3701 NW 98th Street
Gainesville, FL 32606-5004

wsp.com

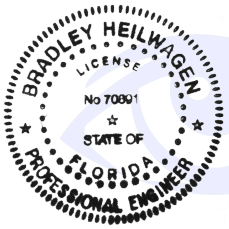
Technical Memorandum

To:	Suwannee River Water Management District
From:	WSP USA Inc.
Date:	September 11, 2025
Project #:	WSP Project #US0037794.7219
Subject:	Edwards Bottomlands Modeling and Assessment of Permit Compliance

CERTIFICATION

Engineering Certification

I hereby certify that I am a registered professional engineer in the State of Florida practicing with WSP USA Inc. (WSP), a Corporation authorized to operate as a business providing engineering consulting services (5392) by the State of Florida Department of Professional Regulation, Board of Engineers. I further certify that I, or others under my direct supervision, have prepared the engineering evaluations, findings, opinions, calculations, conclusions, or technical advice hereby represented in this report.



Digitally signed by brad.heilwagen@wsp.com
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SIGNATURE: Brad Heilwagen

NAME: Bradley Heilwagen

LICENSE #: 70891

DATE: September 11, 2025

1 INTRODUCTION

The Edwards Bottomlands Wetland Mitigation project was undertaken with the goal of replacing an artificial drainage canal referred to as Alligator Creek with wetland and natural channel habitat areas. It involved the construction of a two-stage channel along the northern portion of the Edwards Bottomlands, owned by the City of Starke, Florida. Spoil materials were removed from historic wetlands and meandering channels, effectively restoring the original hydrological conditions across a significant portion of the property. Approximately 7.66 acres of wetlands were created, and 2.67 acres of creek were restored. Additionally, wetland plantings, shoreline stabilization, and removal of invasive species were carried out. The permit for the project was issued in 2017, and construction took place in 2018.

Recent concerns have been raised by community members regarding the impacts of the restoration on local flooding conditions when compared to those prior to project construction, herein referred to as pre-project conditions. The main objective of the modeling and assessment documented within this report is to analyze the impact of the mitigation project on flood elevations in the Edwards Bottomlands and surrounding areas. It compares the pre-project conditions with various post-project conditions and compares current conditions within the basin with and without the Edwards Bottomlands Project. The findings of this evaluation will be used by the Suwannee River Water Management District (SRWMD) to address the community's concerns regarding the restoration's effects on flooding and to ensure compliance with permit conditions.

This memorandum describes and summarizes the work completed by WSP USA Inc. (WSP) under Task 2 Pre- and Post-Project Modeling under SRWMD Task Work Assignment 23/24-149.03, Modeling and Assessment of Permit Compliance of Edwards Bottomlands. The memorandum describes the existing data and models available to WSP at the start of this assignment, the methodology utilized to create pre-project and post-project (as permitted, as constructed, existing and No Edwards Bottomlands) conditions models, and the results of the modeling.

Figure 1 - Project Area (west of US 301 in Starke, FL)

2 EXISTING DATA AND MODELS

SRWMD is a Cooperating Technical Partner (CTP) with the Federal Emergency Management Agency (FEMA). Since 2010, WSP has supported SRWMD as a production consultant, performing modeling and floodplain mapping for the creation of FEMA Flood Insurance Rate Maps (FIRMs) and other digital flood risk products. Throughout this long history of working for SRWMD, WSP had acquired the following data for use in this assignment:

- A Digital Elevation Model (DEM) for the Santa Fe Watershed, dated 2012. This DEM, derived from Light Detection and Ranging (LiDAR) data, represented the pre-project condition of the landscape and features of the Edwards Bottomlands, including a straight drainage ditch that cuts through the bottomlands.

- A draft rain-on-mesh two-dimensional (2D) HEC-RAS model of Alligator Creek and the contributing basin, developed as a part of the FY18 FEMA study of the Santa Fe Watershed. The model extended from the headwaters of Alligator Creek, downstream through Starke and Sampson Lake to the Santa Fe River. It was last updated in November 2023. In FEMA terms, this model was classified as an approximate study, or what FEMA now refers to as Base Level Engineering (BLE) Level C (BLE-C). It is important to note that this model was developed prior to the availability of the 2020 DEM (described below) and was based on the 2012 DEM. Also worth noting is that the model was considered draft in the eyes of FEMA and was not yet being used for regulatory purposes.
- A one-dimensional (1D) Interconnected Channel and Pond Routing (ICPR) model of Alligator Creek, developed as part of the FY11 FEMA study of the Santa Fe Watershed. The model extended from the headwaters to the outlet of Sampson Lake. It was published in December 2015 and used to support the development of regulatory FIRMs for Bradford County. In FEMA terms, this modeling was considered a detailed study or what FEMA now refers to as BLE Level E (BLE-E). This model was calibrated to flooding observed in June 2012 during Tropical Storm Debby at several locations throughout the Alligator Creek basin.
- Field surveys of bridges, culverts, and cross-sections along Alligator Creek and its tributaries. These surveys were conducted in September 2013 and March 2014 as part of the FY11 FEMA study of the Santa Fe Watershed.
- A DEM for the Santa Fe Watershed, dated 2020 (after construction of Edwards Bottomlands).
- Construction plans for Edwards Bottomlands Wetland Mitigation, dated August 2017. These plans include topographic surveys, grading details, hydraulic models, drainage features, and floodplain modifications.
- As-built survey for Edwards Bottomlands Wetland Mitigation, dated December 2018.
- Daily mean water level data for SRWMD gage #02320734 from 11/13/2012 to 05/28/2025.

3 PRE-PROJECT CONDITION

A pre-project condition model was developed to establish the baseline one percent-annual-chance (1%) flood profile to use in evaluating the impacts of the project on flood elevations. The approximate 2D HEC-RAS model described above was copied and updated to reflect the conditions prior to the construction of the Edwards Bottomlands mitigation, as well as modeling standards at the time of this task's completion. Model geometry for this task was developed using HEC-RAS Version 6.4.1 software and referencing the North American Vertical Datum of 1988 (NAVD 88).

3.1 Model Update

3.1.1 Basin Setup

To decrease model runtimes and focus the analysis solely on Edwards Bottomlands and immediate upstream areas, the approximate 2D HEC-RAS model basin was clipped (Figure 2). The portions of the model beginning approximately 0.35 miles downstream of the vicinity of U.S. 301 ALT (Starke Bypass) and extending downstream to the Santa Fe River were removed. The Edwards Bottomland parcel begins roughly 1.6 miles upstream from the new downstream limit of the model. By retaining a portion of the model in areas downstream of Edwards Bottomlands, the analysis ensured that the results in that area were not influenced by the downstream boundary condition.

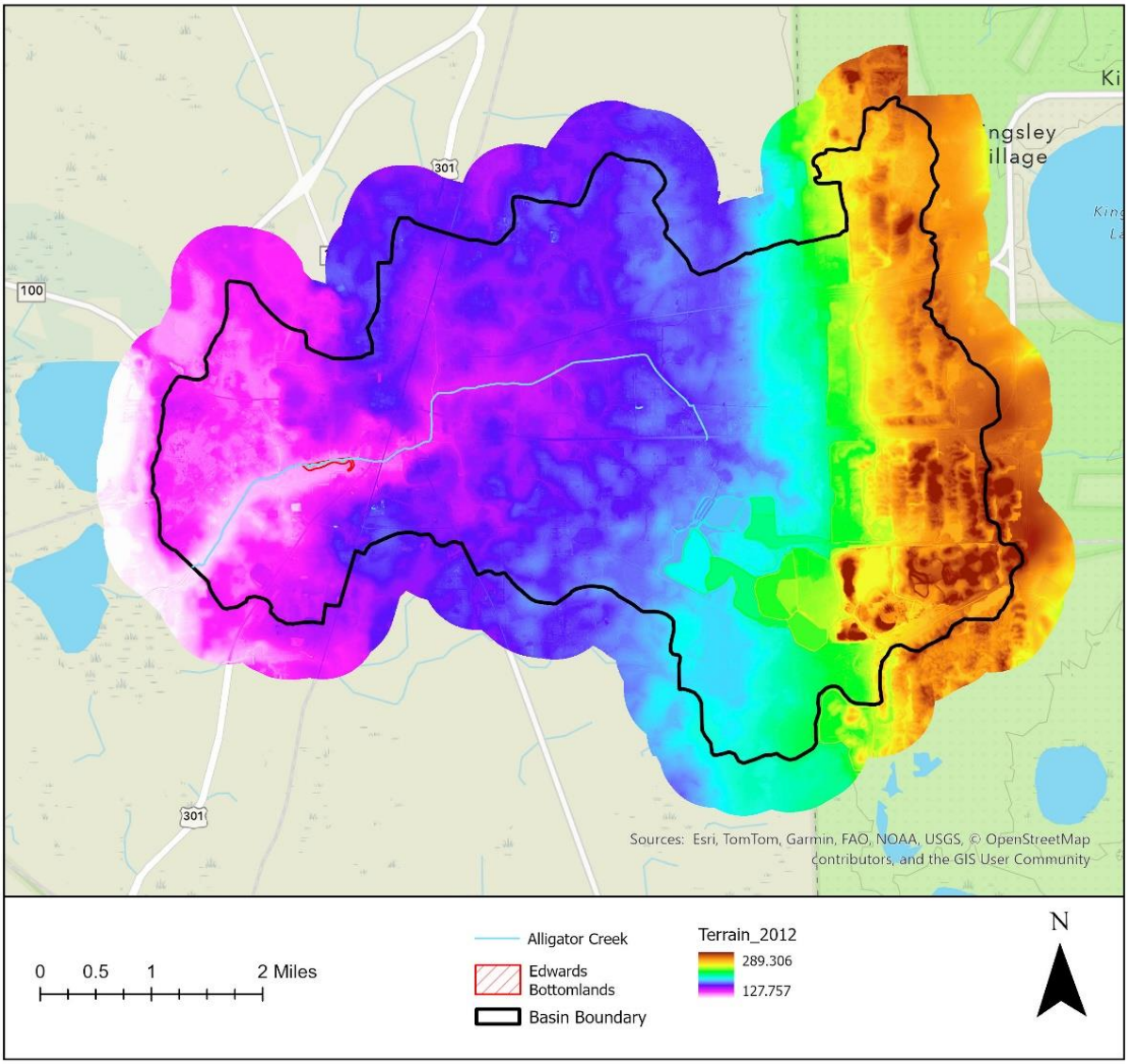


Figure 2 - Clipped Basin and Terrain (2012) for Pre-Project Condition Model

3.1.2 Terrain Modification

As noted above, the 2012 DEM with a 5-foot resolution was used for the pre-project condition model. The DEM was projected in the North American Datum of 1983 (NAD 1983) HARN State Plane Florida North FIPS 0903 (US Feet), with the linear unit in US Feet and the vertical datum in NAVD 1988. WSP re-clipped the DEM to align with the newly defined basin extent as shown in Figure 2, and a 1/2-mile buffer was applied around the selected area.

