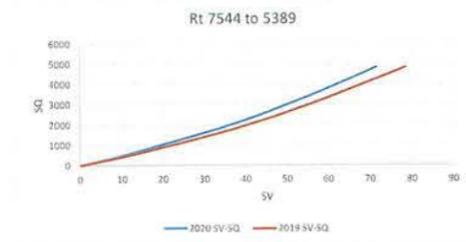
Rt 7544 to 5389 FROM STA. 8636 TO 7544

SV	SQ	Avg Flood Wave hrs	No. of Subreaches	2020 SV	2020 SQ	Approved SV	Approved SQ
0	0			0	0	0	0
2.56	238	0.1400	1.68	2.56	238	2.54	238
5.17	475	0.1467	1.76	5.17	475	5.21	475
7.56	713	0.1533	1.84	7.56	713	7.66	713
9.68	951	0.1467	1.76	9.68	951	9.84	951
11.68	1189	0.1467	1.76	11.68	1189	11.9	1189
13.55	1426	0.1400	1.68	13.55	1426	13.82	1426
15.32	1664	0.1333	1.60	15.32	1664	15.64	1664
17.01	1902	0.1267	1.52	17.01	1902	17.36	1902
18.66	2139	0.1267	1.52	18.66	2139	19.06	2139
20.23	2377	0.1200	1.44	20.23	2377	20.65	2377
21.75	2615	0.1200	1.44	21.75	2615	22.24	2615
23.26	2853	0.1200	1.44	23.26	2853	23.79	2853
24.72	3090	0.1200	1.44	24.72	3090	25.32	3090
26.19	3328	0.1133	1.36	26.19	3328	26.81	3328
27.61	3566	0.1067	1.28	27.61	3566	28.23	3566
28.97	3803	0.1067	1.28	28.97	3803	29.65	3803
		Avg. Subreaches	1.68				
							Round up* 2



Rt 7544 to 5389 FROM STA. 7544 TO 5389

SV	SQ	Avg Flood Wave hrs	No. of Subreaches	2020 SV	2020 SQ	Approved SV	Approved SQ
0	0			0	0	0	0
6.6	301	0.2267	2.72	6.6	301	7.2	301
12.65	602	0.2267	2.72	12.65	602	14.11	602
18.12	902	0.2133	2.56	18.12	902	20.2	902
23.52	1203	0.2067	2.48	23.52	1203	26.4	1203
28.77	1504	0.2067	2.48	28.77	1504	31.99	1504
33.6	1805	0.1933	2.32	33.6	1805	37.24	1805
38.11	2105	0.1933	2.32	38.11	2105	42.05	2105
42.52	2406	0.1933	2.32	42.52	2406	46.96	2406
46.51	2707	0.1800	2.16	46.51	2707	51.77	2707
50.38	3008	0.1800	2.16	50.38	3008	55.51	3008
54.24	3308	0.1733	2.08	54.24	3308	59.65	3308
57.85	3609	0.1667	2.00	57.85	3609	63.54	3609
61.42	3910	0.1600	1.92	61.42	3910	67.36	3910
64.92	4211	0.1600	1.92	64.92	4211	71.2	4211
68.37	4512	0.1600	1.92	68.37	4512	75.01	4512
71.79	4812	0.1600	1.92	71.79	4812	78.69	4812
		Avg. Subreaches	2.45				
							Round up* 3



Rt 5389 to Mouth FROM STA. 5389 TO 1502

SV	SQ	Avg Flood Wave hrs	No. of Subreaches	2020 SV	2020 SQ	Approved SV	Approved SQ
0	0			0	0	0	0
17.01	304	0.4600	1.84	17.01	304	15.18	304
32.81	609	0.4400	1.76	32.81	609	28.89	609
46.17	913	0.4133	1.65	46.17	913	40.42	913
58.28	1218	0.3933	1.57	58.28	1218	51.18	1218
69.1	1522	0.3667	1.47	69.1	1522	61.33	1522
78.71	1827	0.3533	1.41	78.71	1827	70.29	1827
87.81	2131	0.3333	1.33	87.81	2131	78.67	2131
96.58	2436	0.3200	1.28	96.58	2436	87.31	2436
104.87	2740	0.3133	1.25	104.87	2740	95.13	2740
112.81	3045	0.3000	1.20	112.81	3045	102.86	3045
120.35	3349	0.2933	1.17	120.35	3349	110.27	3349
127.71	3654	0.2867	1.15	127.71	3654	117.32	3654
134.84	3958	0.2800	1.12	134.84	3958	124.29	3958
141.9	4262	0.2733	1.09	141.9	4262	131.03	4262
148.83	4567	0.2667	1.07	148.83	4567	137.63	4567
155.71	4871	0.2600	1.04	155.71	4871	144.1	4871
		Avg. Subreaches	1.51				
							Round up* 2



River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Volume (acre-ft)	Trvl Tme Avg (hrs)
5389	10%	301	191.23	195.3	17.01	0.69
5389	20%	602	191.23	196.03	32.81	0.66
5389	30%	902	191.23	196.56	46.17	0.62
5389	40%	1203	191.23	197.03	58.28	0.59
5389	50%	1504	191.23	197.41	69.1	0.55
5389	60%	1805	191.23	197.73	78.71	0.53
5389	70%	2105	191.23	198.02	87.81	0.5
5389	80%	2406	191.23	198.29	96.58	0.48
5389	90%	2707	191.23	198.54	104.87	0.47
5389	100%	3008	191.23	198.78	112.81	0.45
5389	110%	3308	191.23	199	120.35	0.44
5389	120%	3609	191.23	199.21	127.71	0.43
5389	130%	3910	191.23	199.42	134.84	0.42
5389	140%	4211	191.23	199.62	141.9	0.41
5389	150%	4512	191.23	199.81	148.83	0.4
5389	160%	4812	191.23	200	155.71	0.39

River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Volume (acre-ft)	Trvl Tme Avg (hrs)
1502	10%	304	183.93	188.14		0
1502	20%	609	183.93	189.47		0
1502	30%	913	183.93	190.14		0
1502	40%	1218	183.93	190.66		0
1502	50%	1522	183.93	191.04		0
1502	60%	1827	183.93	191.35		0
1502	70%	2131	183.93	191.63		0
1502	80%	2436	183.93	191.9		0
1502	90%	2740	183.93	192.16		0
1502	100%	3045	183.93	192.39		0
1502	110%	3349	183.93	192.62		0
1502	120%	3654	183.93	192.83		0
1502	130%	3958	183.93	193.03		0
1502	140%	4262	183.93	193.22		0
1502	150%	4567	183.93	193.41		0
1502	160%	4871	183.93	193.59		0

August 2020 HEC-RAS Proposed Conditions Flow File

Approved Study				
Node	DA	25-yr Flow	Peak Time	Volume
471	0.9693	1015.8	03Aug2011	6.81
Existing Lake	0.9693	942.9	03Aug2011	6.81
Lake	0.9693	942.9	03Aug2011	6.81
Route to 7544	0.9693	941.4	03Aug2011	6.81
472	0.9486	898.4	03Aug2011	6.61
US of Trib 7544	0.9486	898.4	03Aug2011	6.61
RS 7544	1.9179	1824.3	03Aug2011	6.71
Rt 7544 to 5389	1.9179	1817.5	03Aug2011	6.71
474	0.4221	369.1	03Aug2011	6.54
US of Trib RS 5389	0.4221	369.1	03Aug2011	6.54
473	0.2594	378.7	03Aug2011	6.79
RS 5389	2.5994	2292.3	03Aug2011	6.69
Rt 5389 to Mouth	2.5994	2265.7	03Aug2011	6.69
475	0.1986	327.1	03Aug2011	6.97
Mouth	2.798	2314.8	03Aug2011	6.71

2020 Update				
Node	DA	25-yr Flow	Peak Time	Volume
471	0.9693	1015.8	03Aug2011	6.81
Existing Lake	0.9693	942.9	03Aug2011	6.81
Lake	0.9693	942.9	03Aug2011	6.81
Route to 7544	0.9693	941.5	03Aug2011	6.81
472	0.9486	898.4	03Aug2011	6.61
US of Trib 7544	0.9486	898.4	03Aug2011	6.61
RS 7544	1.9179	1824.7	03Aug2011	6.71
Rt 7544 to 5389	1.9179	1818.4	03Aug2011	6.71
474	0.4221	369.1	03Aug2011	6.54
US of Trib RS 5389	0.4221	369.1	03Aug2011	6.54
473	0.2594	378.7	03Aug2011	6.79
RS 5389	2.5994	2296.5	03Aug2011	6.69
Rt 5389 to Mouth	2.5994	2268.1	03Aug2011	6.69
475	0.1986	327.1	03Aug2011	6.97
Mouth	2.798	2317.2	03Aug2011	6.71

Difference	% Diff
0	0.0%
0	0.0%
0	0.0%
0.1	0.0%
0	0.0%
0	0.0%
0.4	0.0%
0.9	0.0%
0	0.0%
0	0.0%
0	0.0%
4.2	0.2%
2.4	0.1%
0	0.0%
2.4	0.1%

Approved Study				
Node	DA	100-yr Flow	Peak Time	Volume
471	0.9693	1299.3	03Aug2011	9.22
Existing Lake	0.9693	1233.3	03Aug2011	9.22
Lake	0.9693	1233.3	03Aug2011	9.22
Route to 7544	0.9693	1232	03Aug2011	9.21
472	0.9486	1156.1	03Aug2011	8.99
US of Trib 7544	0.9486	1156.1	03Aug2011	8.99
RS 7544	1.9179	2378.1	03Aug2011	9.11
Rt 7544 to 5389	1.9179	2370.7	03Aug2011	9.11
474	0.4221	476.8	03Aug2011	8.91
US of Trib RS 5389	0.4221	476.8	03Aug2011	8.91
473	0.2594	477.8	03Aug2011	9.2
RS 5389	2.5994	3006.5	03Aug2011	9.08
Rt 5389 to Mouth	2.5994	2980.3	03Aug2011	9.08
475	0.1986	410.3	03Aug2011	9.4
Mouth	2.798	3054.1	03Aug2011	9.11

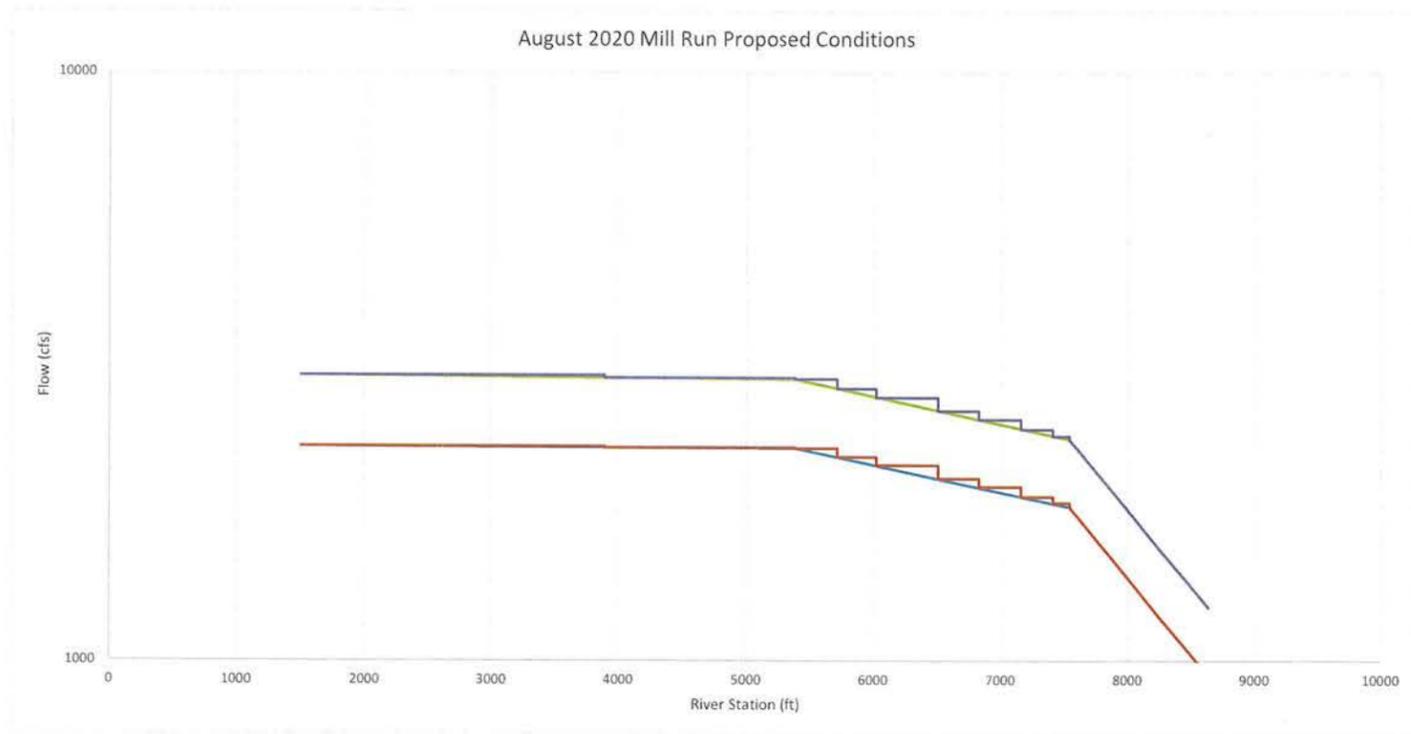
2020 Update				
Node	DA	100-yr Flow	Peak Time	Volume
471	0.9693	1299.3	03Aug2011	9.22
Existing Lake	0.9693	1233.3	03Aug2011	9.22
Lake	0.9693	1233.3	03Aug2011	9.22
Route to 7544	0.9693	1232	03Aug2011	9.21
472	0.9486	1156.1	03Aug2011	8.99
US of Trib 7544	0.9486	1156.1	03Aug2011	8.99
RS 7544	1.9179	2378.4	03Aug2011	9.11
Rt 7544 to 5389	1.9179	2371.9	03Aug2011	9.11
474	0.4221	476.8	03Aug2011	8.91
US of Trib RS 5389	0.4221	476.8	03Aug2011	8.91
473	0.2594	477.8	03Aug2011	9.2
RS 5389	2.5994	3011.7	03Aug2011	9.08
Rt 5389 to Mouth	2.5994	2983.4	03Aug2011	9.08
475	0.1986	410.3	03Aug2011	9.4
Mouth	2.798	3058.4	03Aug2011	9.11

Difference	% Diff
0	0.0%
0	0.0%
0	0.0%
0	0.0%
0	0.0%
0	0.0%
0	0.0%
0.3	0.0%
1.2	0.1%
0	0.0%
0	0.0%
0	0.0%
5.2	0.2%
3.1	0.1%
0	0.0%
4.3	0.1%

River Sta.	25-Yr	100-Yr
8636	943	1233
7544	1825	2378
7412	1855	2410
7162	1900	2475
6830	1975	2570
6509	2040	2660
6026	2150	2800
5718	2220	2900
5389	2297	3012
3891	2305	3025
1502	2317	3058

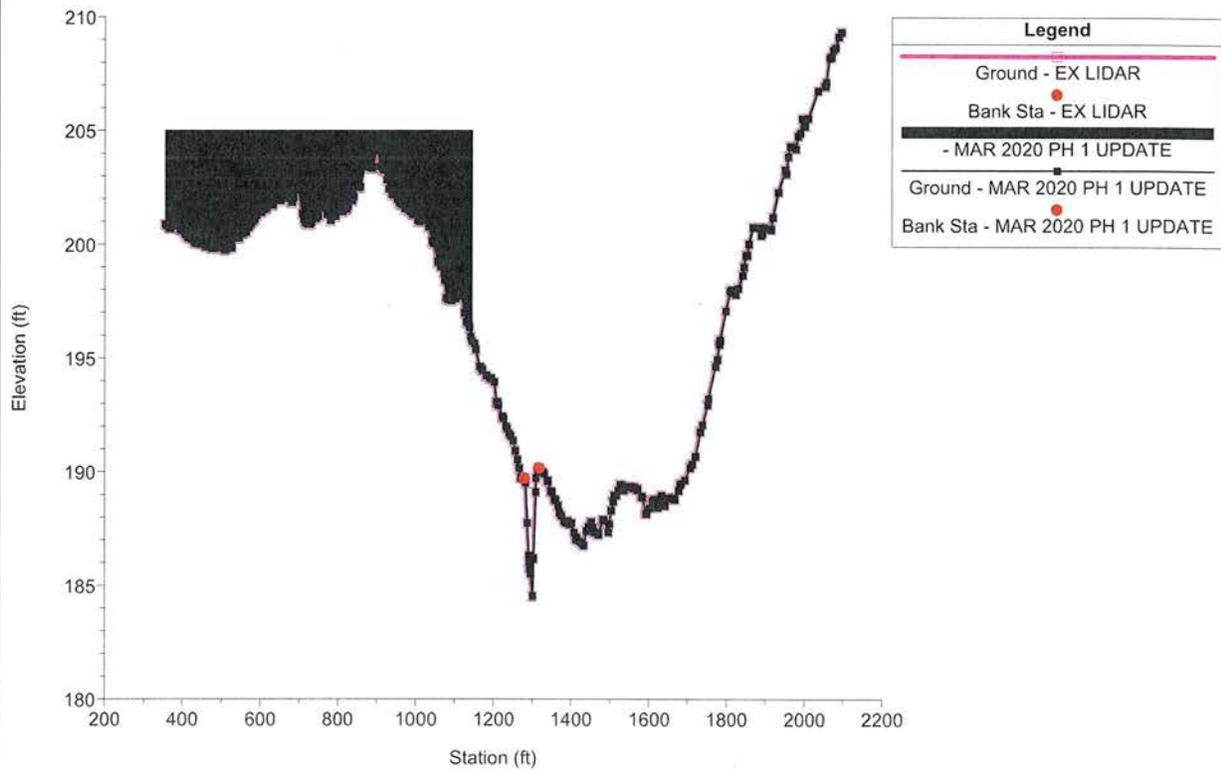
Lake	8636	943
RS 7544	7544	1825
RS 5389	5389	2297
Mouth	1502	2317
8636	943	
7544	1825	
7544	1855	2%
7412	1855	
7412	1900	2%
7162	1900	
7162	1975	4%
6830	1975	
6830	2040	3%
6509	2040	
6509	2150	5%
6026	2150	
6026	2220	3%
5718	2220	
5718	2297	3%
5389	2297	
5389	2305	0%
3891	2305	
3891	2317.2	1%
1502	2317.2	

8636	1233	
7544	2378	
7544	2410	1%
7412	2410	
7412	2475	3%
7162	2475	
7162	2570	4%
6830	2570	
6830	2660	4%
6509	2660	
6509	2800	5%
6026	2800	
6026	2900	4%
5718	2900	
5718	3012	4%
5389	3012	
5389	3025	0%
3891	3025	
3891	3058.4	1%
1502	3058.4	

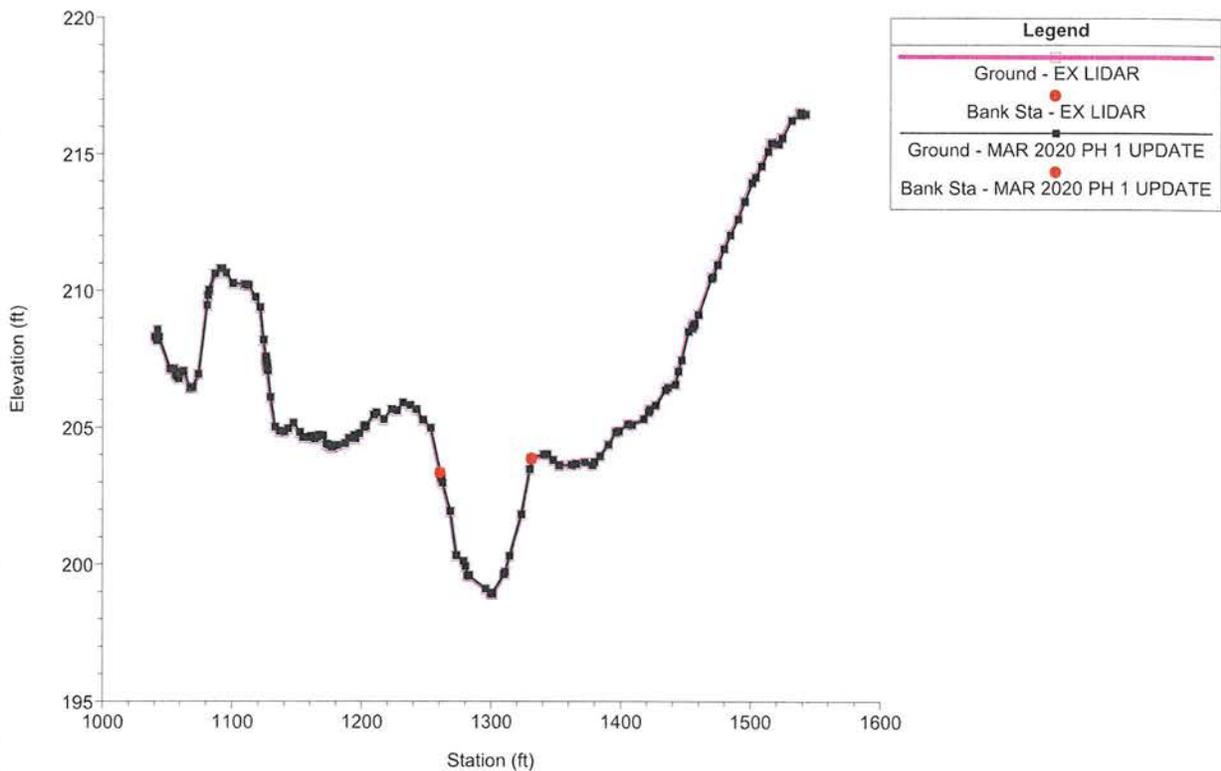


Appendix C – HEC-RAS Cross-Section Comparison

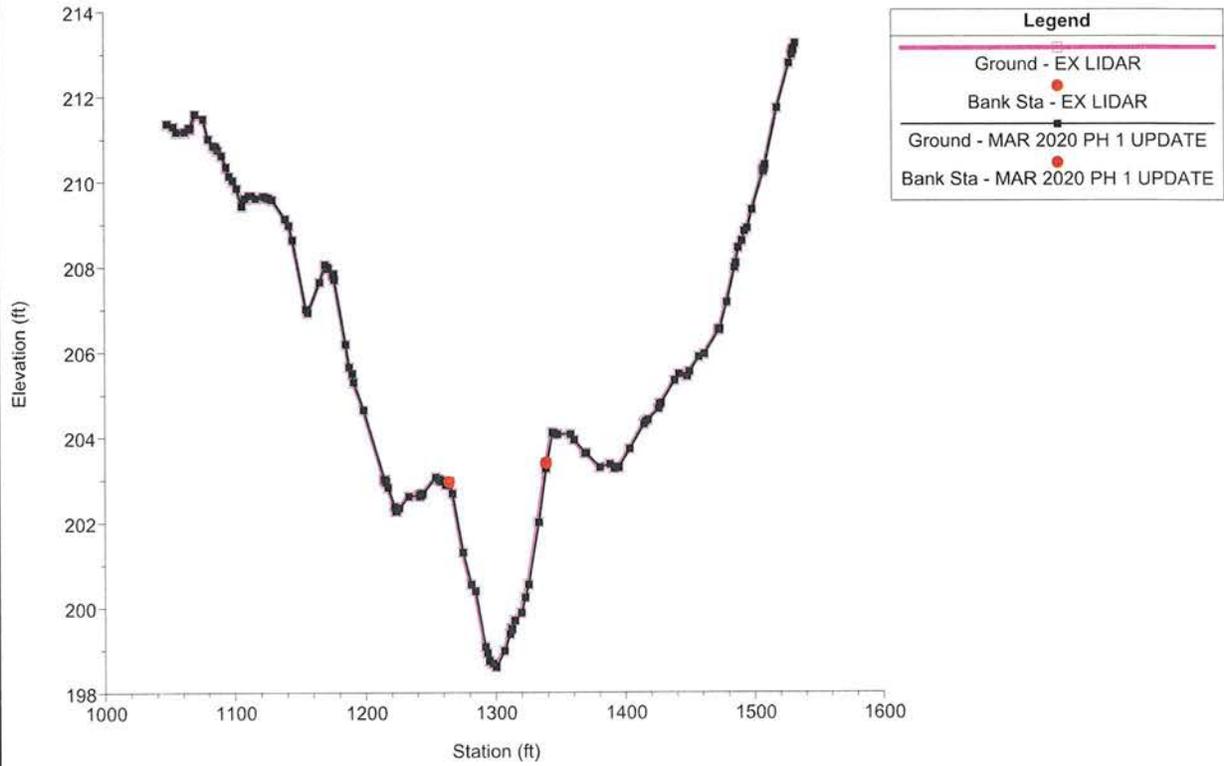
MILL CREEK TRIB 4 Plan: 1) MAR 2020 PH 1 UPDATE 2) EX LIDAR
1950.717



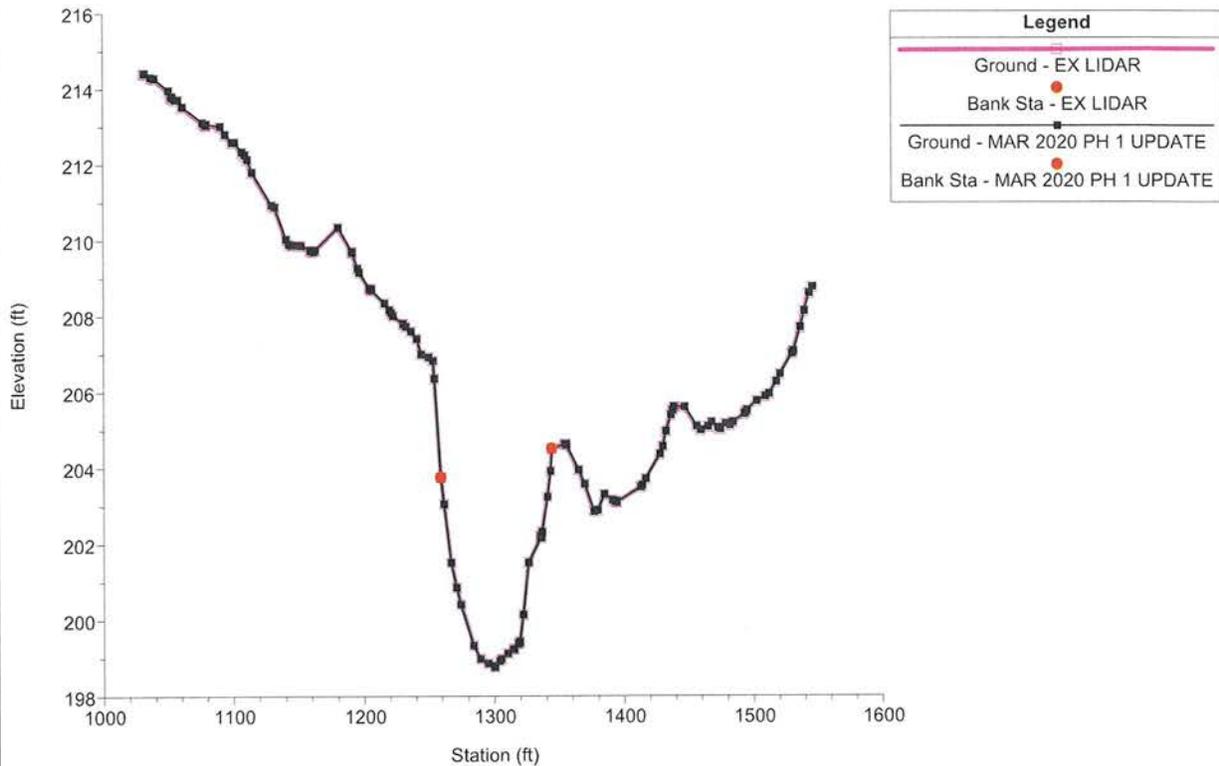
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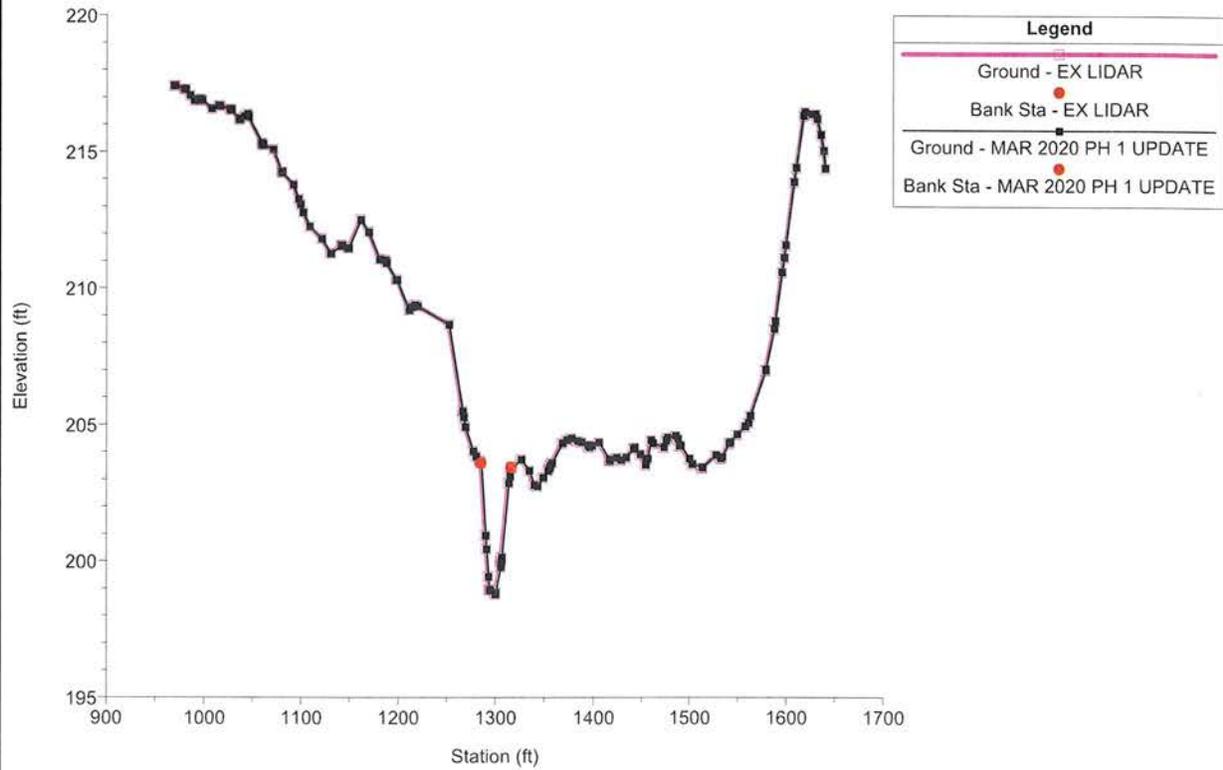
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8610.259



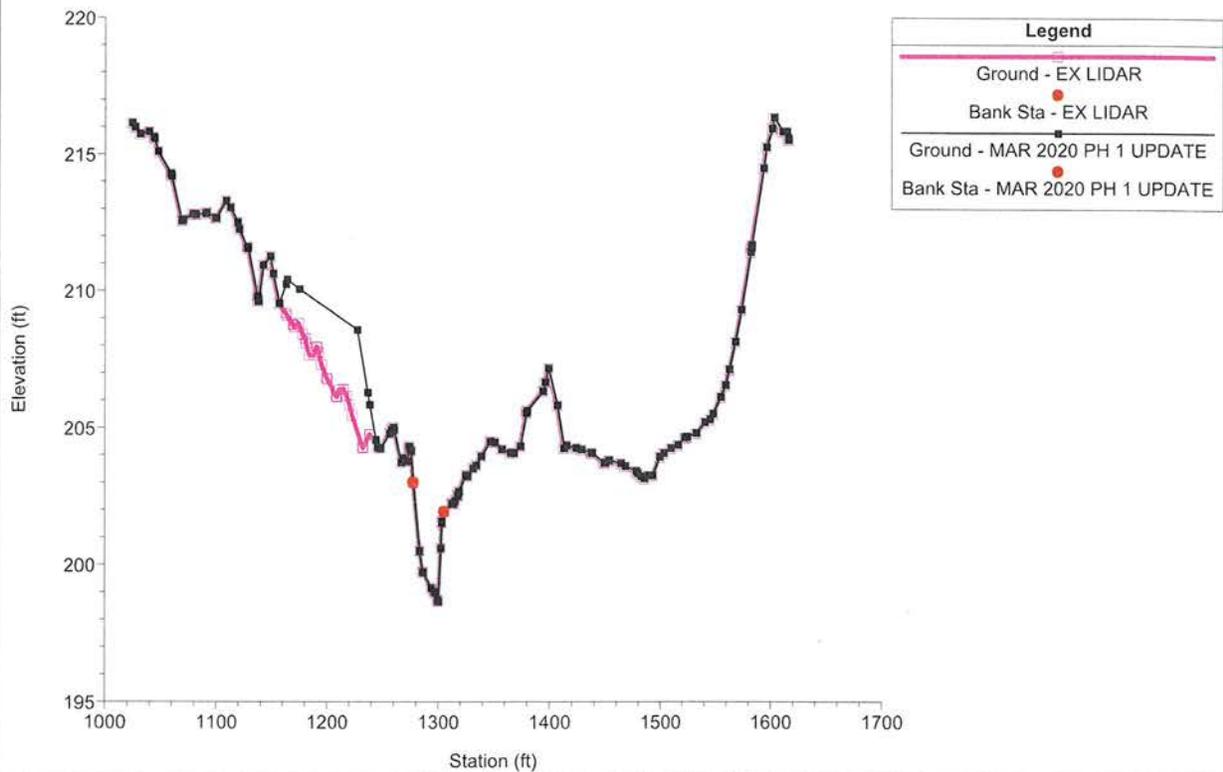
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8560.184