WSP incorporated additional hydro-connectors into the model, thereby increasing its level of detail to ensure a more accurate representation of the hydraulic features along the stream. Using RAS Mapper Terrain Modifications, hydro connectors burn through embankments in the terrain, which then provide a connecting path for water to flow through.

Since the LiDAR data used to create the 2012 DEM could not penetrate the latent water surface at the time of collection, the approximate model had potential to underestimate channel capacity and overestimate flood elevations. To remedy this, WSP incorporated channel bathymetry into the terrain for Alligator Creek and other unnamed tributaries based on the field survey data collected for the FY11 FEMA project. WSP used RAS Terrain Modifications to burn in a trapezoidal channel with a set bottom width and elevations interpolated between the surveyed points.

3.1.3 Precipitation

According to the documentation for the approximate 2D HEC-RAS model, rainfall depths for all storm events were determined by averaging the partial-duration rainfall data provided by the National Oceanic and Atmospheric Administration (NOAA) in Atlas 14, Volume 9: Precipitation-Frequency Atlas of the United States (NOAA, 2021). These events included the 10%, 4%, 2%, 1%, and 0.2% events over a 24-hour period. WSP used the same rainfall data used in the approximate model for the pre-project condition model.

3.1.4 2D Mesh Geometry

WSP used the clipped basin boundary to define the extent of the 2D mesh area. The general mesh size of the geometry was updated from 200 feet by 200 feet to 100 feet by 100 feet to capture the level of detail needed to represent Edwards Bottomlands. Additional break lines were incorporated wherever needed through the basin to represent hydraulically significant features such as roadways. The cell spacing along the break lines was kept the same as the approximate model, which is 100 feet.

WSP also updated the channel refinement regions along Alligator Creek and enforced them in the mesh using the modeled streamlines. The mesh size within the channel refinement region varied based on the width of the channel ranging from a minimum of 50 feet to a maximum of 100 feet. In some areas where a clearly defined channel is not visible in the terrain or aerial imagery, channel refinement regions were not used.

3.1.5 Manning's and Loss Computation

According to the documentation for the approximate 2D HEC-RAS model, the land cover dataset used in the model was developed based on the 2010 or 2011 true color photography by the Florida Department of Environmental Protection's Bureau of Watershed Restoration. Manning's roughness coefficients were assigned to the 2D area using the Florida Level II Land Use classification. A Manning's roughness coefficient of 0.035 was assigned to the channel along Alligator Creek within the Edwards Bottomlands parcel. For the floodplain, a Manning's value of 0.12 was applied, corresponding to the Wetland Hardwood Forests classification. WSP made no changes to the Manning's value and soil data for the pre-project condition model.

Additionally, a raster dataset containing percolation rates for the study area obtained from the Florida Geological Survey's Florida Aquifer Vulnerability Assessment project (Florida Geological Survey, 2005) was used in the approximate 2D HEC-RAS model. This dataset was derived from publicly available STATSGO and SSURGO datasets. The average weighted soil permeability values ranged from 0.29 to 34.9 in/hr across the basin. WSP made no changes to this layer either.

3.1.6 Survey Incorporation

WSP incorporated hydraulic structures along Alligator Creek and other unnamed tributaries into the pre-project model using the field survey data described above or data obtained from the ICPR model dated December 2015. A total of 14 structures were incorporated into the model, consisting of six bridges and

eight culverts. Bridges were modeled by assigning the SA Connection Type to Bridge (Internal to 2D Flow Area) and then defining the four bridge cross-sections. The deck width and rail height were also incorporated into the deck geometry where applicable. Opening length, pier locations, widths, and shapes were provided from survey notes. For the modeling approach, energy and momentum were chosen for low-flow methods, and Pressure and/or Weir were chosen for high-flow methods. For the Hydraulic Property Table Parameters, the head water maximum elevation and maximum flow were set to contain the flood waters. Debris flow was not considered at any bridges.

Culvert location, number of barrels, stationing, dimensions, material, and inlet configurations were obtained from survey data. Manning's roughness values and entrance loss coefficients were obtained from the HEC-RAS manual, based on the survey photos. Culverts were set to use the Normal 2D Equation for the overflow computation, which sets the flow over the top of the structure to be computed as normal 2D flow between cells.

3.1.7 Boundary Condition

WSP implemented external boundary condition lines to control the flow and stage of water entering and exiting the model at the mesh boundary. Since Alligator Creek is a headwater basin, no inflow boundary condition line was required for the model. The downstream boundary condition line (called LakeSampson_Outlet), located near the Starke Bypass just upstream of Sampson Lake, was set to a Stage Hydrograph to account for the backwater effect from the lake just downstream. The location of the boundary condition line coincided with that of node NA2341 from the ICPR model, so WSP extracted the stage hydrograph (Figure 3) for that node from the ICPR model and applied it as the downstream boundary condition in the pre-project condition model.

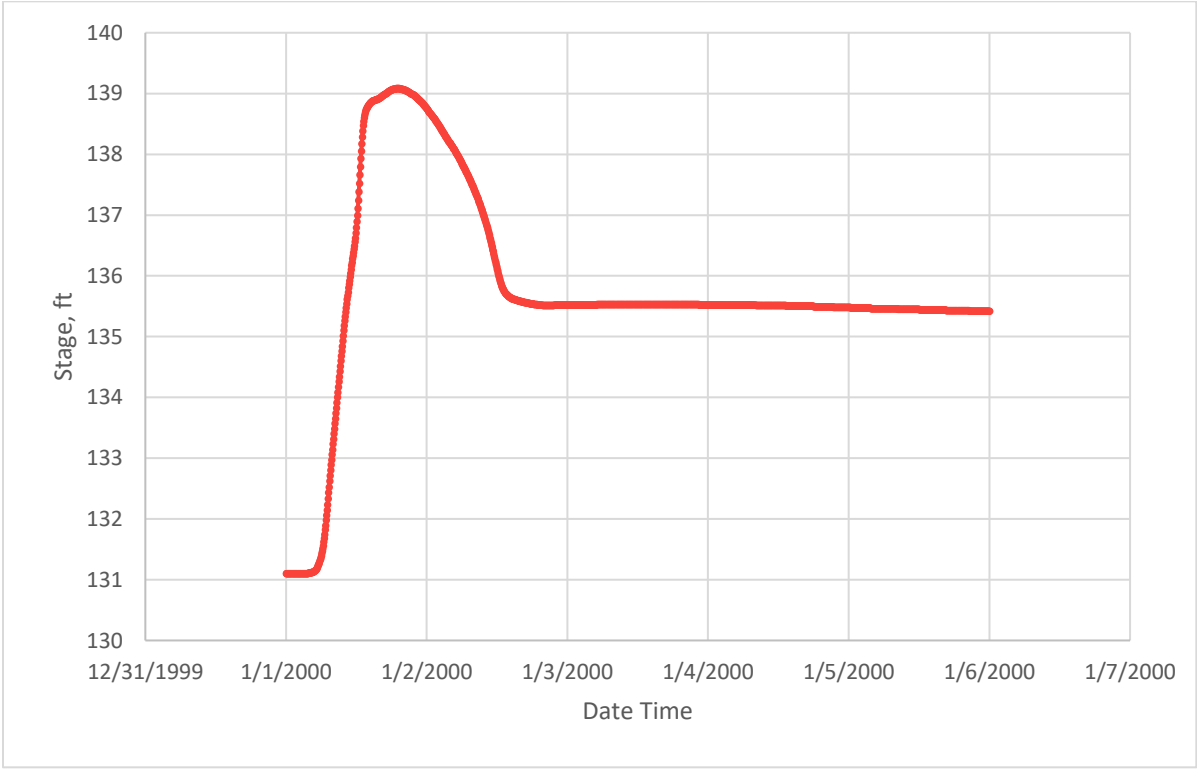


Figure 3 - Extracted Stage Hydrograph for Node NA2341 from ICPR Model

3.1.8 Reference Line

WSP added an additional nine reference lines to the model along Alligator Creek and its tributaries. These reference lines were placed at key locations just upstream and downstream of Edwards Bottomland, as well as within Edwards Bottomlands, to monitor stage and flow under both pre-project and post-project conditions. A mesh was enforced along the reference lines, with a cell size of 100 feet by 100 feet.

3.2 Calibration

WSP was provided with gage records for Alligator Creek near Starke that spanned from 11/13/2012 to 05/28/2025. Although operated under the same gage number (#02320734) for this period, the location of the gage has been changed over time. Originally located just downstream of the Starke wastewater treatment plant, it was moved 200 feet upstream in 2016 and another 900 feet upstream in 2019. WSP analyzed the records and found that daily measured water levels increased each time the gage was relocated in the upstream direction. Additionally, the model being developed was to reflect pre-project conditions, circa approximately 2017, leaving only five years of usable data in the provided records. Given the changes in gage location and the short period of record prior to construction of Edwards Bottomlands, WSP chose not to utilize the gage data for calibration of pre-project conditions.

As noted in Section 2, the 1D ICPR model was calibrated to flooding observed in June 2012 during Tropical Storm Debby. Given this level of calibration of known flooding that occurred prior to the project and that the 1D ICPR model supports the effective 1% elevations found on the FEMA FIRM, WSP calibrated the pre-project condition model result to align with the results of the 1D ICPR model. At several locations along Alligator Creek, the pre-project model's 1% flow values were found to be significantly lower than the 1D ICPR results. One primary reason for this difference was the higher percolation rate (0.29 to 34.9 in/hr) used in the pre-project model, which the 1D ICPR model did not account for. Also, the ICPR nodes along Alligator Creek exhibited significant fluctuations in flow values that were not reflected in the pre-project model. To bring the pre-project model results closer to the 1D ICPR flows and resulting elevations, an internal boundary condition line was added along Alligator Creek near the ICPR node (NA1861). The pre-project model hydrograph was then multiplied by a factor representing the average flow from all downstream nodes and passed through the internal boundary condition.

4 POST-PROJECT CONDITIONS (AS PERMITTED)

The pre-project condition model was duplicated to create the post-project condition (as permitted) model that reflects the removal of soil and reshaping of the flood littoral zone of Edwards Bottomlands as outlined in the Permit Document (Construction Plan). WSP made the following updates to develop the post-project condition model:

- WSP extracted a clipped DEM of the Edwards Bottomlands parcel from the 2020 DEM (**Error! R eference source not found.**) and merged with the existing 2012 DEM. The 2020 DEM was initially used to capture permitted changes including the removal of soil and reshaping of the flood littoral zone and was then adjusted to match the August 2017 construction plans. The 2012 DEM was retained for the rest of the basin to ensure that no other modifications outside the parcel were included. This clipped and adjusted 2020 DEM accurately reflects the newly meandered channel, replacing the former straight drainage ditch, and provides a more precise representation of the updated hydrological and wetland conditions post-restoration.

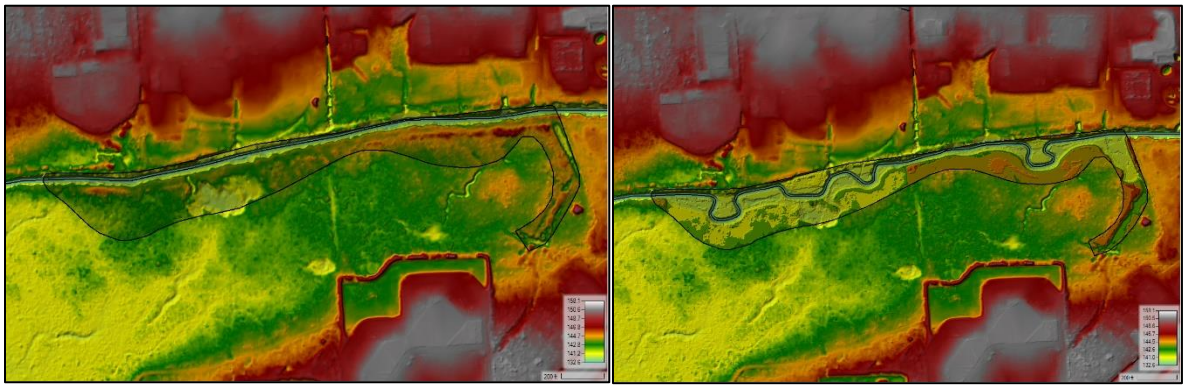


Figure 4 - Terrain data Representing Pre-Project (2012) and Post-Project (2020) Conditions

WSP updated the channel refinement on the Edwards Bottomlands parcel to capture the new meandered channel. The mesh was reinforced along the refined section, with the cell size remaining unchanged.

- According to the construction plan, there were no significant changes to the channel size within the Edwards Bottomlands parcel. Therefore, WSP maintained the channel dimensions with a top width of 23 feet, a bottom width of 16 feet, and a side slope of 1:1 (Figure 5).

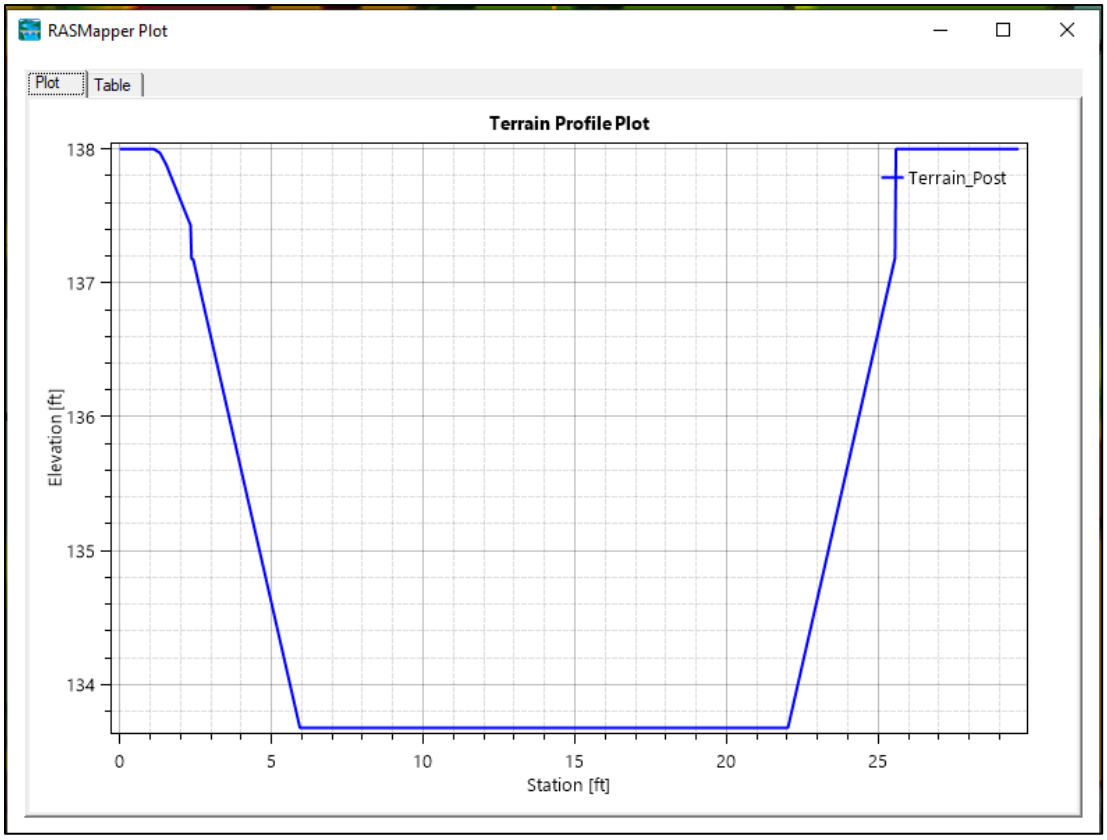


Figure 5 - Typical Channel Cross-Section along Alligator Creek within Edwards Bottomlands

- WSP maintained the Manning's roughness coefficient for the channel section within the Edwards Bottomlands parcel at 0.035 and adjusted the Manning's value for the meandered belt from 0.12

to 0.07. As a condition of the permit, forests and brushes in this area were to be removed and replaced with gama grass. Although the typical Manning's value for gama grass ranges from 0.025 to 0.03, WSP conservatively applied a value of 0.07 to account for taller grasses. This was classified under a land cover polygon designated as "Vegetated Non-Forest Wetland." (**Error! Reference source not found.**)

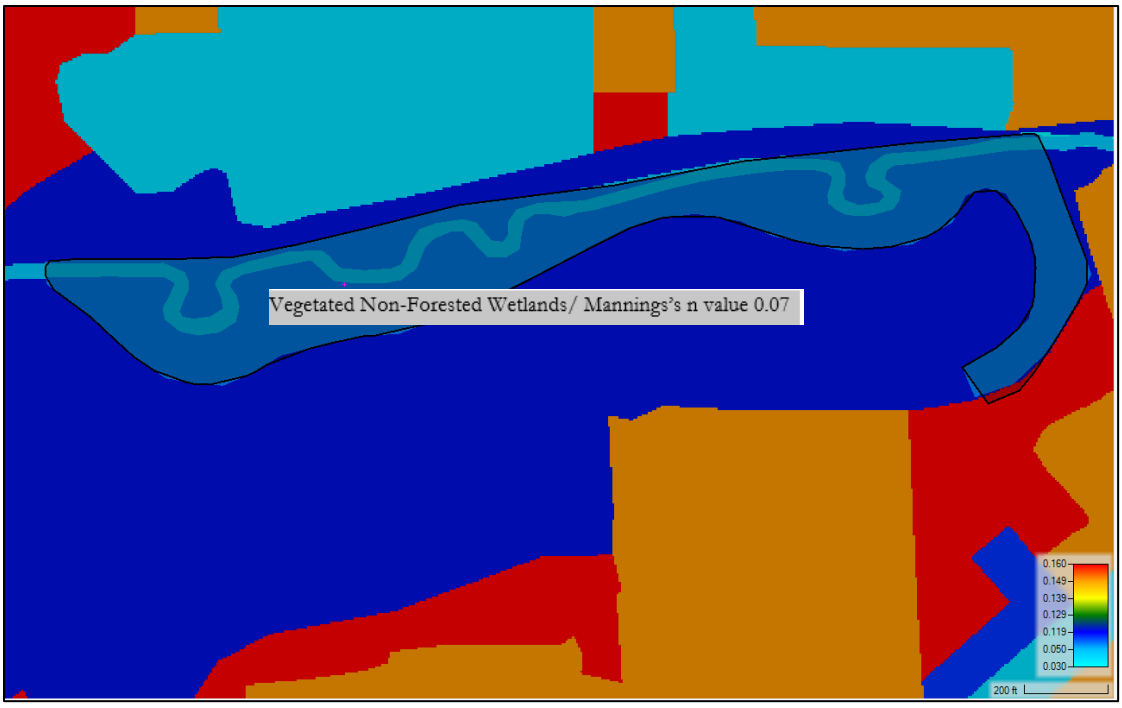


Figure 6 - Landcover Classification Polygon of Edwards Bottomlands Parcel for Post-Project Condition (As Permitted)

5 POST-PROJECT CONDITIONS (AS CONSTRUCTED)

WSP used the post-project (as permitted) condition model as the foundation to create the post-project (as constructed) model, which reflects the actual site conditions following the completed wetland restoration at Edwards Bottomlands. The following updates were made to develop the post-project (as constructed) model:

- WSP conducted a field survey in November/December 2024, collecting cross-section data along Alligator Creek within the Edwards Bottomlands parcel. The data was gathered at the same seven locations previously used in the Construction Plan. These locations are shown in Figure 7.