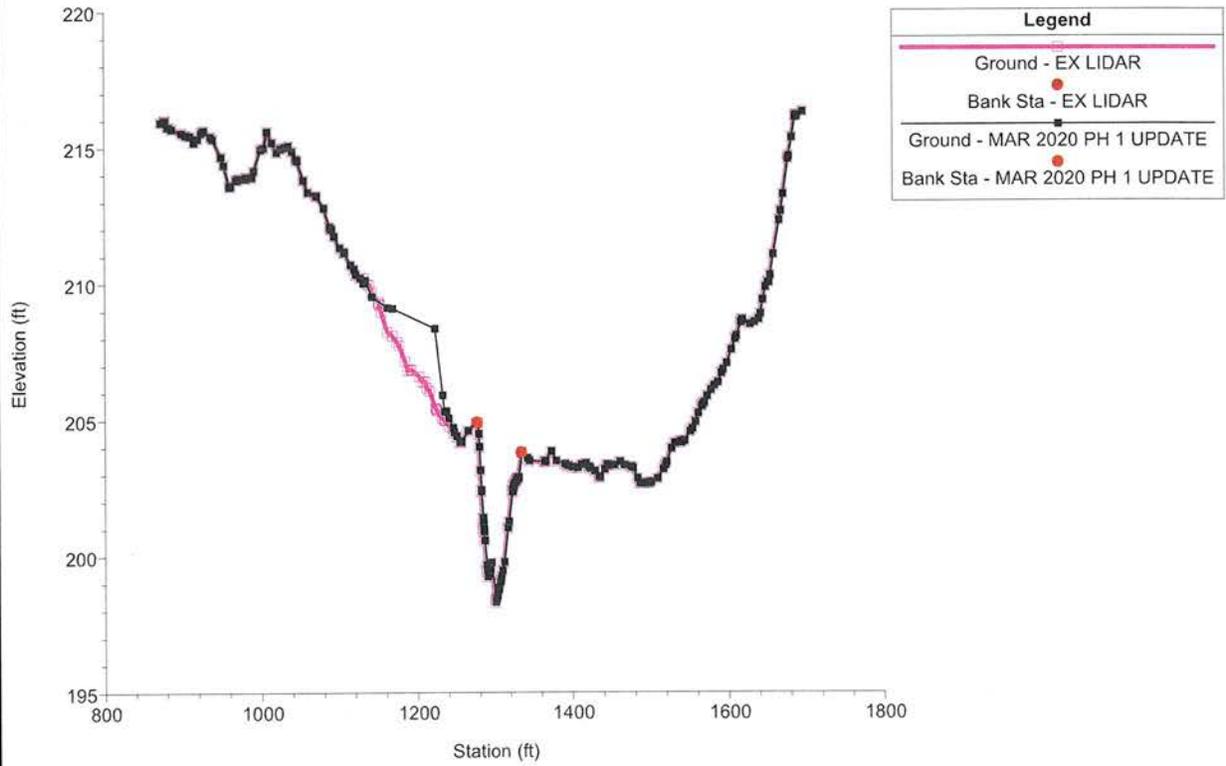
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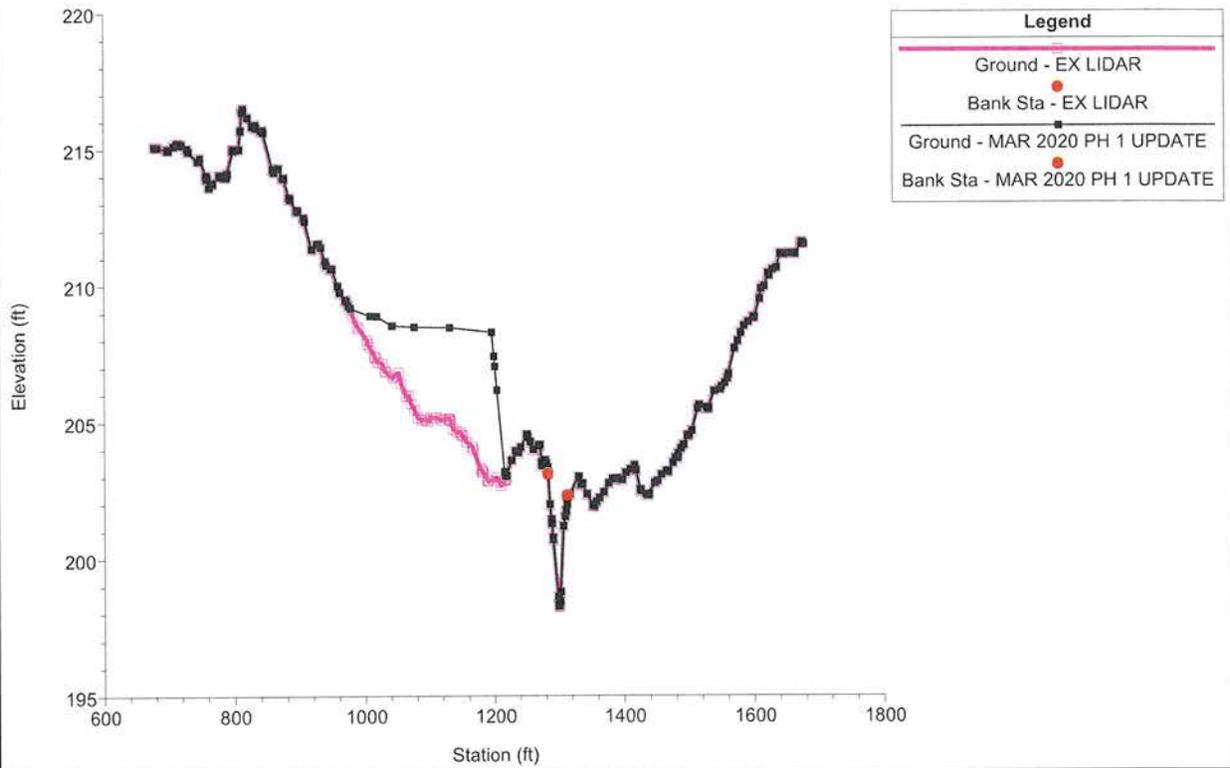
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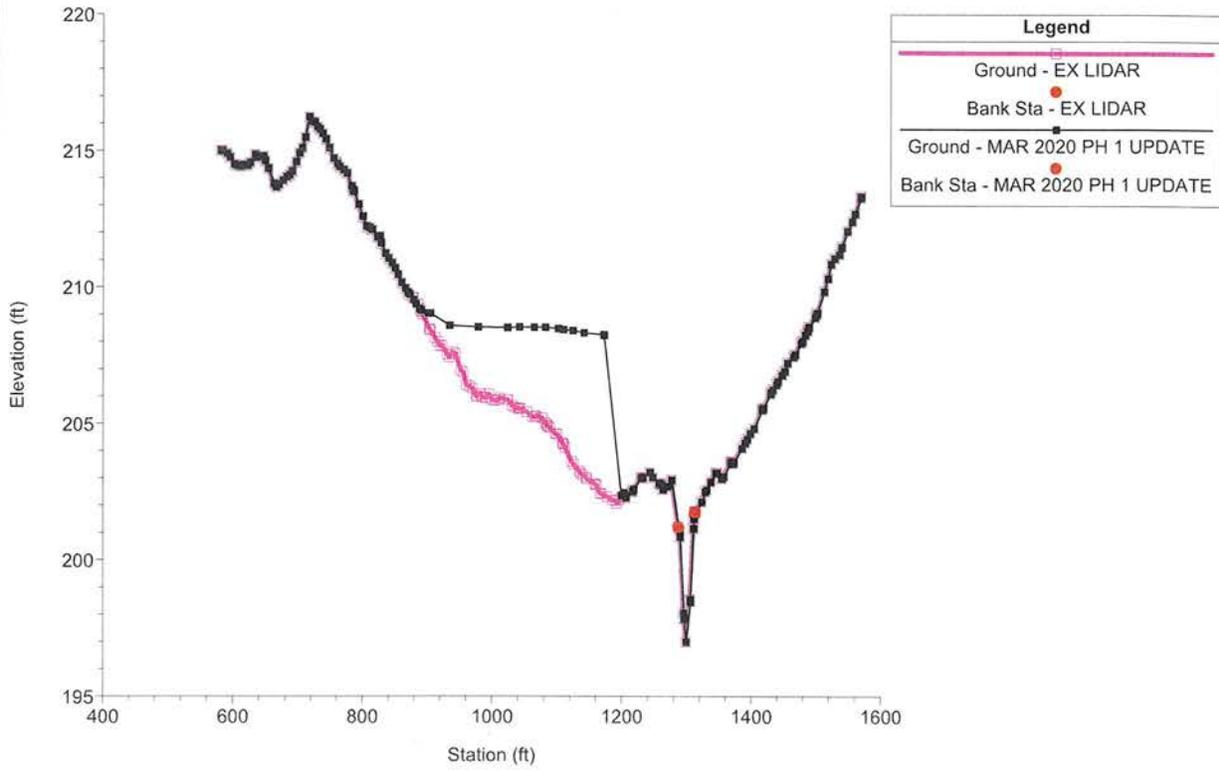
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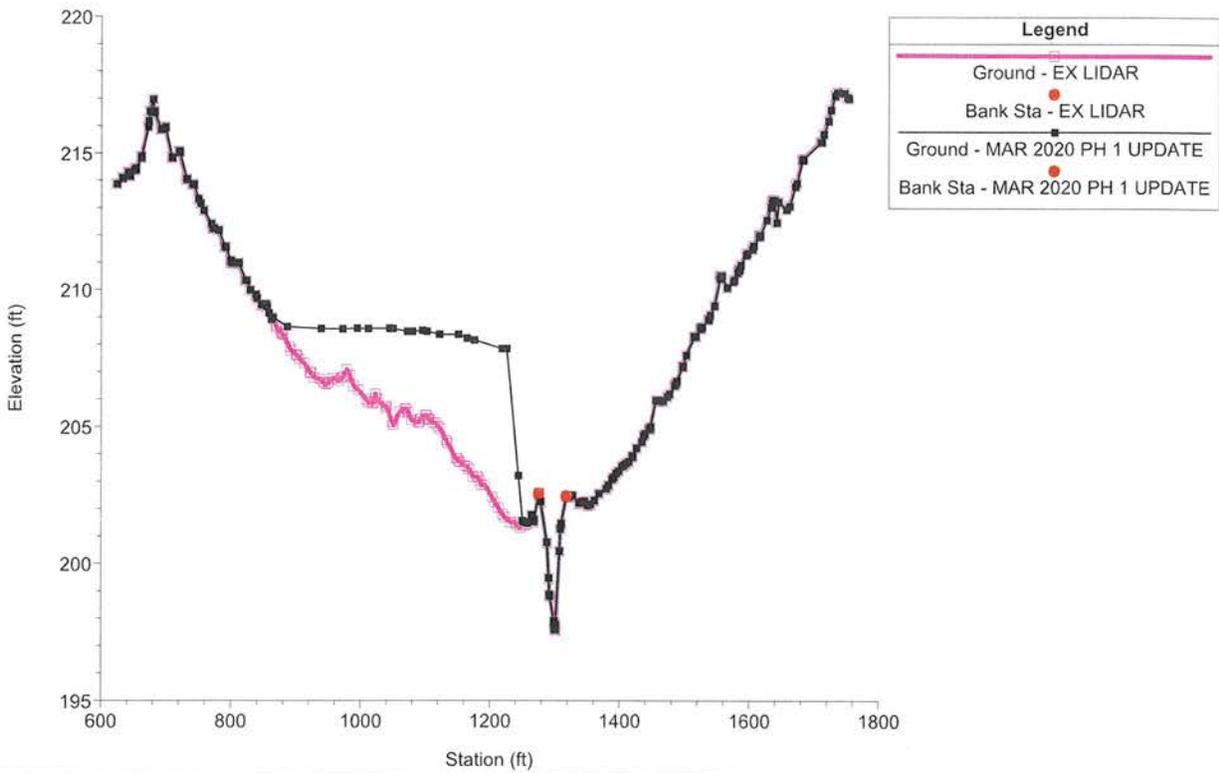
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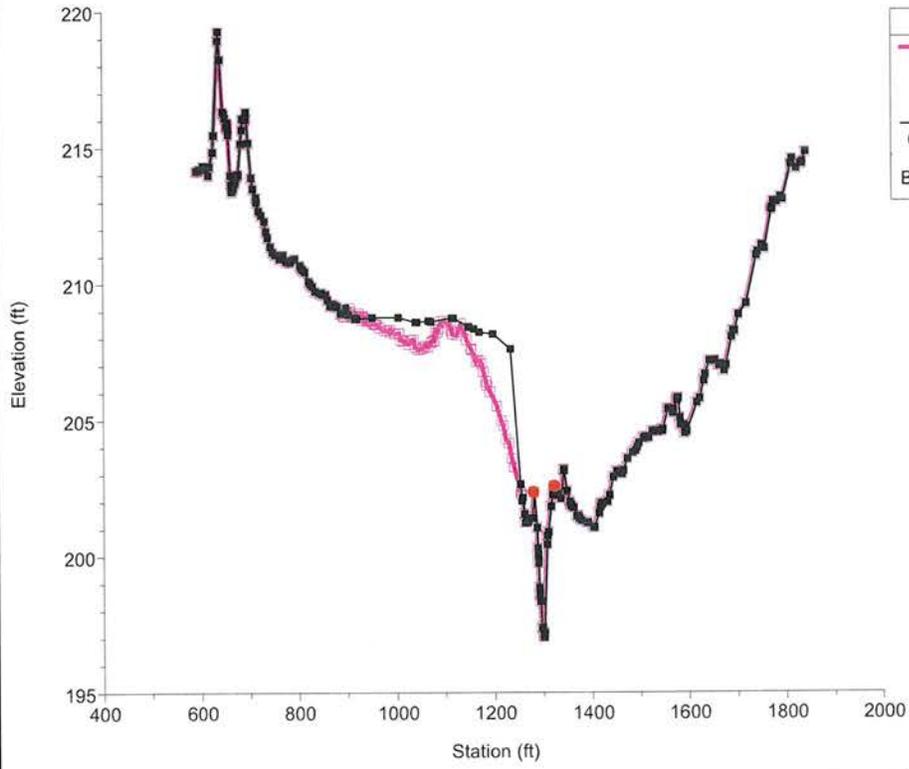
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7964.355