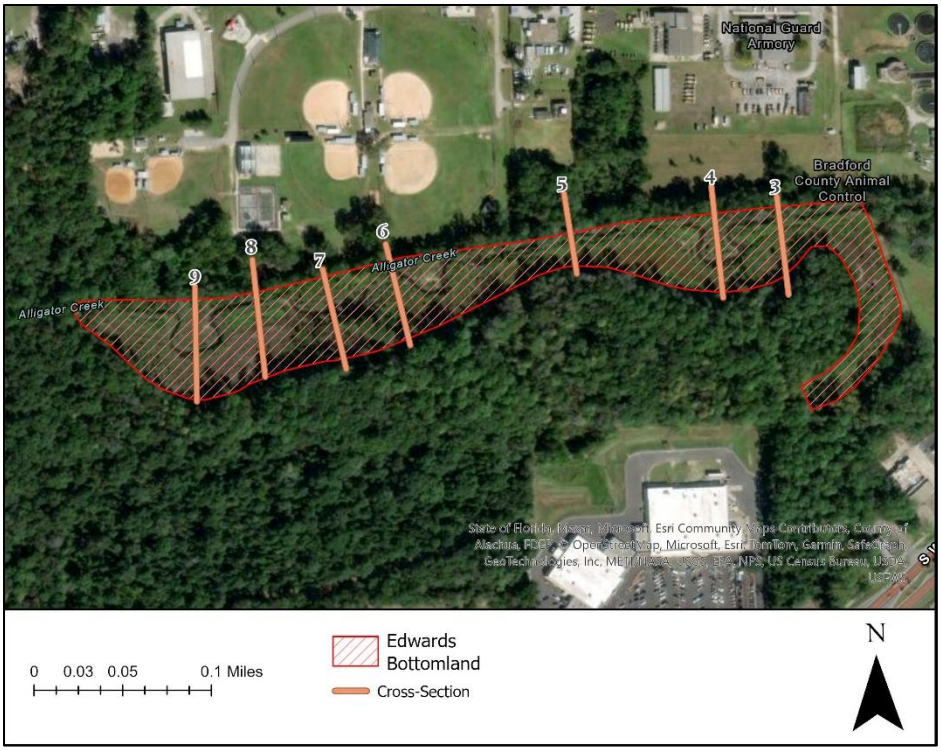


Figure 7 – Survey Cross-Section Location Along Alligator Creek used in Construction Plan

- Using the collected cross-section data and the established river centerline within the Edwards Bottomlands parcel, WSP generated a detailed terrain raster in the HEC-RAS Geometry Editor. This raster data was essential in accurately representing the topography, channel bathymetry, and floodplain conditions of the site as they currently exist. During the modeling process, bank stations were strategically defined to ensure that the meandering channels were precisely captured.
- WSP then integrated the detailed terrain data, derived from the survey cross-section measurements, with the existing 2012 DEM during the process of importing terrain data into RAS Mapper. This integration involved mosaicking the newly extracted terrain data with the 2012 DEM to create a comprehensive and continuous elevation model that accurately reflects the removal of soil and reshaping of the flood littoral zone exactly as it was constructed. **Error! Reference source not found.** presents the comparison of terrain data between post-project (as permitted) and post-project (as constructed) conditions.

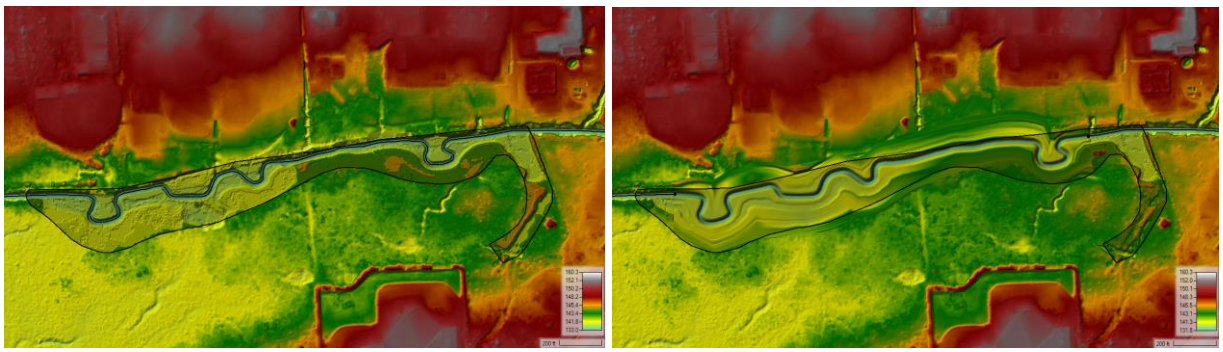


Figure 8 – Terrain data representing Post-Project (As Permitted, left) and Post-Project (As Constructed, right) condition

- WSP drew profile lines in RAS Mapper at the same locations as the survey cross-sections. The terrain cross-sections were then compared with the survey data to ensure alignment and consistency. Figure 9 presents the comparison between post-project (as permitted) and post-project (as constructed) at cross-section 9. Additional comparisons for other cross-sections are provided in Appendix 1 on page 21 of this memorandum.

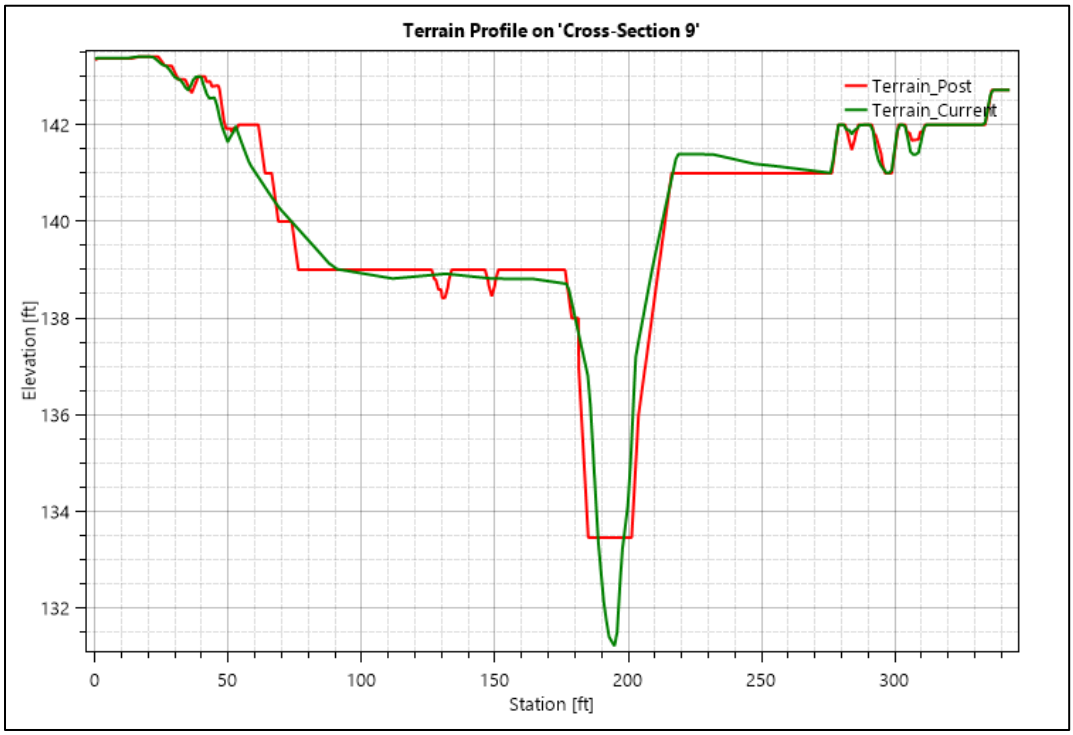


Figure 9 – Comparison of Terrain Profile Between Post-Project (As Permitted) and Post-Project (As Constructed) at Cross-Section 9

- WSP updated the channel refinement for the Edwards Bottomlands parcel to capture the meandered channel. Given the field confirmation that gama grass was indeed planted, the Manning's roughness coefficients for both the channel and floodplain within the parcel were kept the same as in the post-project (as permitted) model to maintain consistency with the original design parameters.

6 POST-PROJECT CONDITIONS (EXISTING)

WSP used the post-project (as constructed) condition model as the foundation to create the post-project (existing) model. This model reflects the completed wetland restoration at Edwards Bottomland and all the other changes throughout the basin post 2012. The following updates were made to develop the post-project (as constructed) model:

- WSP integrated detailed terrain data, derived from survey cross-sections for the Edwards Bottomlands parcel, into the existing 2020 DEM during the terrain import process in RAS Mapper. This involved mosaicking the newly extracted data, collected during the Edwards Bottomlands construction phase, with the 2020 DEM to produce a continuous elevation model. The result accurately reflects current topographic conditions in the parcel and incorporates basin-wide topographic changes since 2012. One notable update, shown in Figure 10, is the inclusion of the

Starke Bypass and the storage pond features present in the 2020 DEM but absent in the 2012 terrain data.