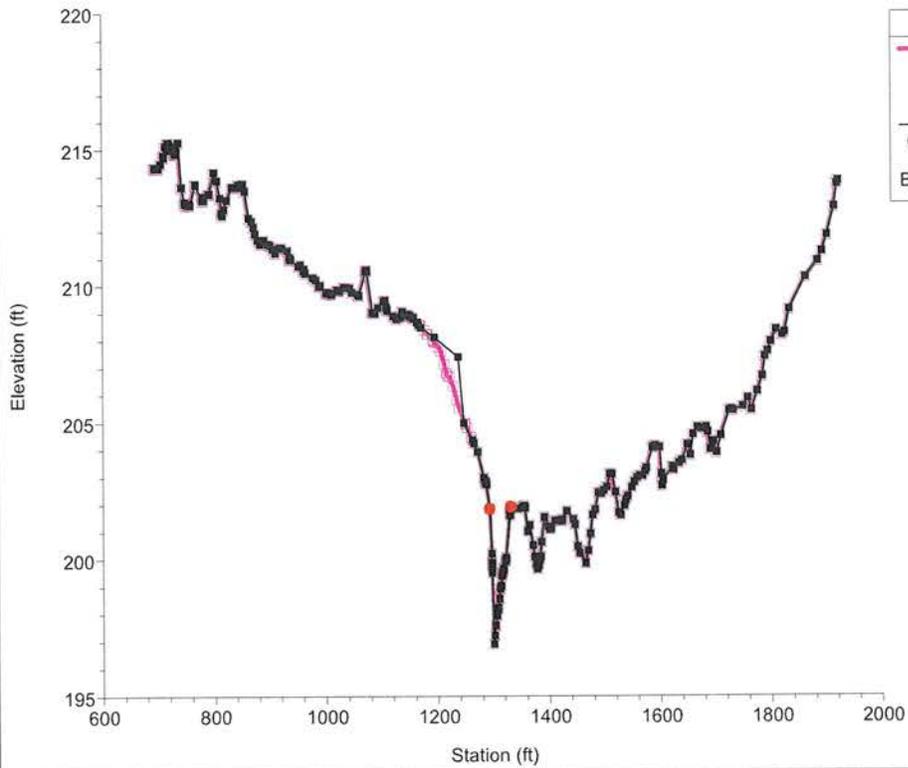
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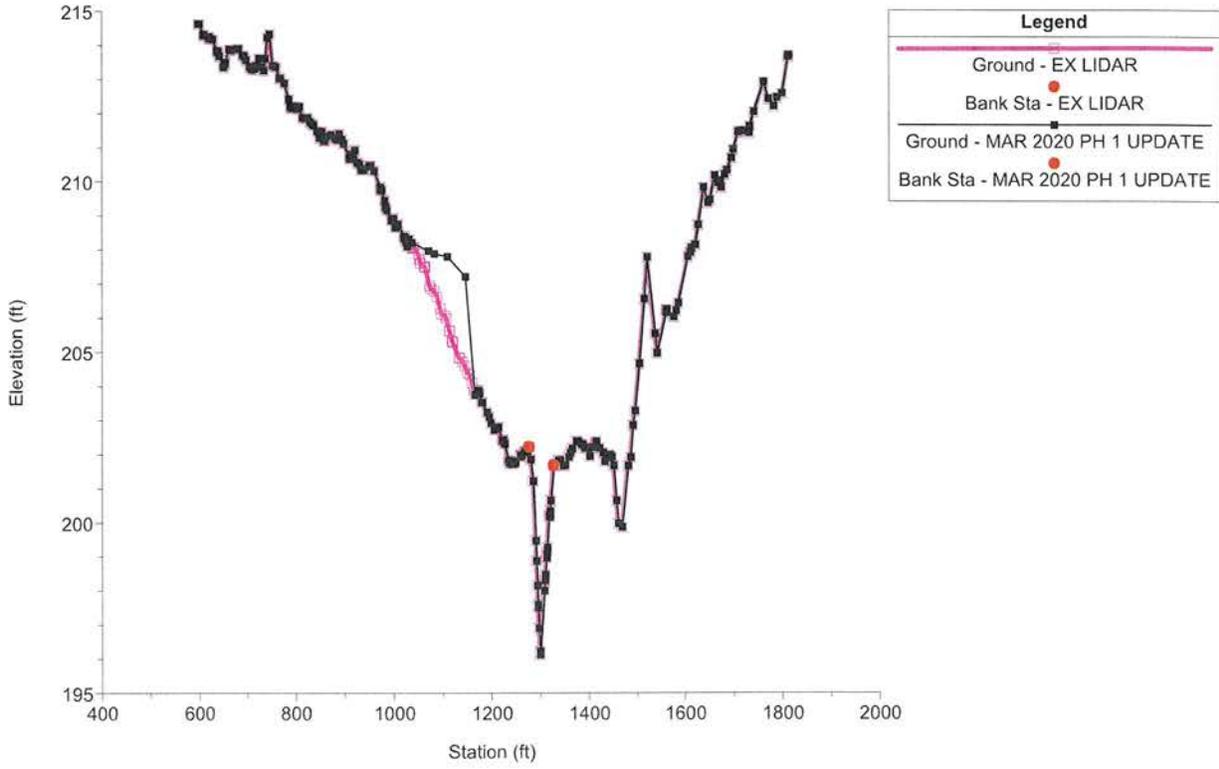
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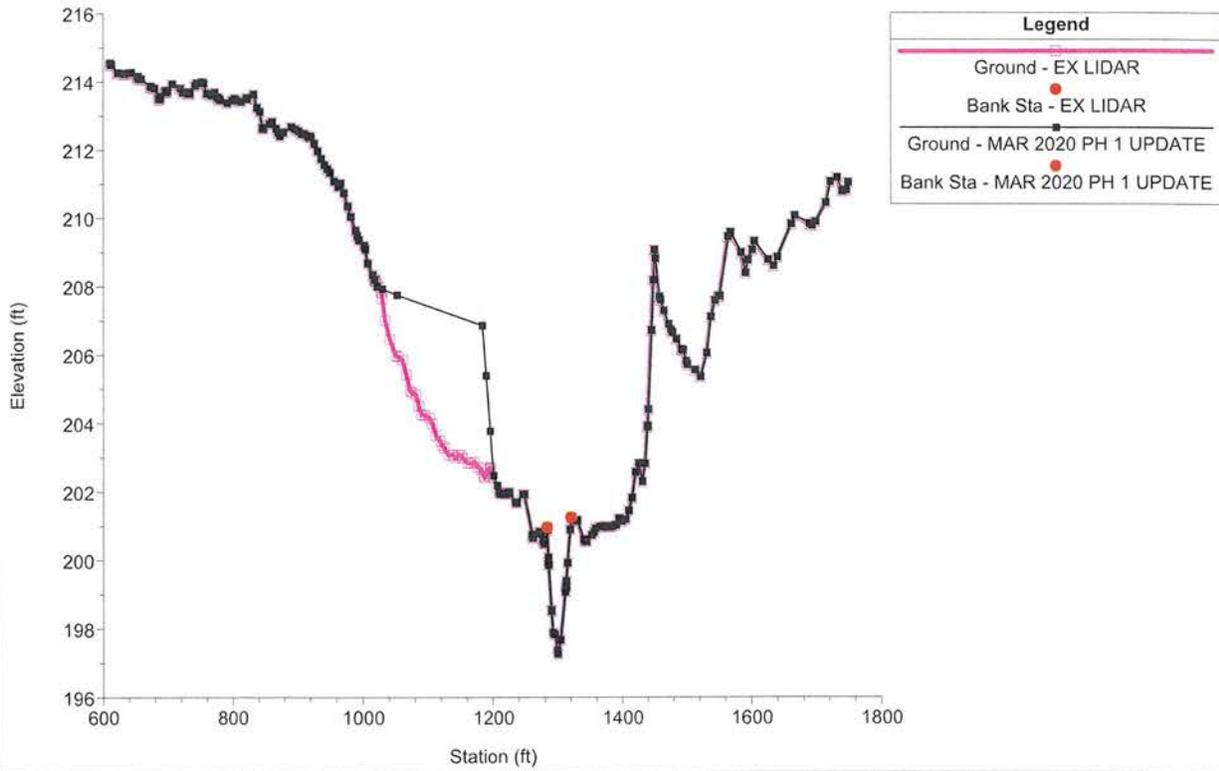
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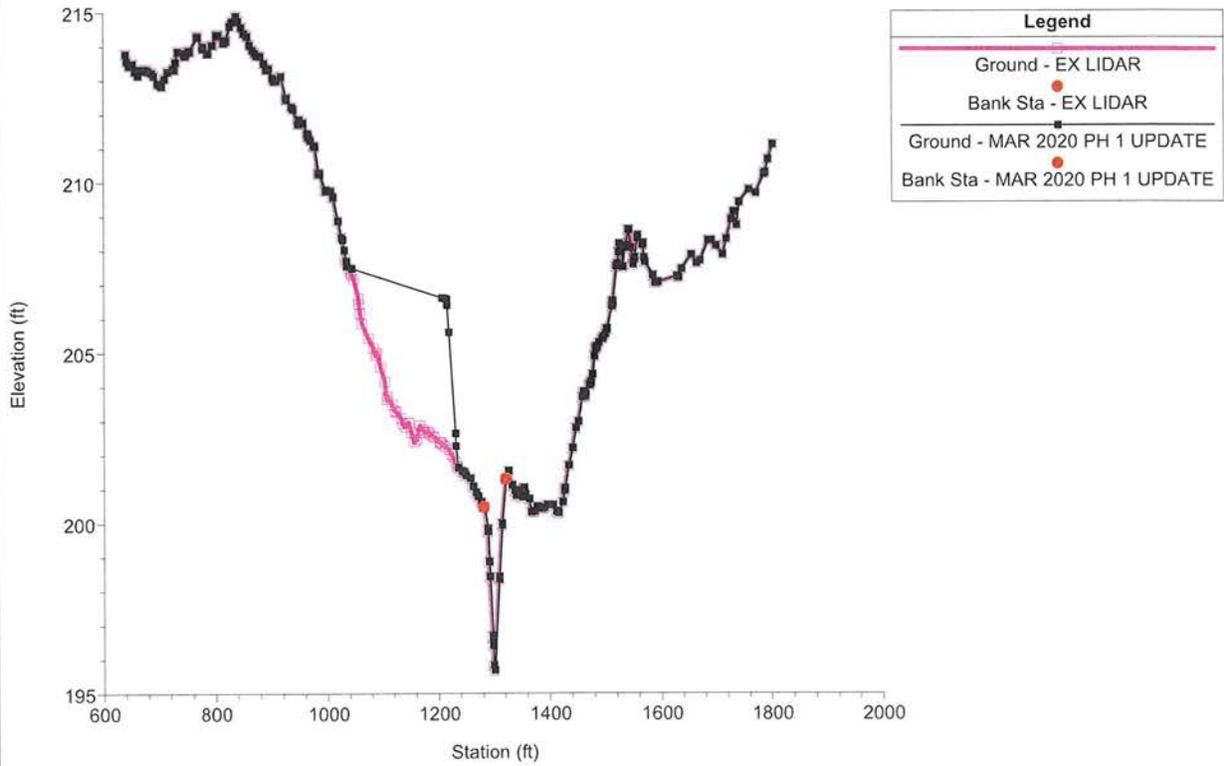
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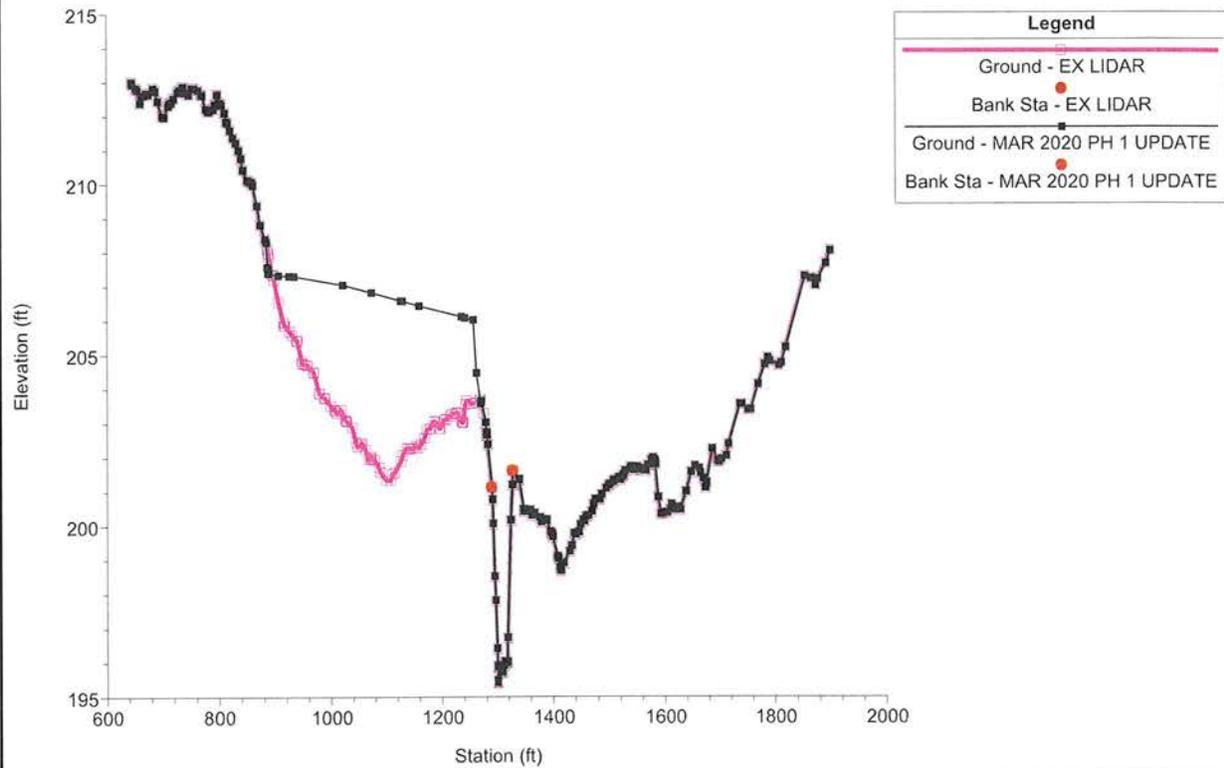
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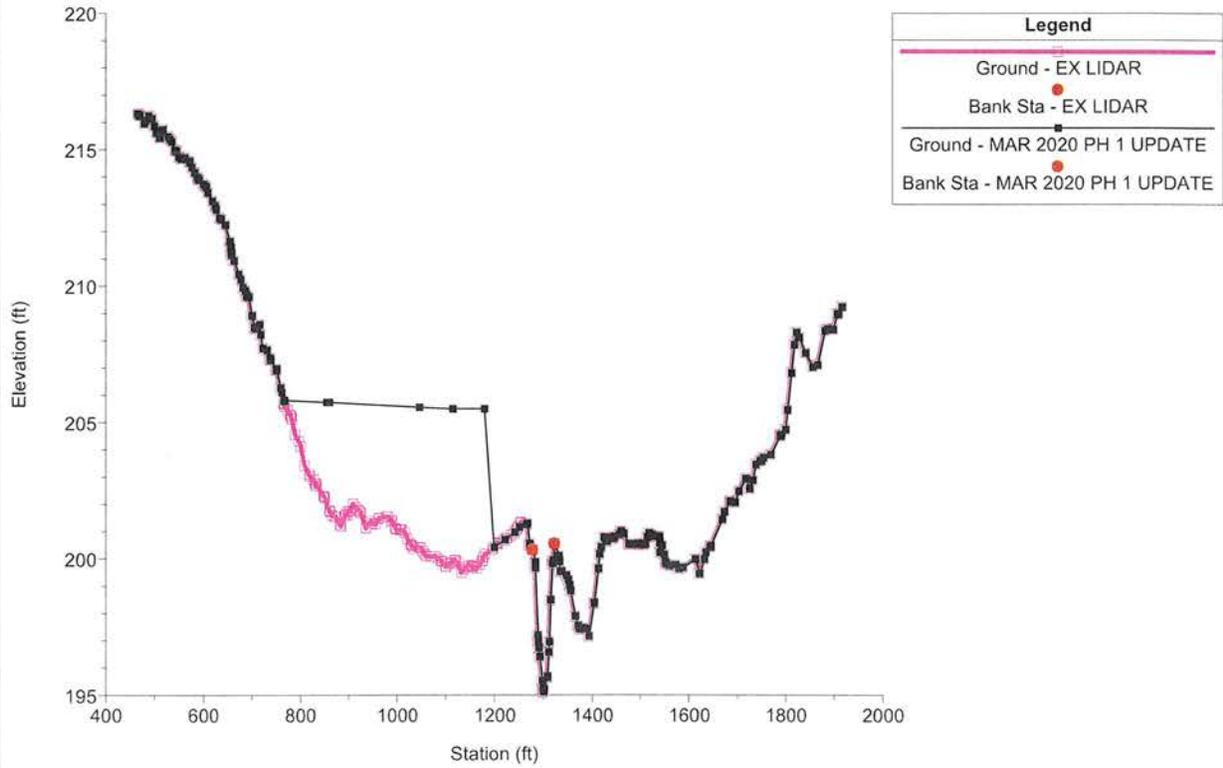
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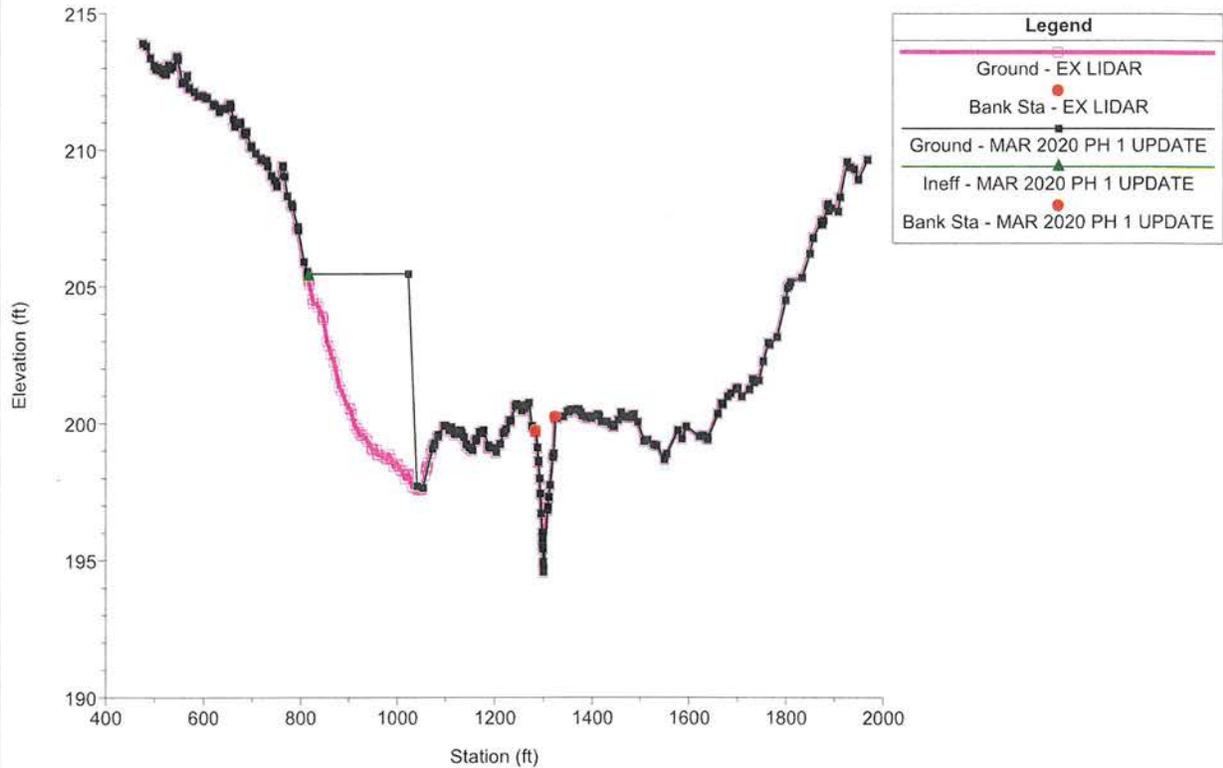
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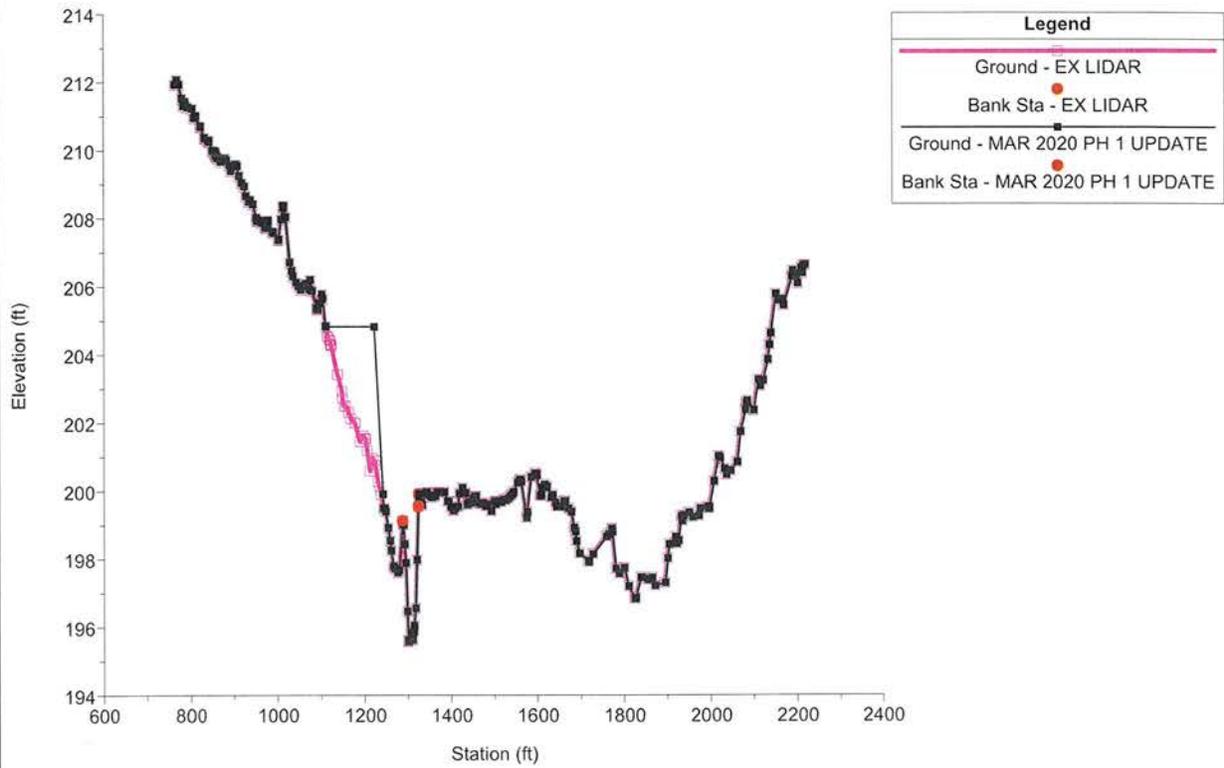
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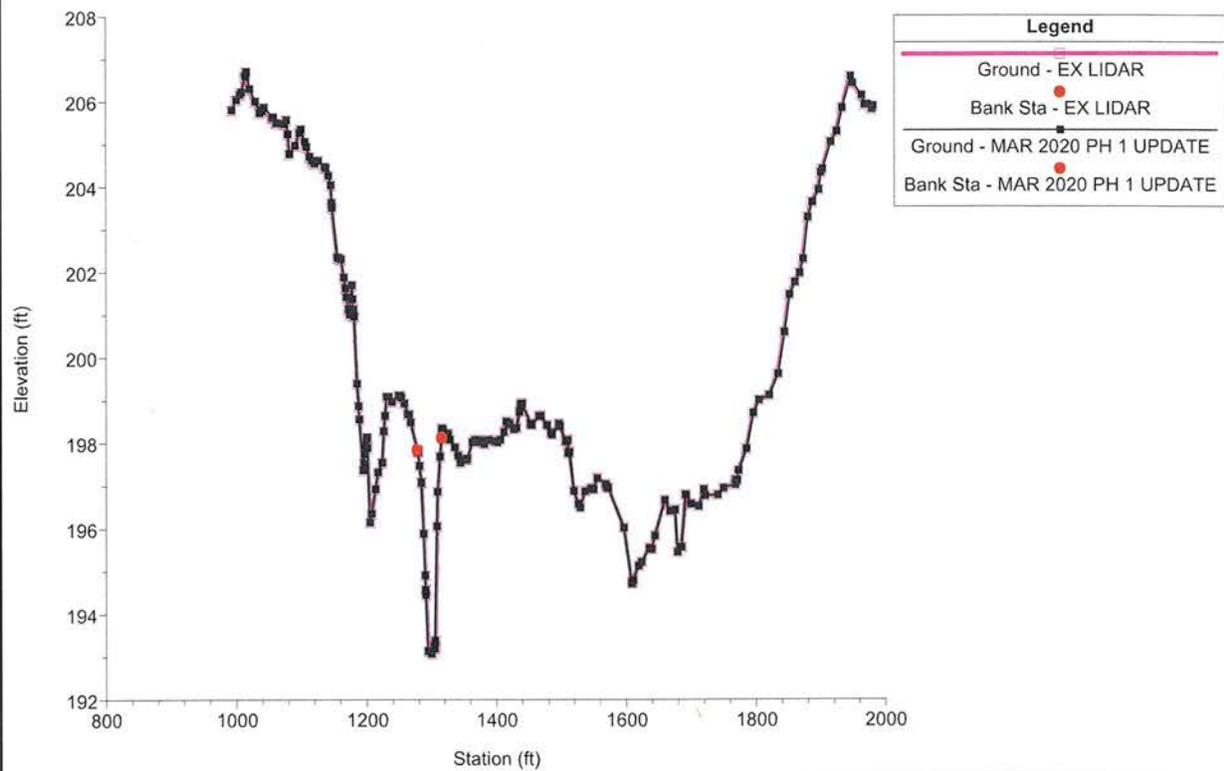
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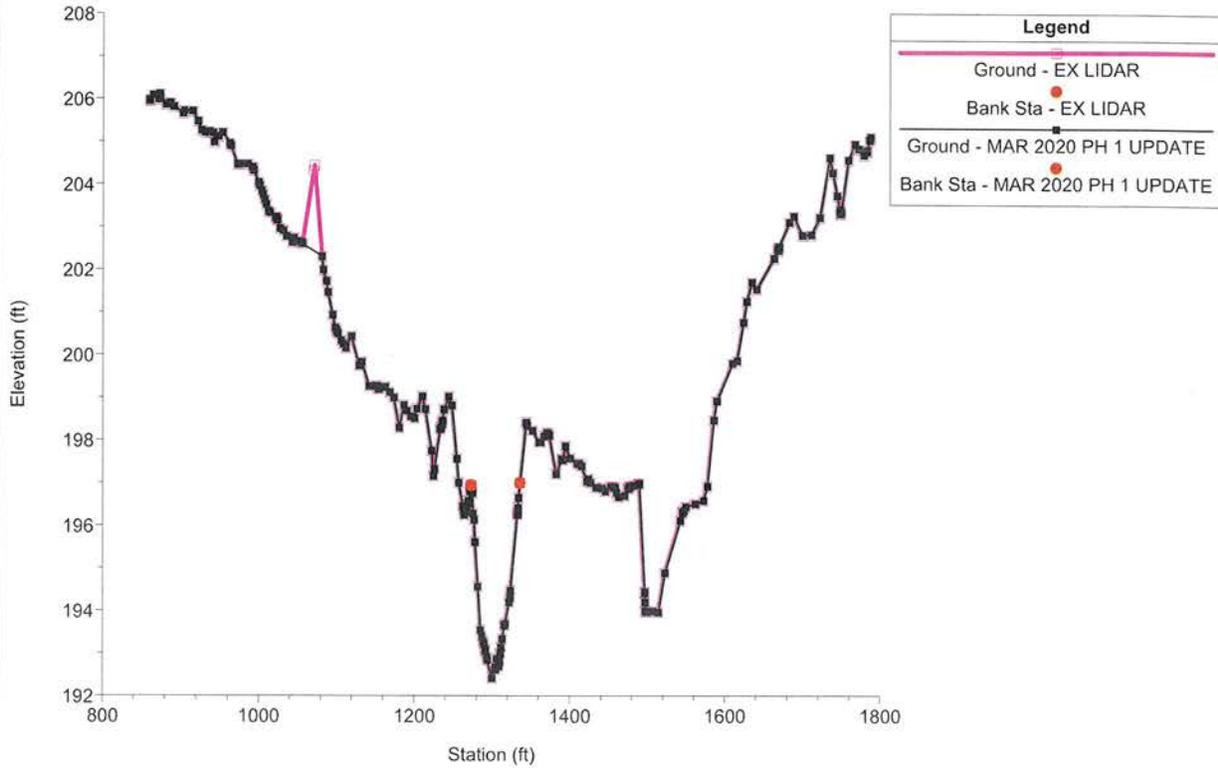
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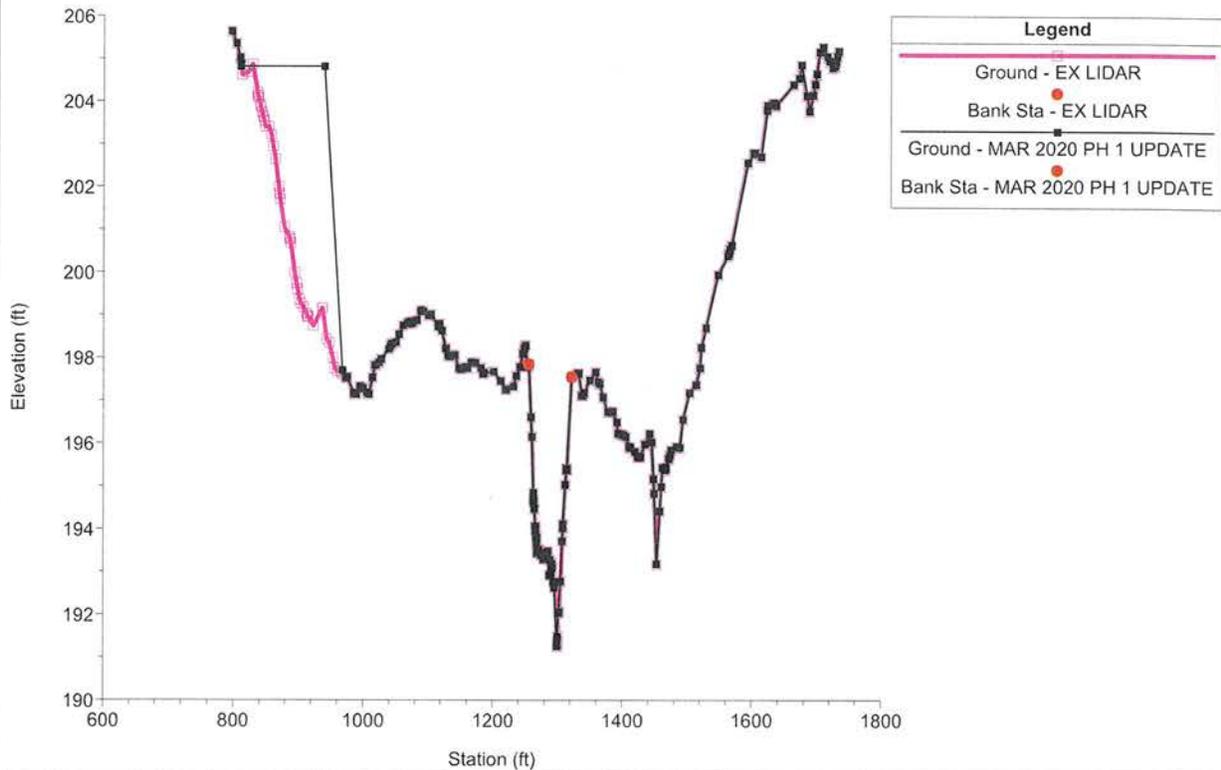
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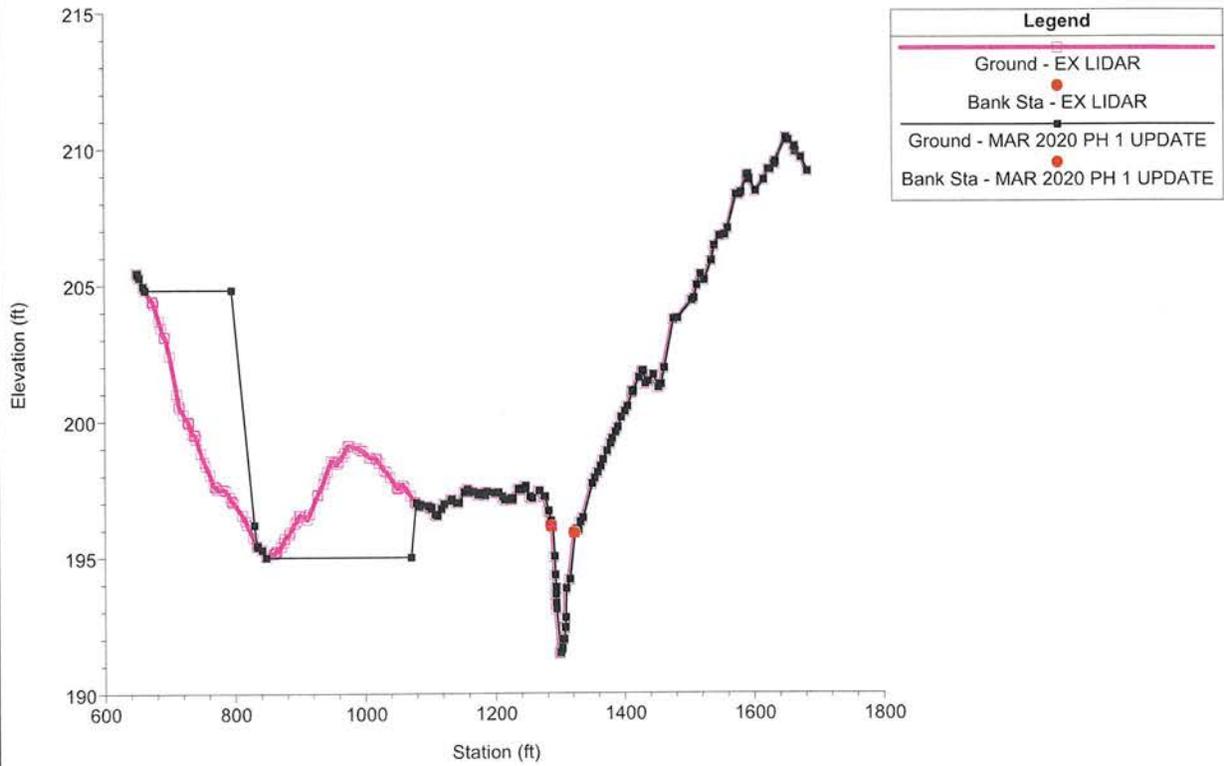
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5814.791



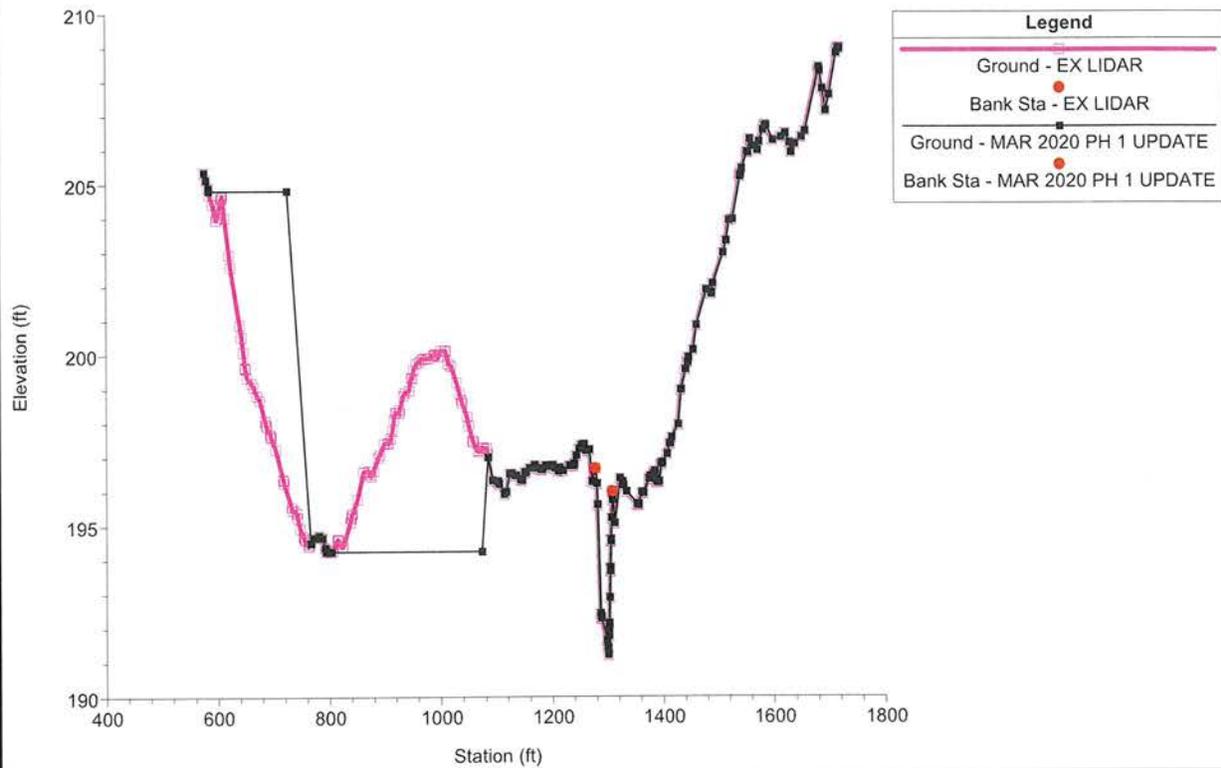
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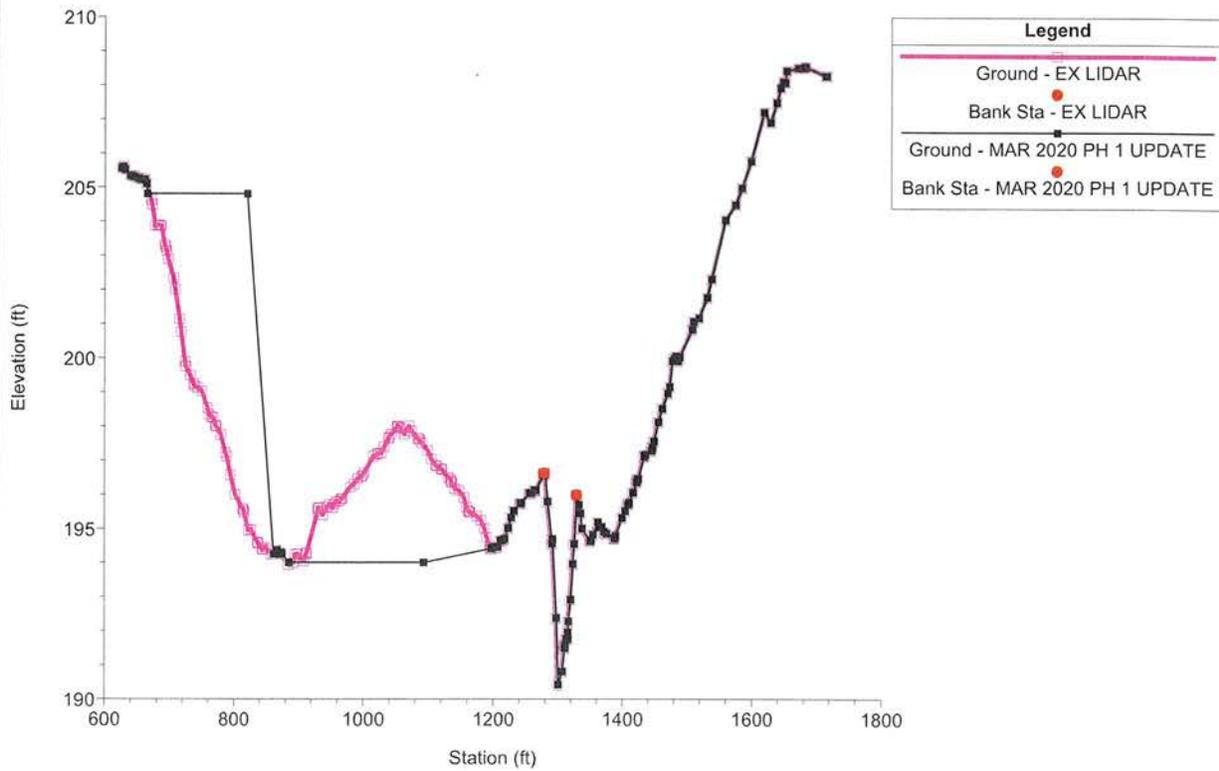
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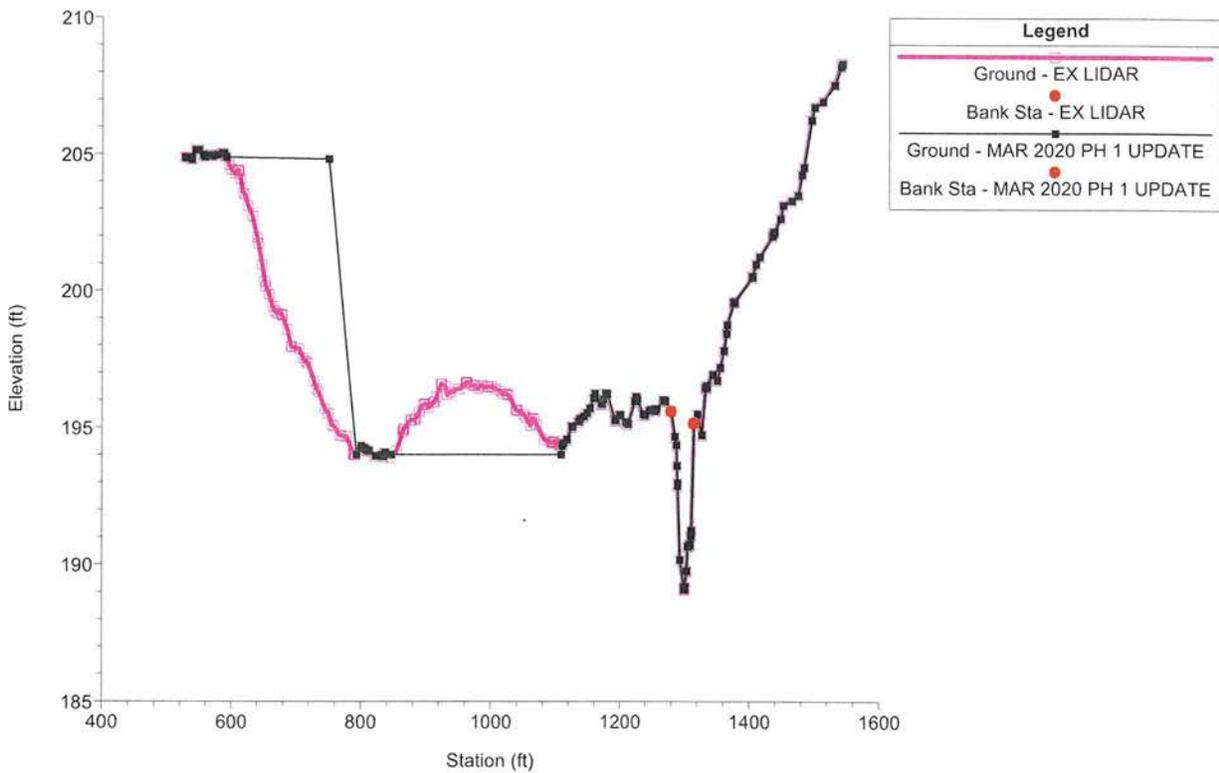
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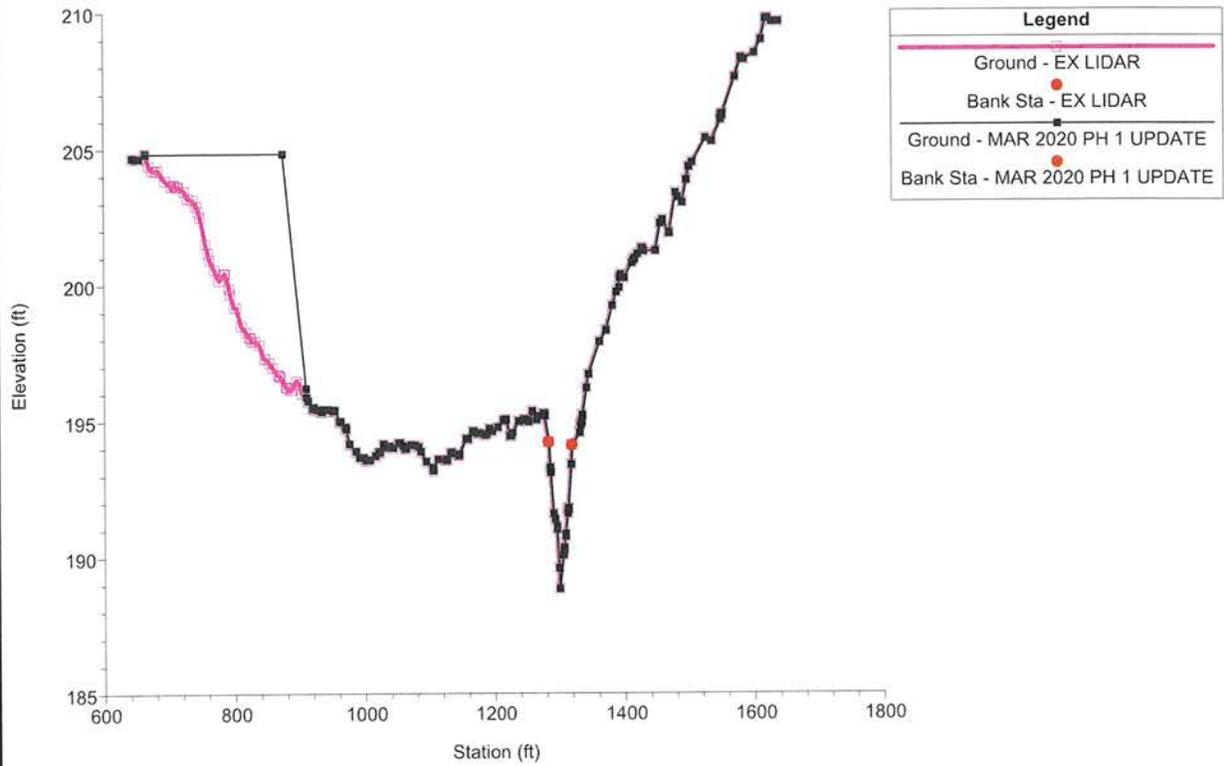
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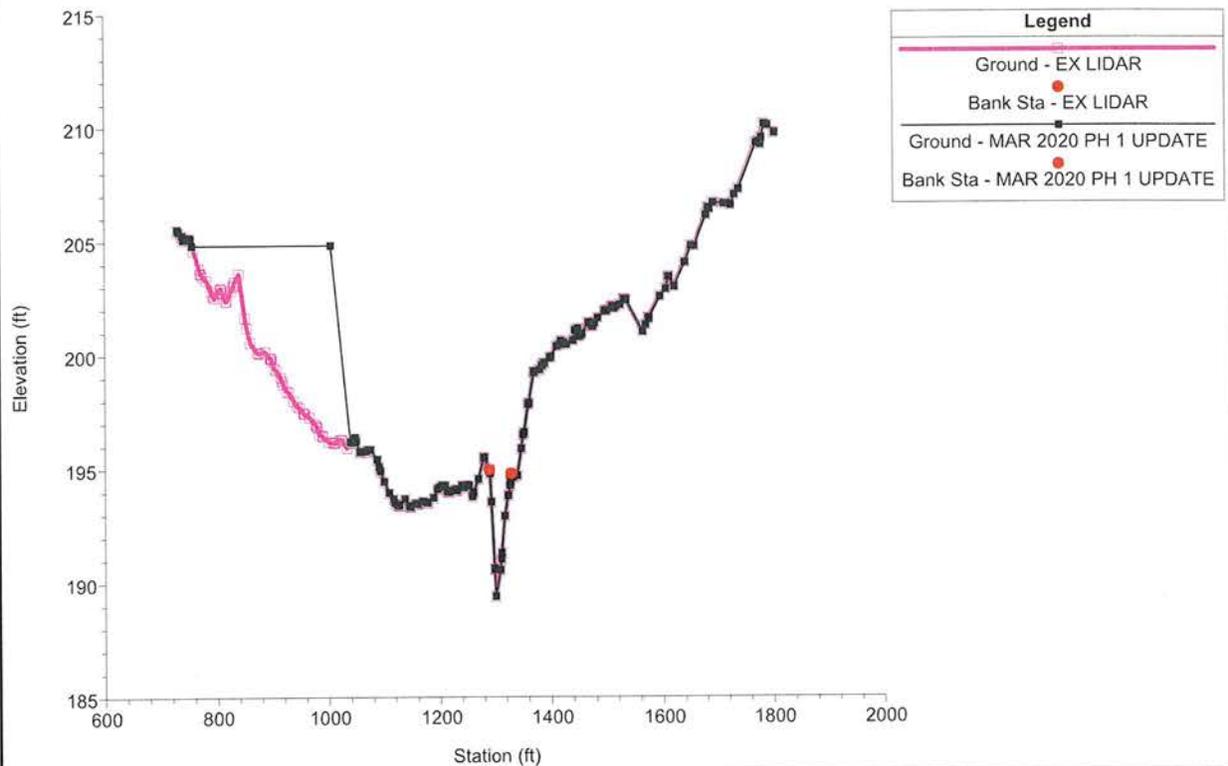
MILL CREEK TRIB 4 Plan: 1) MAR 2020 PH 1 UPDATE 2) EX LIDAR
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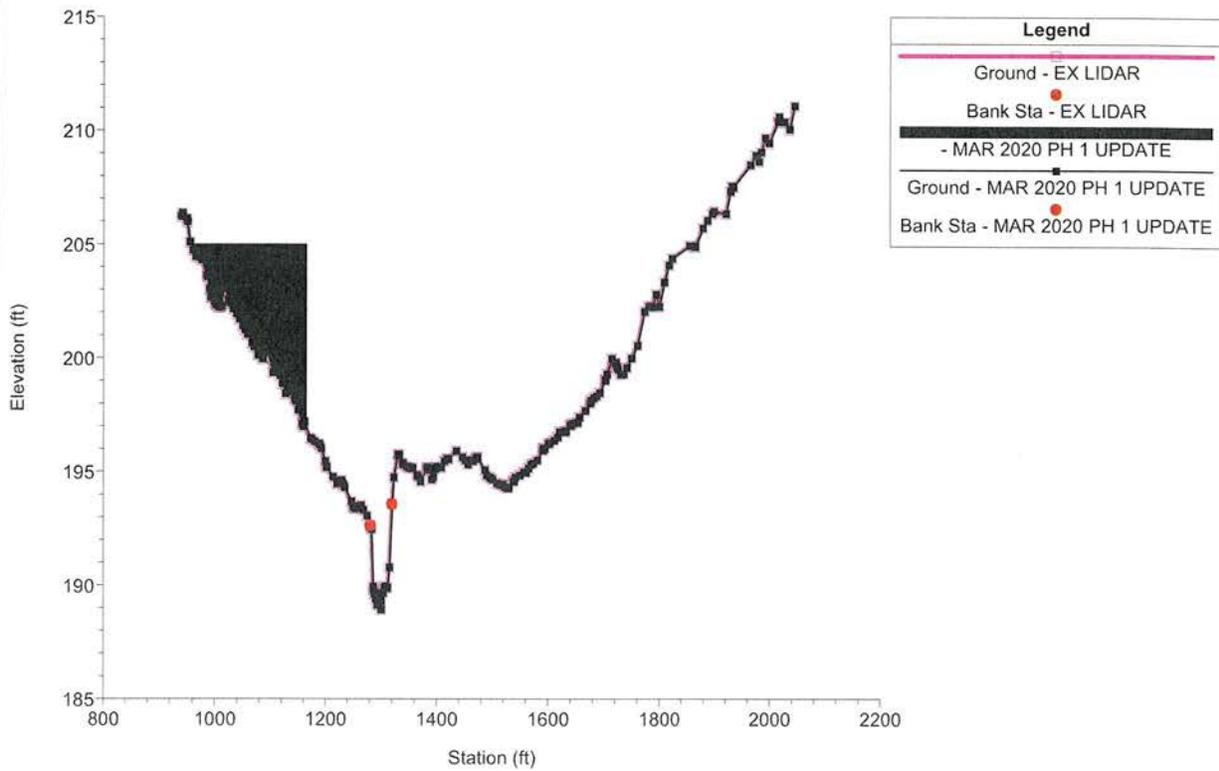
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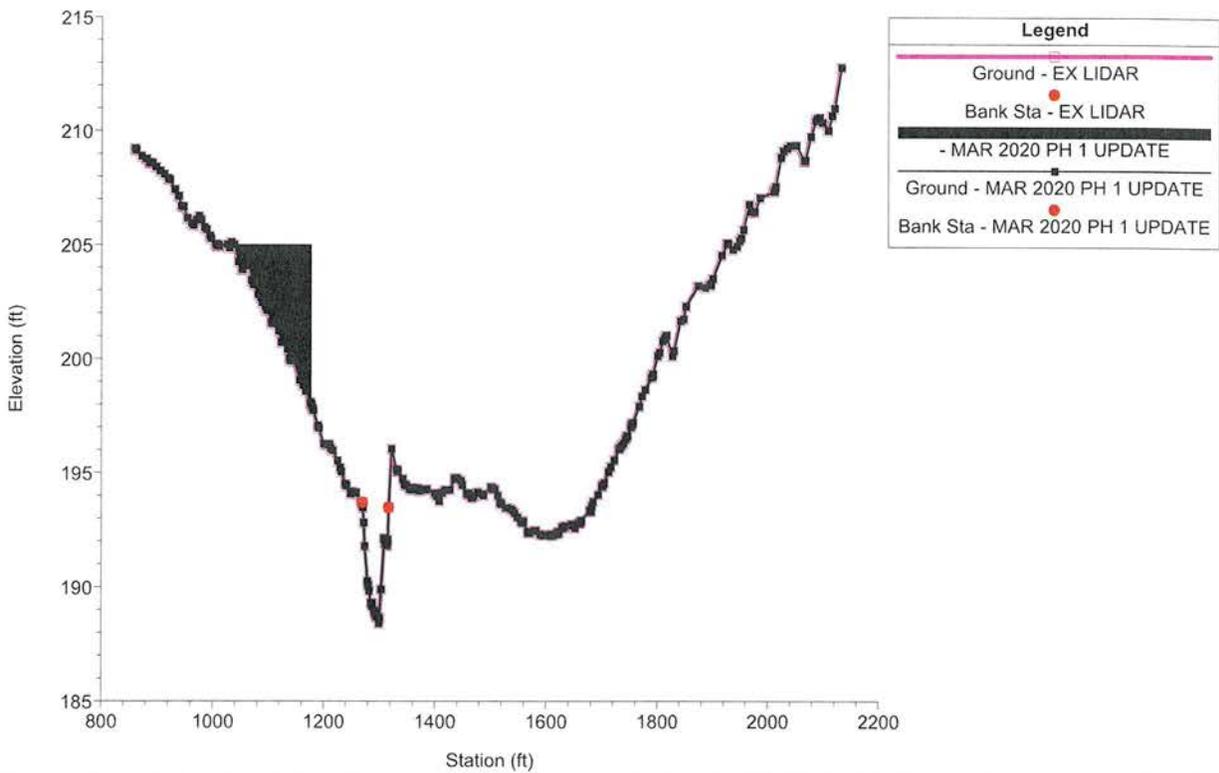