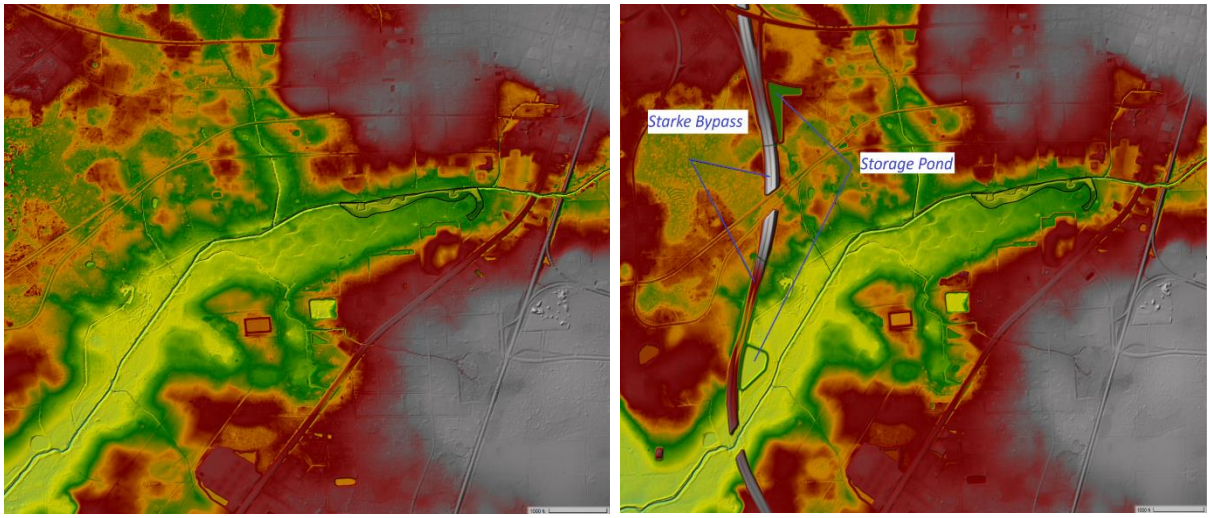


Figure 10 - Terrain data representing Post-Project (As Constructed, left) and Post-Project (Existing, right) condition

- Break lines were incorporated into the model, and the mesh was refined to accurately represent the Starke Bypass and Storage Pond. A cell spacing of 100 feet was applied along the break lines.
- WSP updated the Landcover Layer by adding classification polygons to represent the Starke Bypass and the Storage Pond. The Starke Bypass was classified as "Transportation" with a Manning's n value of 0.04, while the Storage Pond was classified as "Reservoirs" with a Manning's n value of 0.03.

7 POST-PROJECT CONDITIONS (NO EDWARDS BOTTOMLANDS)

WSP used the post-project (existing conditions) model as the foundation to create the post-project (No Edwards Bottomlands) model. This model represents conditions following the completion of all basin-wide improvements since 2012, but with the Edwards Bottomlands restoration effectively removed. The following updates were made to develop the post-project (No Edwards Bottomlands) model:

- To represent pre-restoration conditions at the Edwards Bottomlands parcel, the 2012 DEM was clipped to the parcel boundary to capture the original ground surface prior to the wetland restoration project. Since the 2012 DEM is generally lower in elevation than the 2020 dataset, a vertical adjustment of 0.5 feet was applied to align it with the 2020 DEM, ensuring consistent elevation referencing across the model. The adjusted 2012 terrain was then mosaiced with the 2020 DEM, allowing the pre-project topography within the Edwards Bottomlands area to be integrated seamlessly into the basin-wide post-project terrain as shown in Figure 11. Additionally, the channel bathymetry within the parcel was modified to match pre-restoration channel elevations, preserving the original channel form. Meanwhile, the surrounding floodplain areas within the parcel were raised to match the 2020 DEM, maintaining continuity with the existing topography.

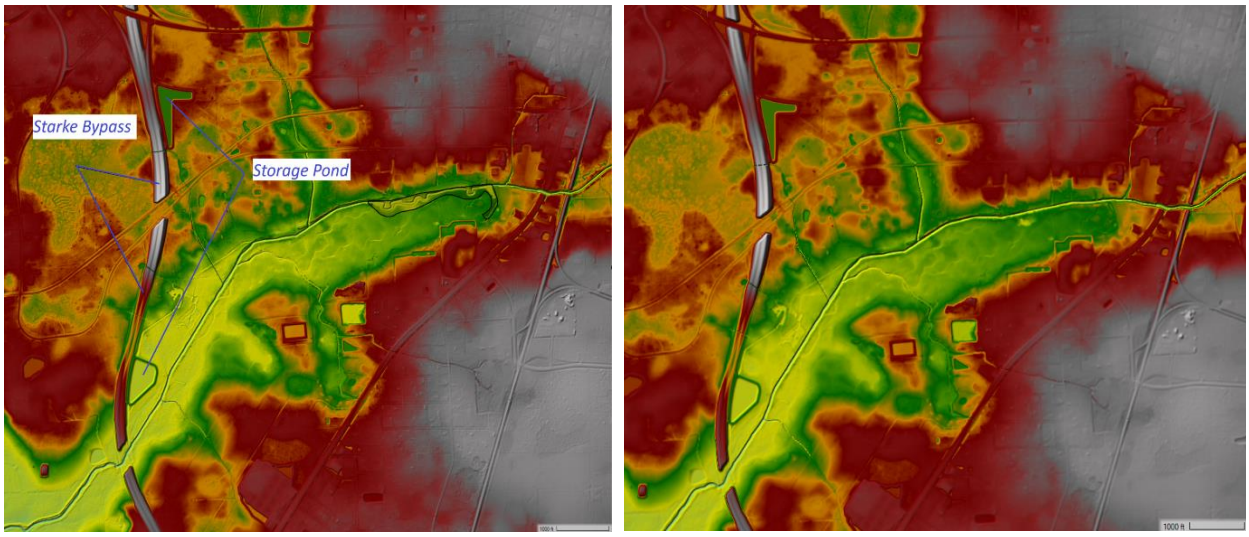


Figure 11 - Terrain data representing Post-Project (Existing, left) and Post-Project (No Edwards Bottomlands, right) condition

- WSP updated the channel refinement on the Edwards Bottomlands parcel to capture the Pre-restoration straight channel. The mesh was reinforced along the refined section, with the cell size remaining unchanged.
- WSP maintained the original Land Cover Layer and associated Manning's roughness values to represent pre-project conditions within the Edwards Bottomlands parcel. This included a Manning's value of 0.035 for the channel and 0.12 for the surrounding floodplain, which corresponds to the "Wetland Hardwood Forests" classification.

8 RESULTS COMPARISON AND CONCLUSION

The purpose of this task was to evaluate the effects of the Edwards Bottomlands Wetland Mitigation Project on flood elevations in Alligator Creek in Starke, Florida, to verify compliance with permit conditions. To do this, WSP performed a comparison of the 1% flood elevations for the pre-project, post-project (as permitted), and post-project (as constructed) conditions using the 2D HEC-RAS model. Although they reflect changes made to the basin outside of just those made to Edwards Bottomlands, WSP also included the post-project (existing) and post-project (No Edwards Bottomlands) flood elevations for a realistic comparison.

WSP used RAS Mapper to extract the 1% flood elevations for each condition at nine reference locations, seen in Figure 12-16. Table 1 presents a comparison of 1% flood elevations. When comparing the pre-project, as-permitted, and as-constructed scenarios, the only variable changed was the restoration of Edwards Bottomlands — the results show no increase in flood elevations upstream or downstream of the project. As-constructed conditions show that flood elevations remained largely unchanged when compared to the as-permitted scenario. In fact, slight drops in elevation (typically less than 0.05 ft) were observed at a few locations.

In contrast, the existing condition scenario incorporates changes beyond Edwards Bottomlands and shows more noticeable increases in flood elevations throughout the basin. This includes:

- A 0.50 ft increase at US Hwy 301 (from 139.41 ft to 139.91 ft),

- A 0.51 ft increase downstream of Edwards Bottomlands (143.75 ft to 144.22 ft),
- A 0.44 ft increase at Edwards Bottomlands (144.17 ft to 144.56 ft),
- And similar increases at multiple other upstream and downstream locations.