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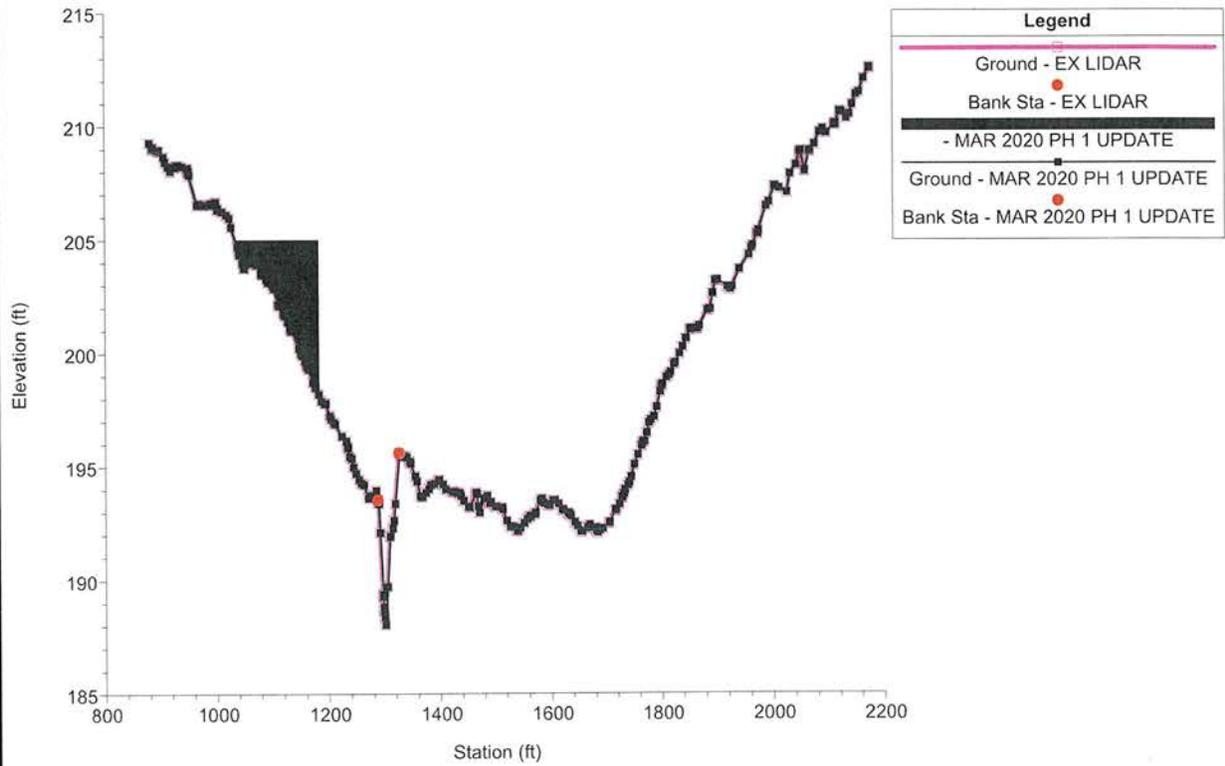
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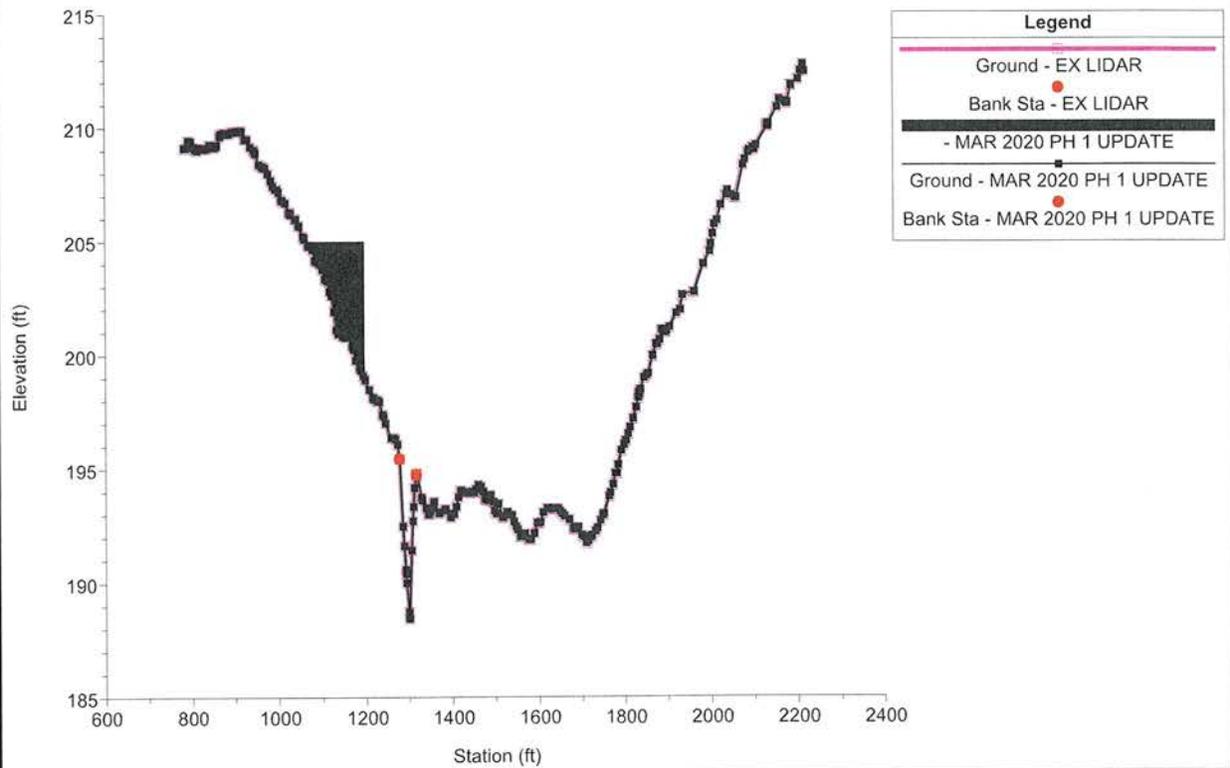
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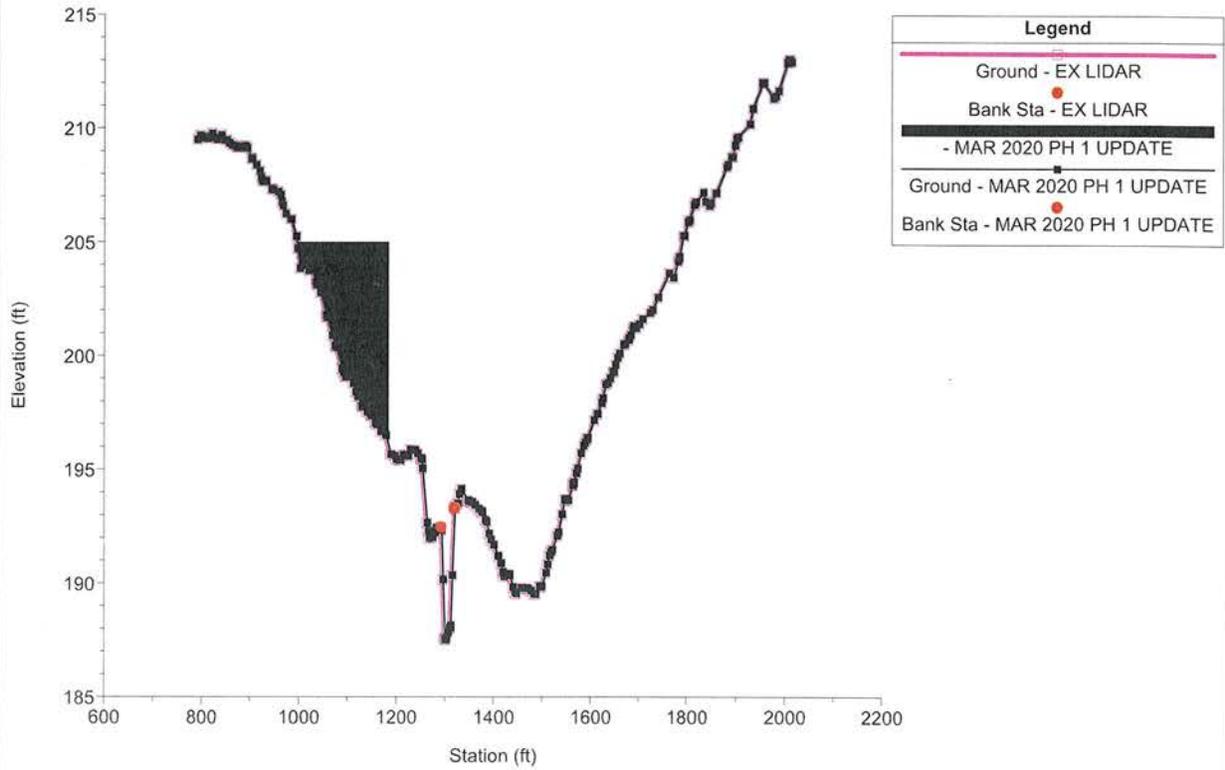
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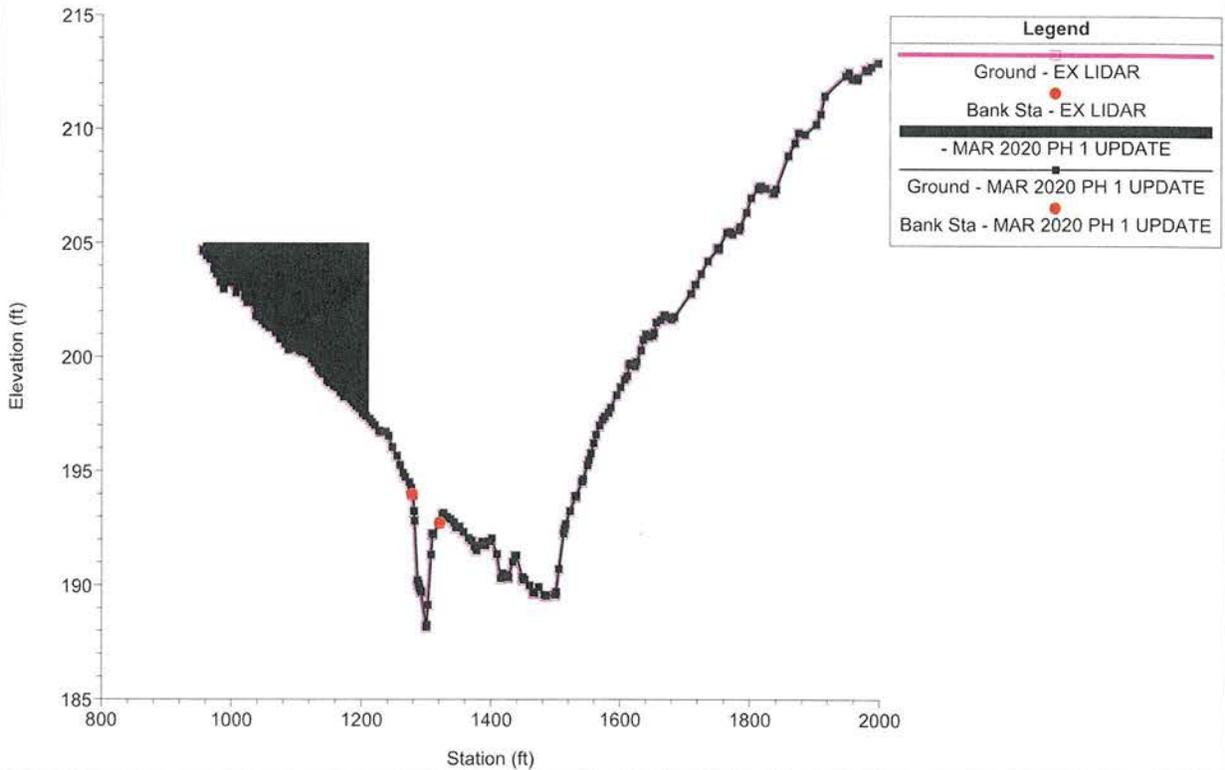
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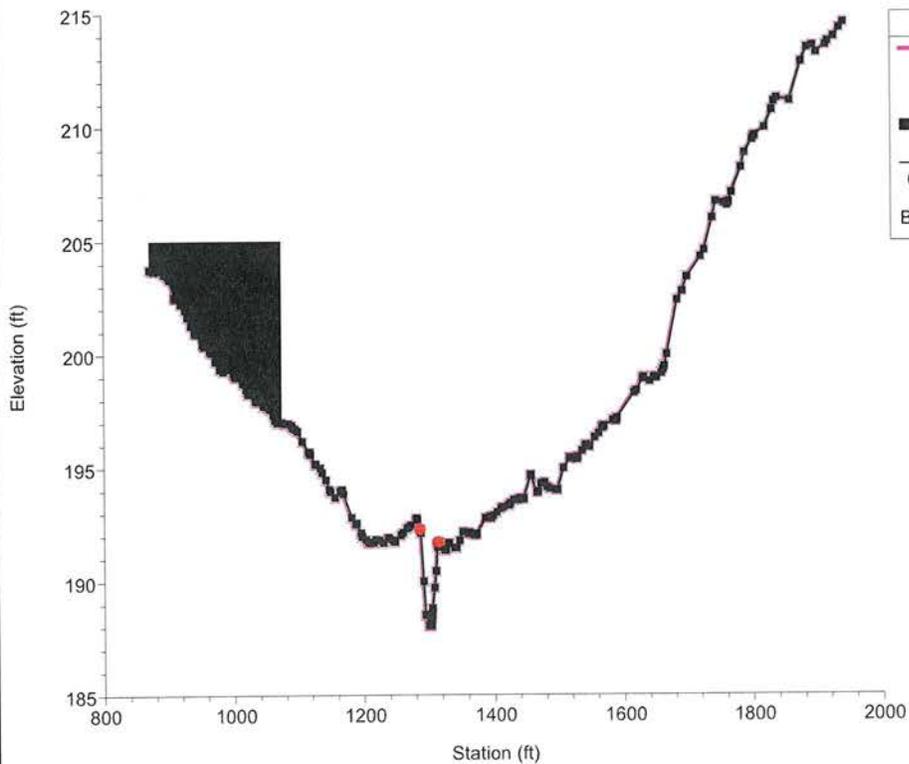
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MILL CREEK TRIB 4 Plan: 1) MAR 2020 PH 1 UPDATE 2) EX LIDAR
3511.35