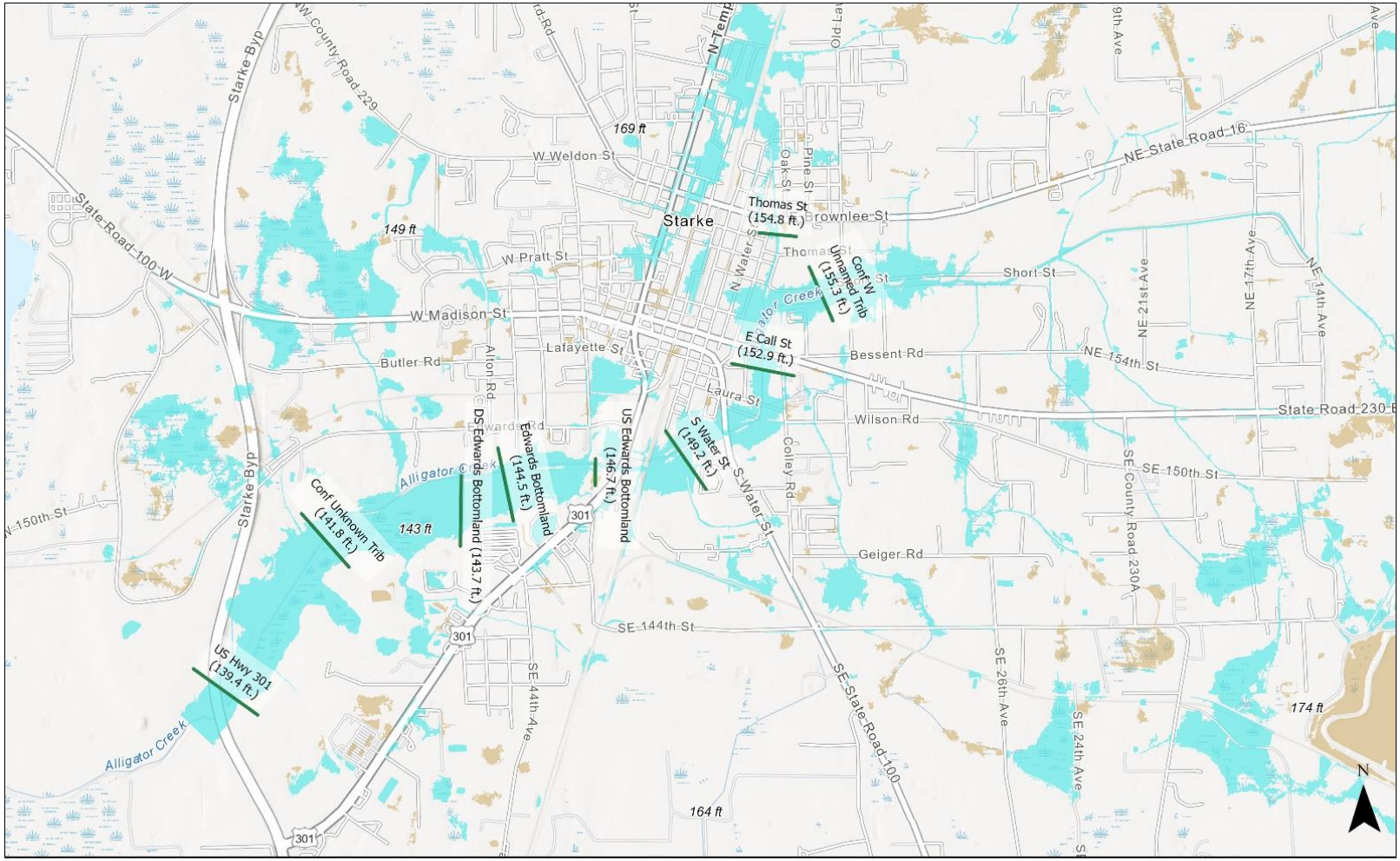
These changes in the existing condition model reflect the cumulative effects of multiple alterations across the watershed, not just the mitigation project. Notable contributing factors include:

- The use of an updated 2020 LiDAR-derived DEM, which is known to be approximately 0.3 to 0.6 feet higher than the 2012 DEM used in prior models, causing baseline elevation shifts.
- New infrastructure such as the Starke Bypass and its associated stormwater storage pond.

Because many of these changes were incorporated into the existing condition simultaneously, it is not possible to isolate how much of the elevation increase at any location is due to each individual change. For this reason, the Post-Project (No Edwards Bottomlands) scenario was developed to specifically evaluate the impact of the restoration alone, by removing the Edwards Bottomlands project while retaining all other basin-wide modifications. Results (Table 1) from the Post-Project (No Edwards Bottomlands) scenario confirm that the Edwards Bottomlands restoration is not responsible for the flood elevation increases observed under existing conditions. In fact, removing the restoration led to higher flood elevations at nearly all locations. Most notably, the water surface elevation at restoration site increased by 0.49 feet (from 144.56 ft to 145.02 ft), and upstream of the project area increased by 0.18 feet (from 147.25 ft to 147.43 ft) when the restoration was removed. Smaller, yet consistent increases were observed upstream of the study area. These results demonstrate that the pre-restoration condition actually worsened flood conditions, and that the restoration has had a measurable, beneficial effect in mitigating flood elevations in Alligator Creek. Therefore, any flood elevation increases seen in the existing condition model are attributable to other basin-wide changes, and not the result of the Edwards Bottomlands Wetland Mitigation Project. The resulting 1% floodplains for each condition are shown in Figure 12-16 as well. Additional water surface elevation (WSEL) comparisons for other storm events are provided in Appendix 2 on page 28.

Table 1 - Comparison of 1% Flood Elevations

Location	Pre-Project Condition, ft	Post-Project Condition (As Permitted), ft	Post-Project Condition (As Constructed), ft	Post-Project Condition (Existing), ft	Post-Project Condition (No EB), ft
Alligator Creek					
US Hwy 301	139.41	139.41	139.41	139.91	139.93
Confluence with Unknown Trib1	141.78	141.78	141.78	142.29	142.34
DS Edwards Bottomlands	143.75	143.75	143.75	144.22	144.30
Edwards Bottomlands	144.53	144.22	144.17	144.56	145.02
US Edwards Bottomlands	146.72	146.60	146.60	147.11	147.43
S. Water St	149.22	149.20	149.19	149.45	149.56
E. Call St	152.86	152.86	152.86	153.31	153.31
Confluence with Unnamed Trib	155.30	155.30	155.30	155.65	155.66
Unnamed Tributary					
Thomas Street	154.83	154.83	154.83	155.29	155.29



Pre-Project Conditions

Starke, Florida

Reference Lines (WSE in ft.)

Zone A

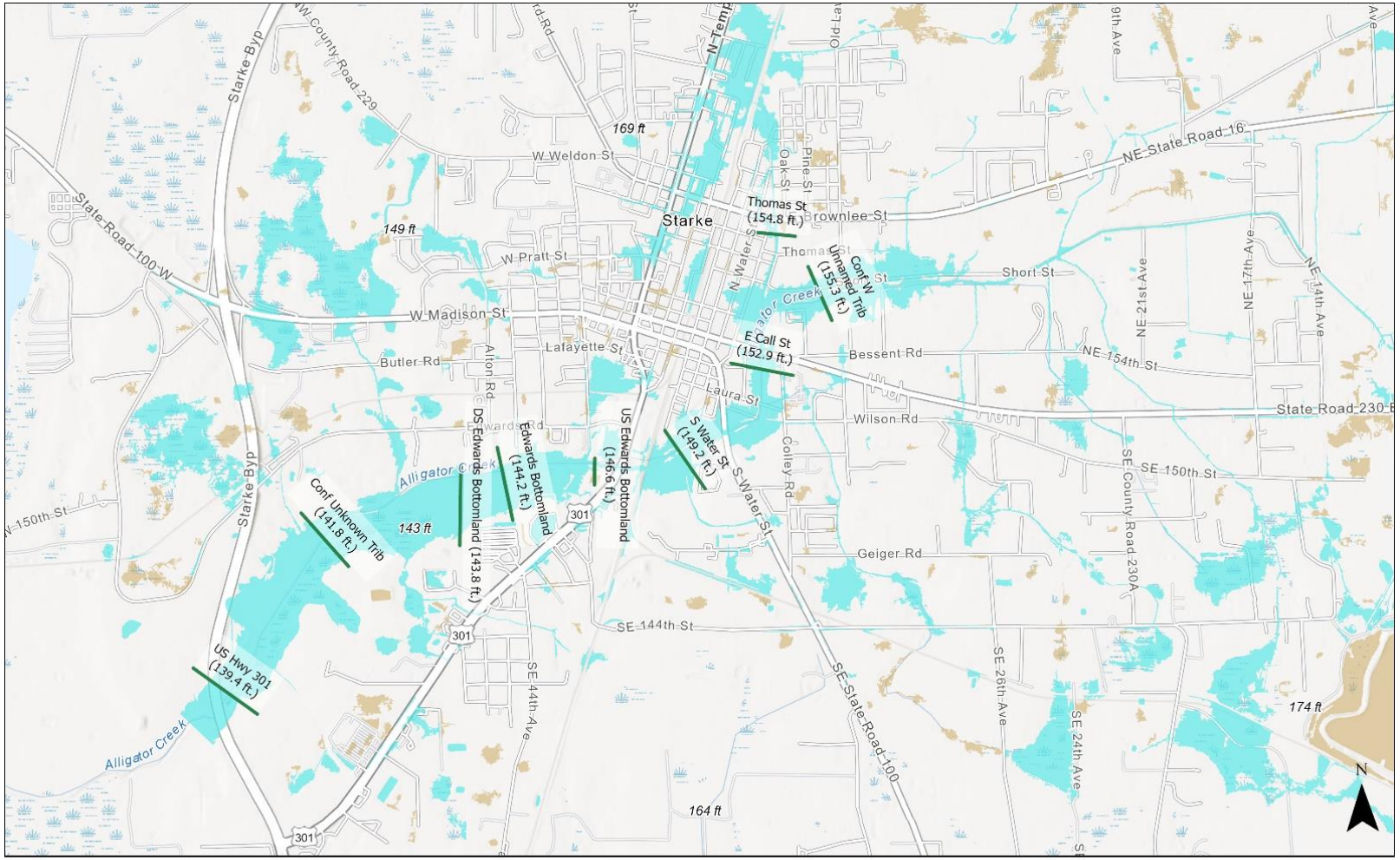
Zone X

0 0.25 0.5 1 Miles

Map intended for planning purposes only
Data sources: ESRI, FEMA

Prepared by JH
May 2025

Figure 12 – 1% Floodplain Mapping for Pre-Project Conditions



Post-Project Conditions (As-Permitted)

Starke, Florida

Reference Lines (WSE in ft.)