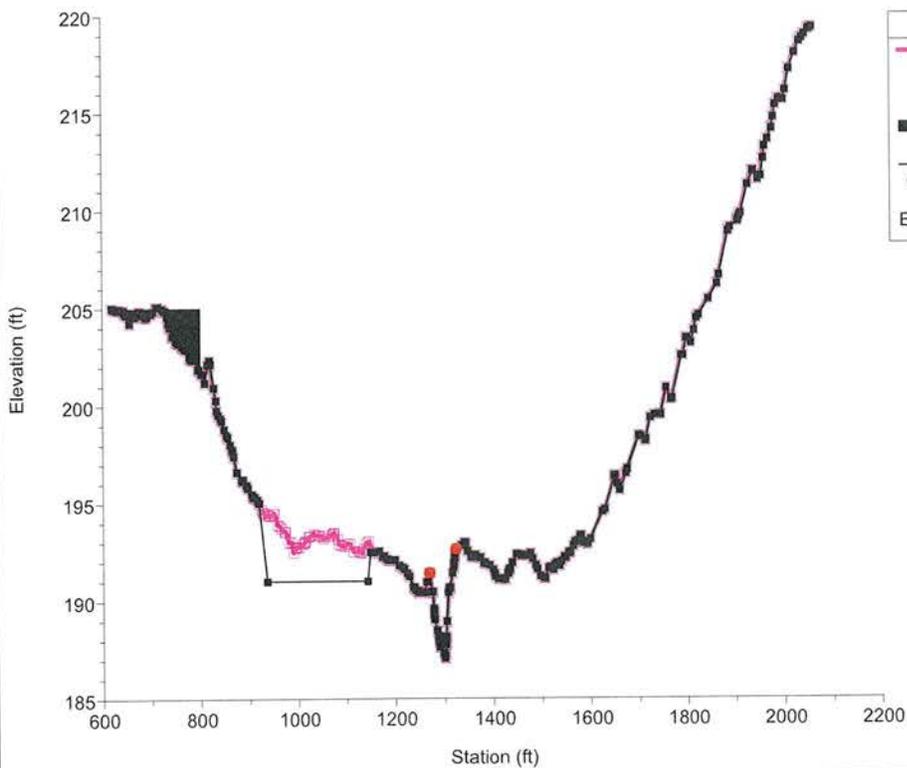


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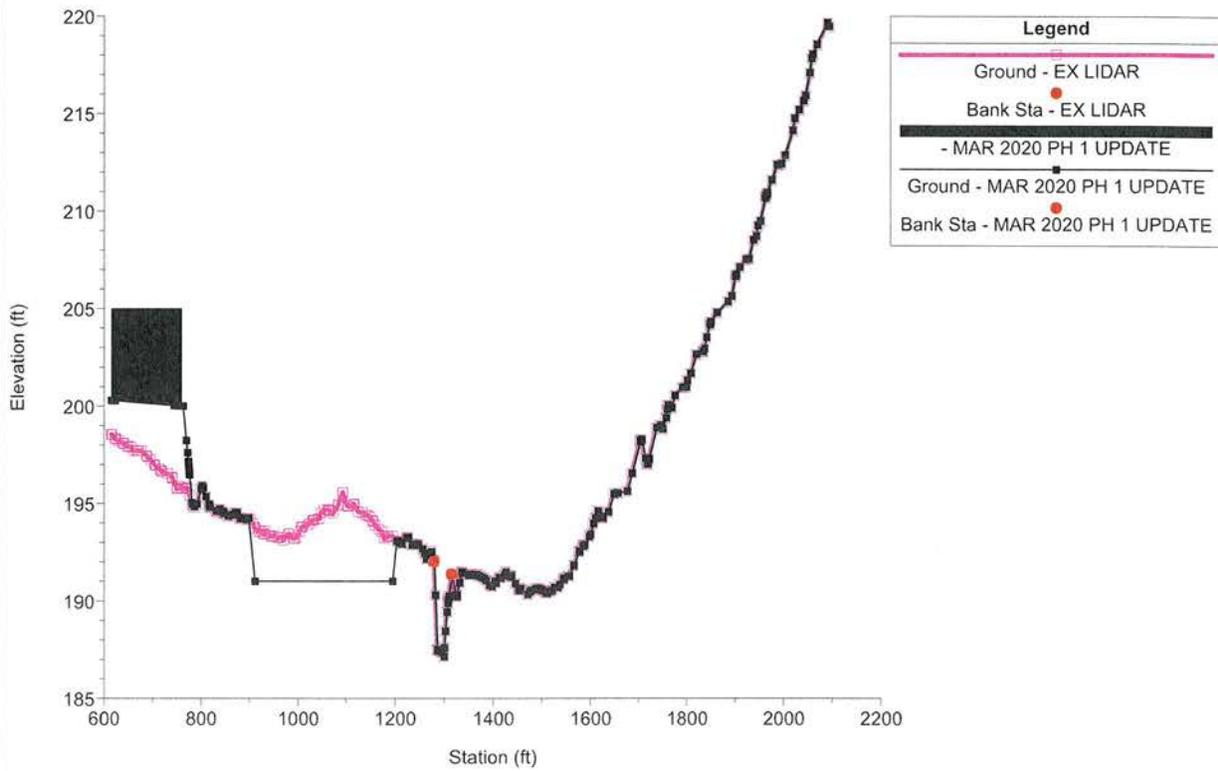
Legend	
Ground - EX LIDAR	
Bank Sta - EX LIDAR	
- MAR 2020 PH 1 UPDATE	
Ground - MAR 2020 PH 1 UPDATE	
Bank Sta - MAR 2020 PH 1 UPDATE	

MILL CREEK TRIB 4 Plan: 1) MAR 2020 PH 1 UPDATE 2) EX LIDAR
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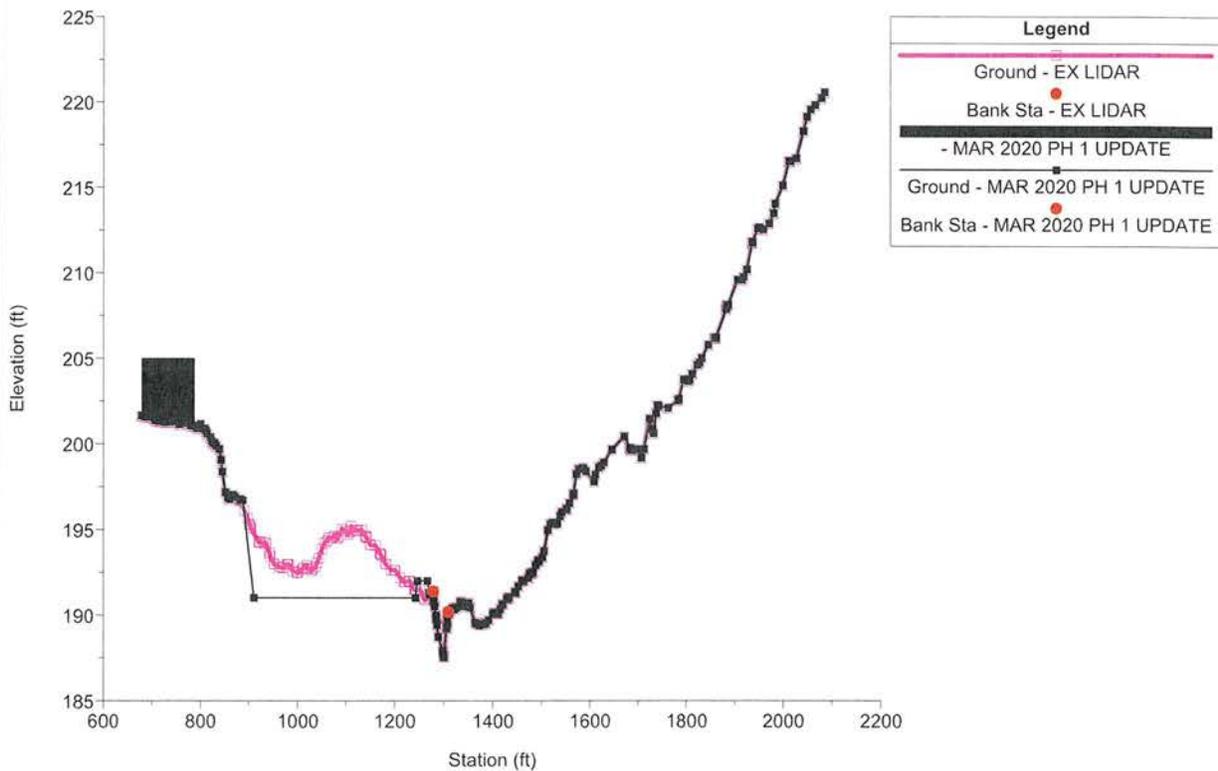


Legend	
Ground - EX LIDAR	
Bank Sta - EX LIDAR	
- MAR 2020 PH 1 UPDATE	
Ground - MAR 2020 PH 1 UPDATE	
Bank Sta - MAR 2020 PH 1 UPDATE	

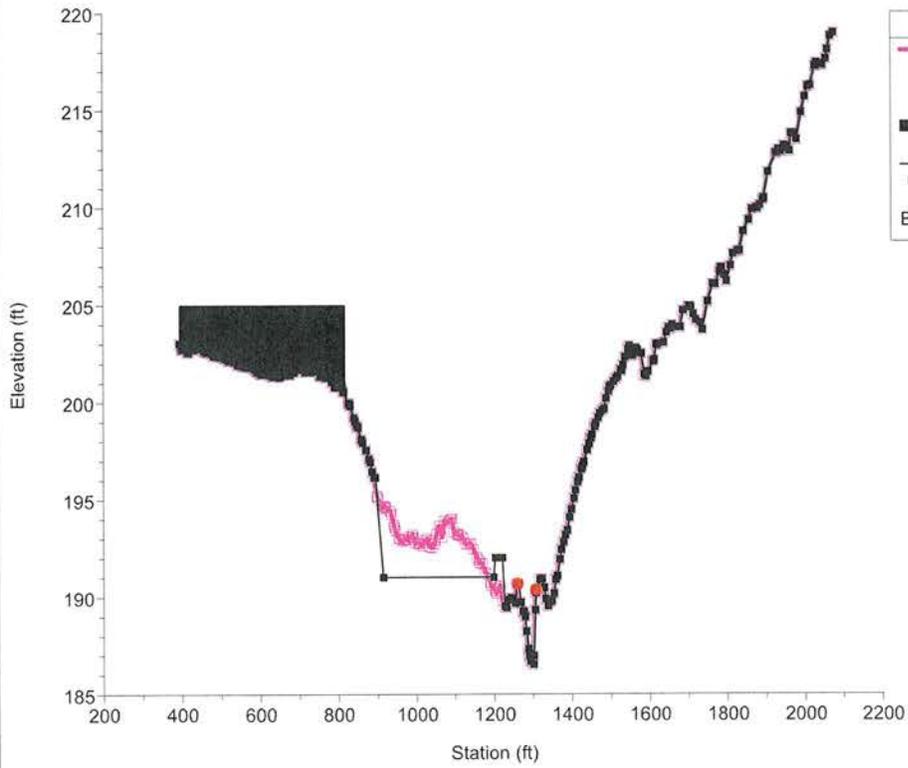
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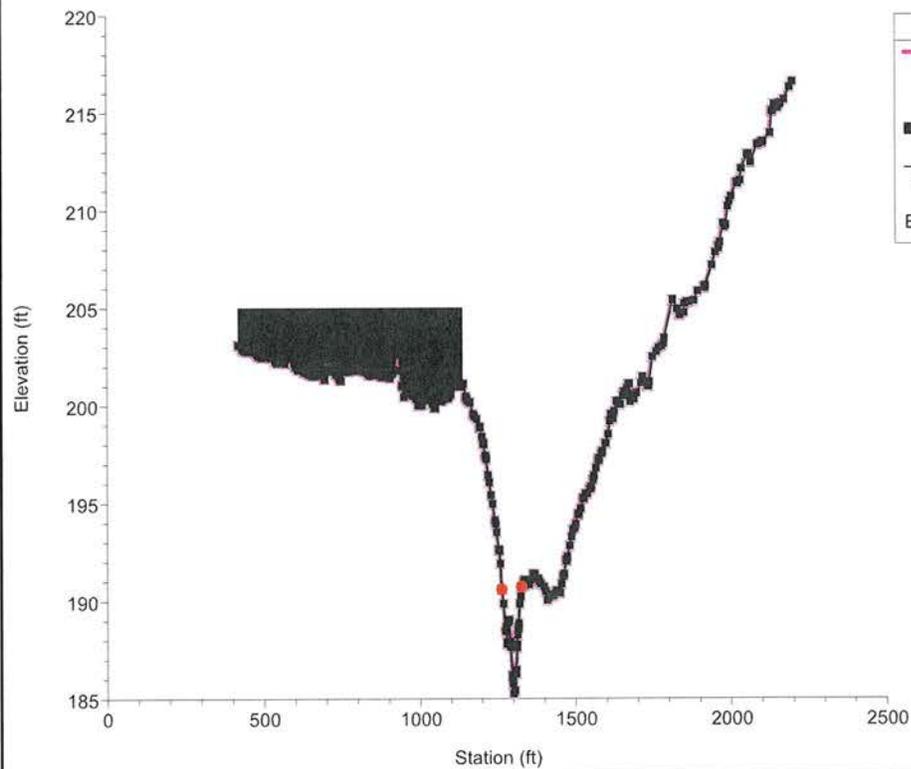
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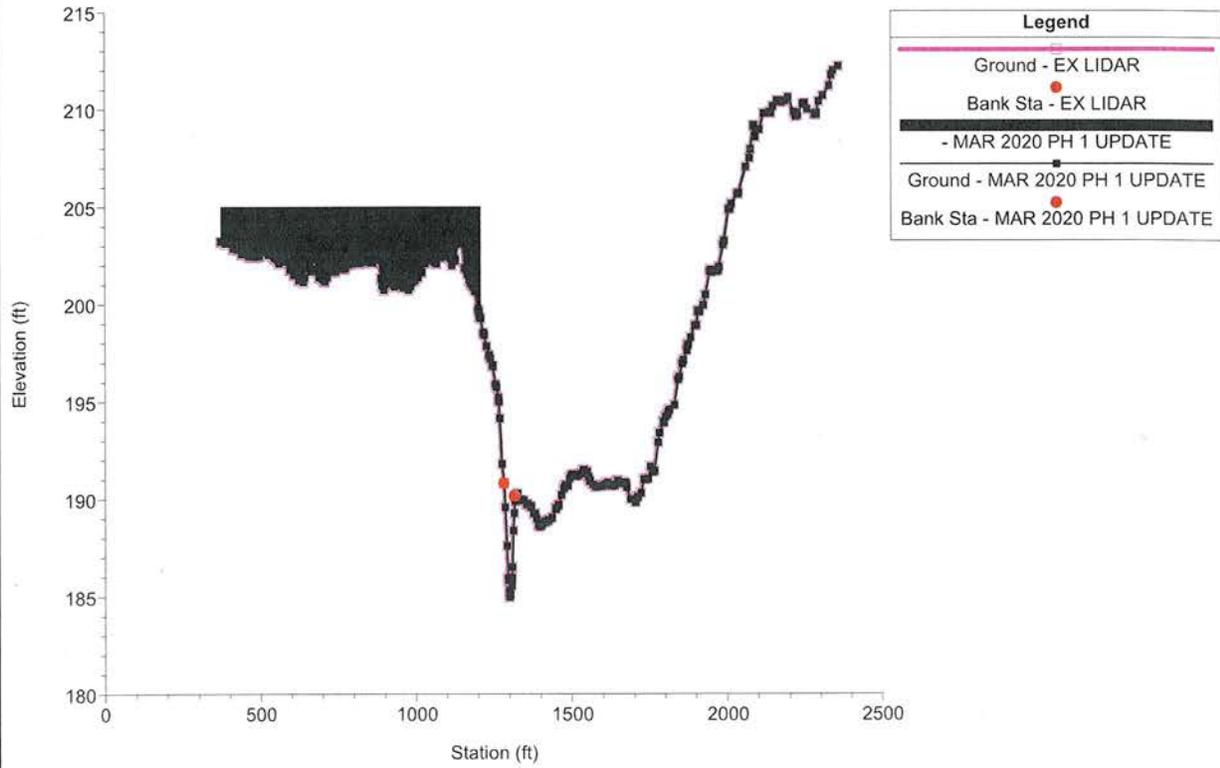
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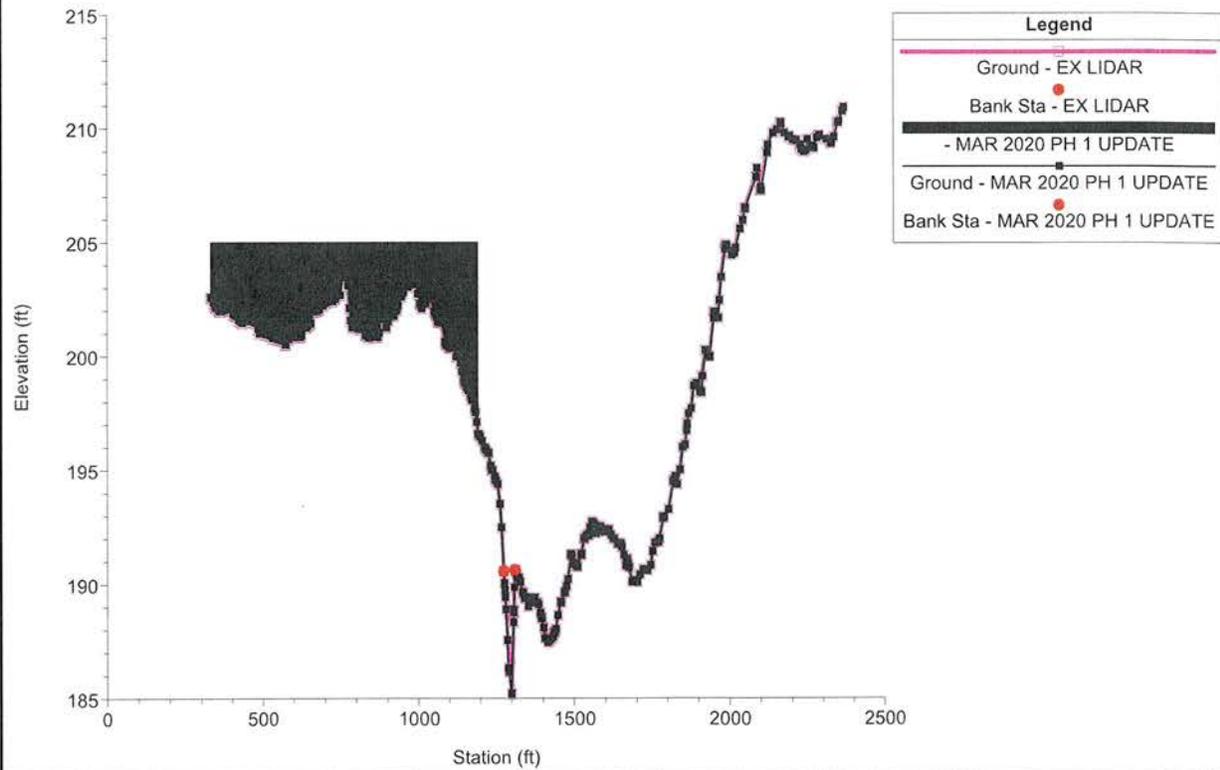
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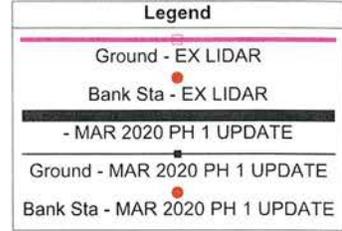
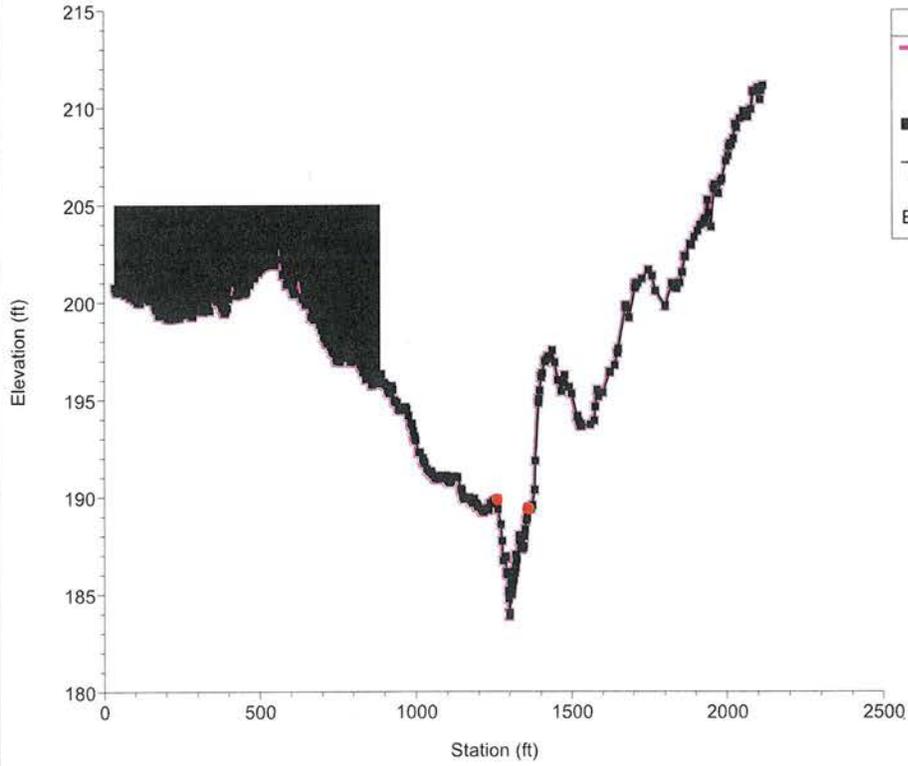
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2053.194



MILL CREEK TRIB 4

Plan: 1) MAR 2020 PH 1 UPDATE
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2) EX LIDAR



MILL CREEK TRIB 4

Plan: 1) MAR 2020 PH 1 UPDATE
1501.642

2) EX LIDAR