Zone A

Zone X

Miles

0 0.25 0.5 1

Map intended for planning purposes only
Data sources: ESRI, FEMA

Prepared by JH
May 2025

Figure 13: 1% Floodplain Mapping for Post-Project Conditions (As Permitted)

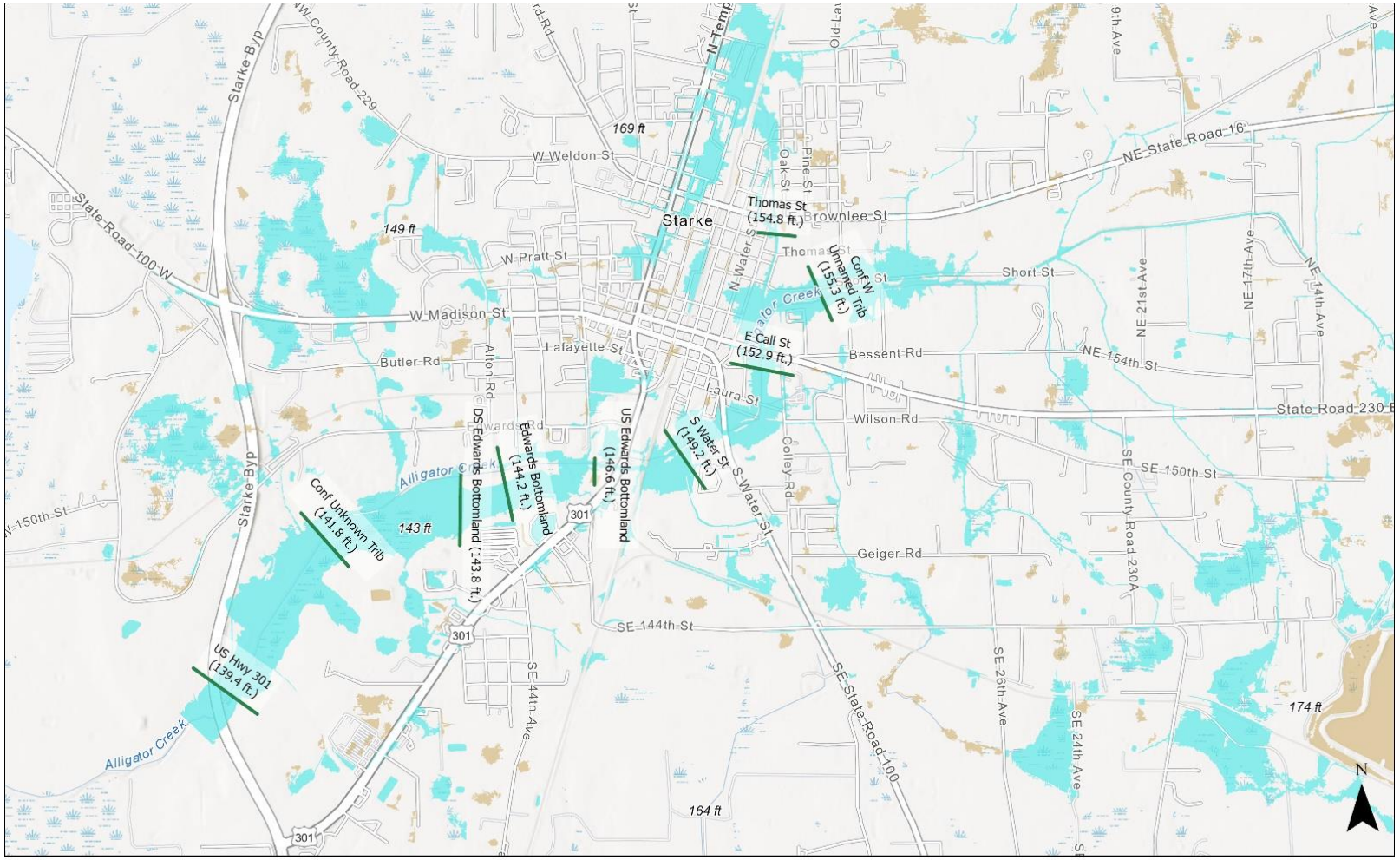


Figure 14: 1% Floodplain Mapping for Post-Project Conditions (As Constructed)

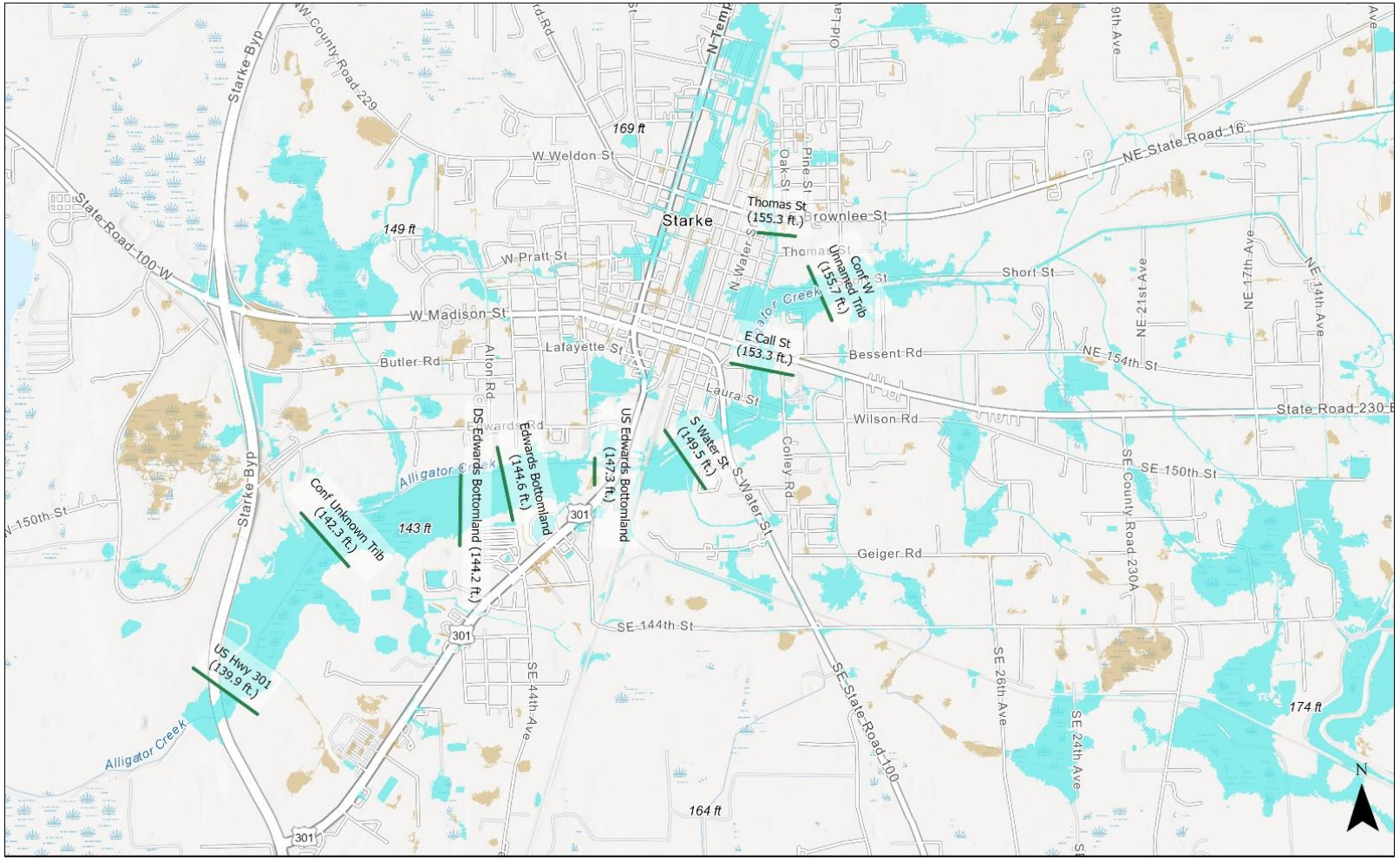
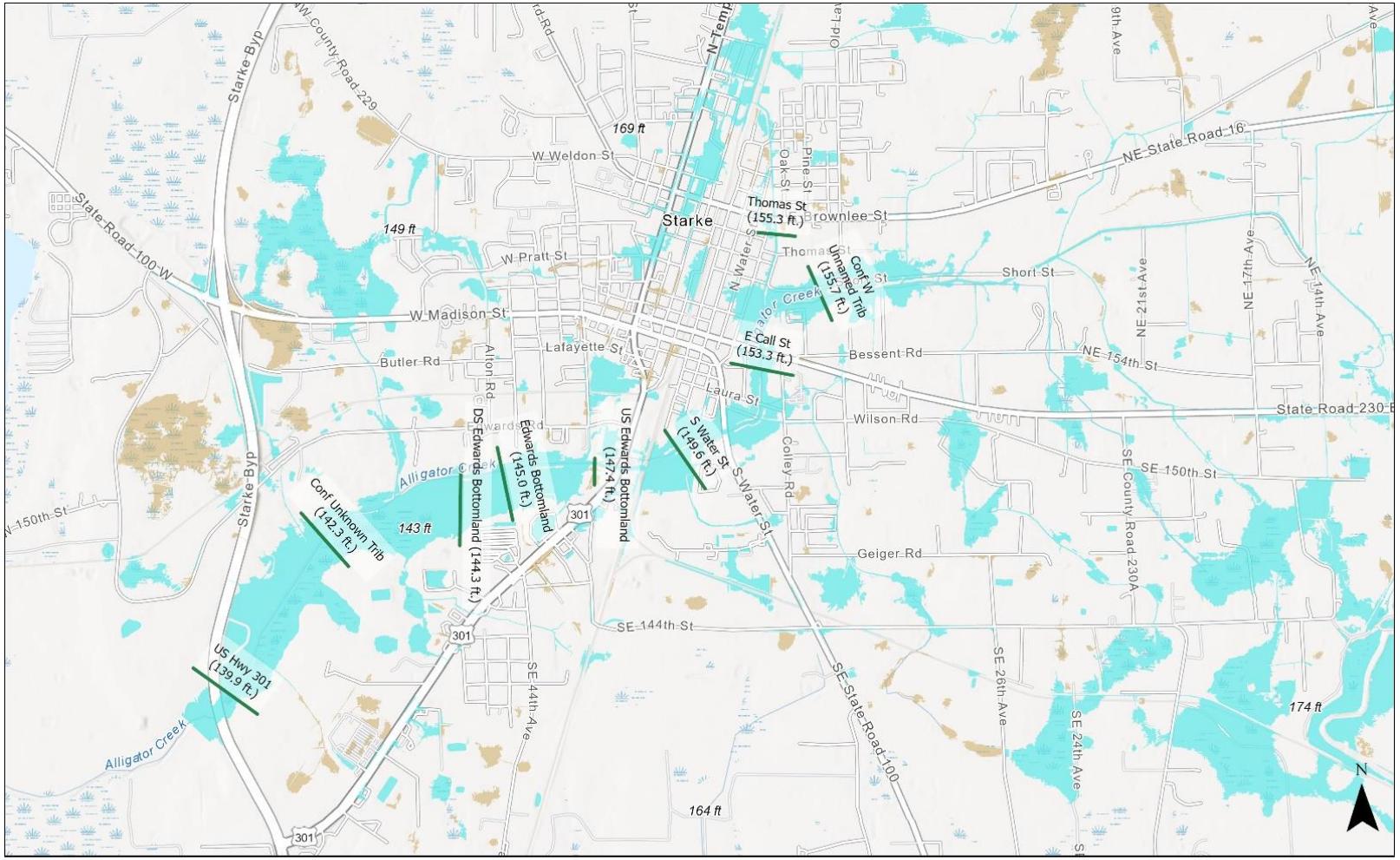


Figure 15: 1% Floodplain Mapping for Post-Project Conditions (Existing)



Post-Project Conditions
(No Edwards Bottomlands)

Starke, Florida

Reference Lines (WSE in ft.)

Zone A

Zone X

Miles
0 0.25 0.5 1

Map intended for planning purposes only
Data sources: ESRI, FEMA

Prepared by JH
August 2025

Figure 16: 1% Floodplain Mapping for Post-Project Conditions (No Edwards Bottomlands)

9 REFERENCES

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Southwest Florida Management District. (2013). Environmental Resource Permit Applicant's Handbook Volume II.

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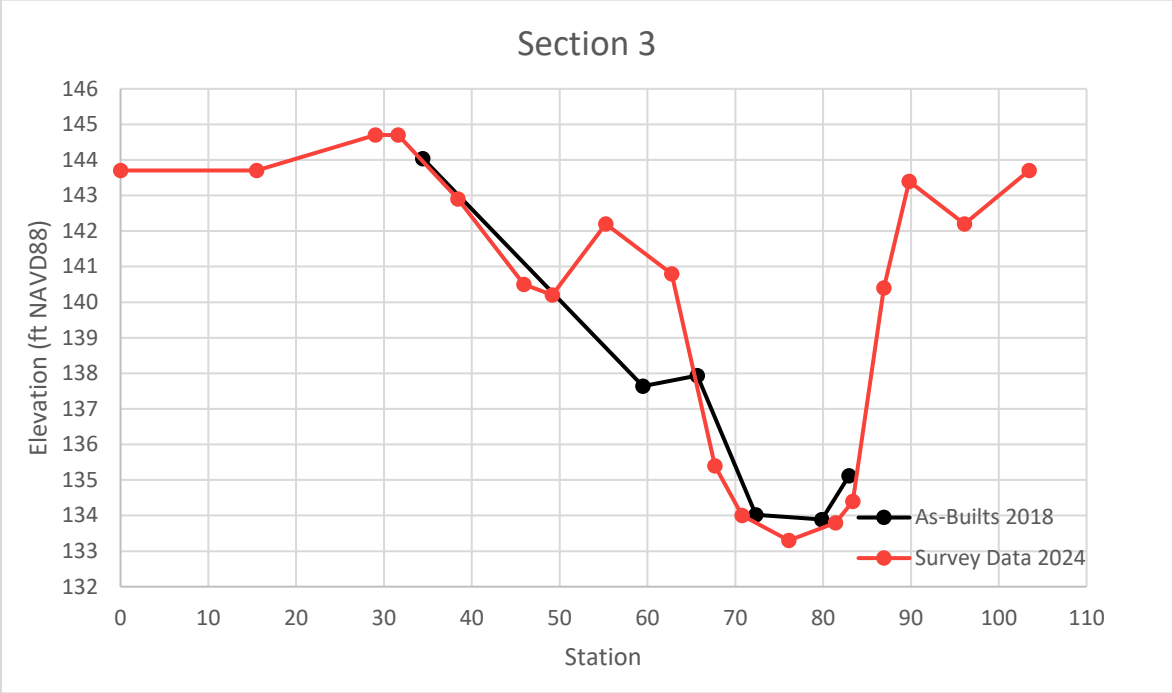
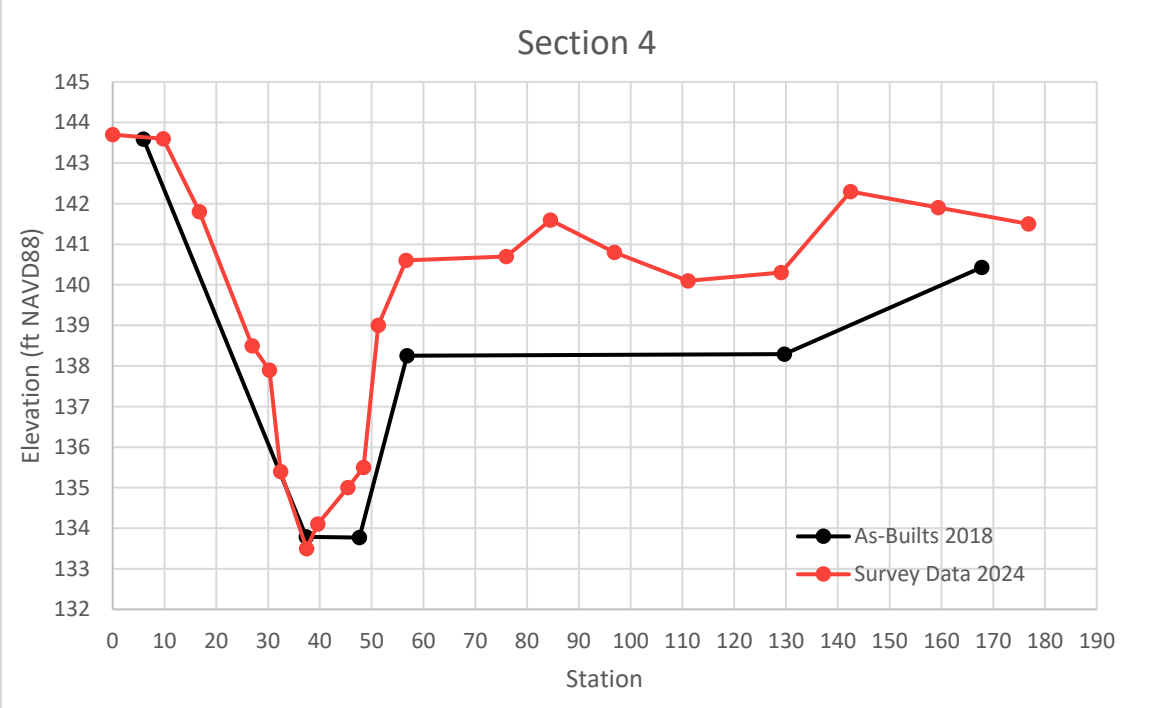
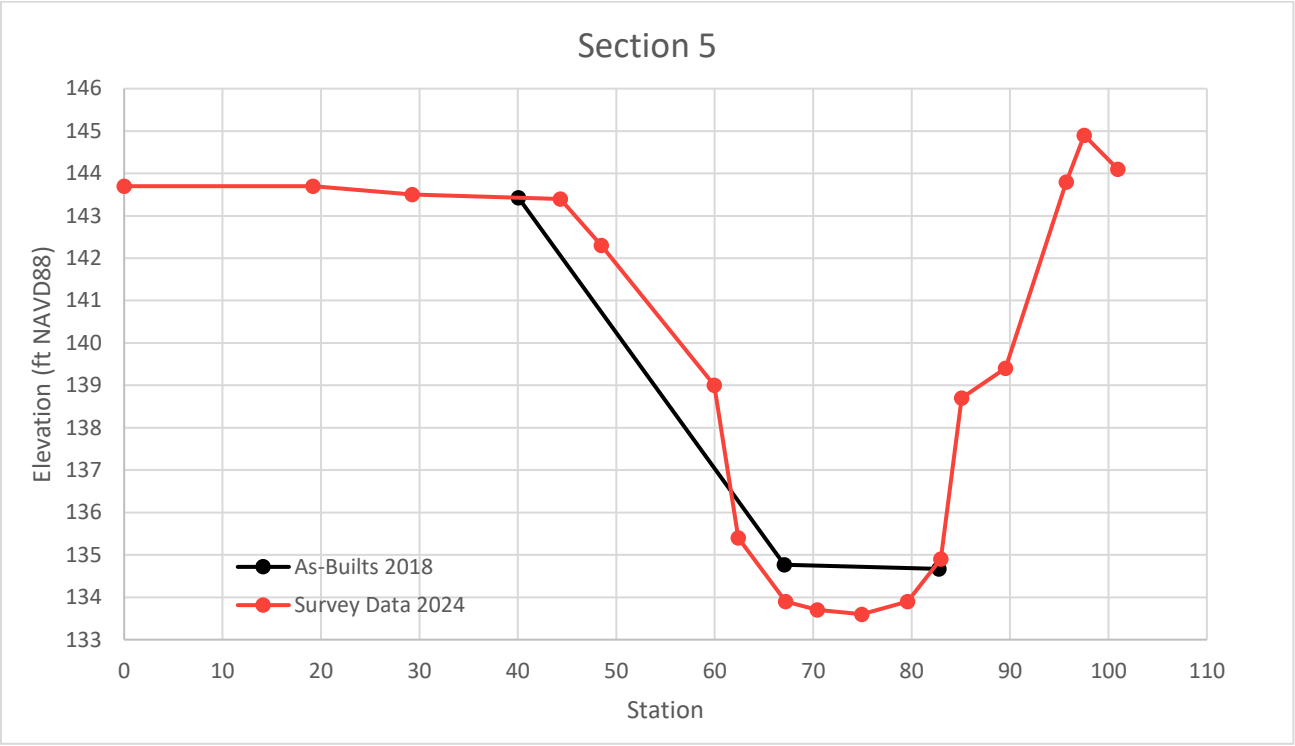
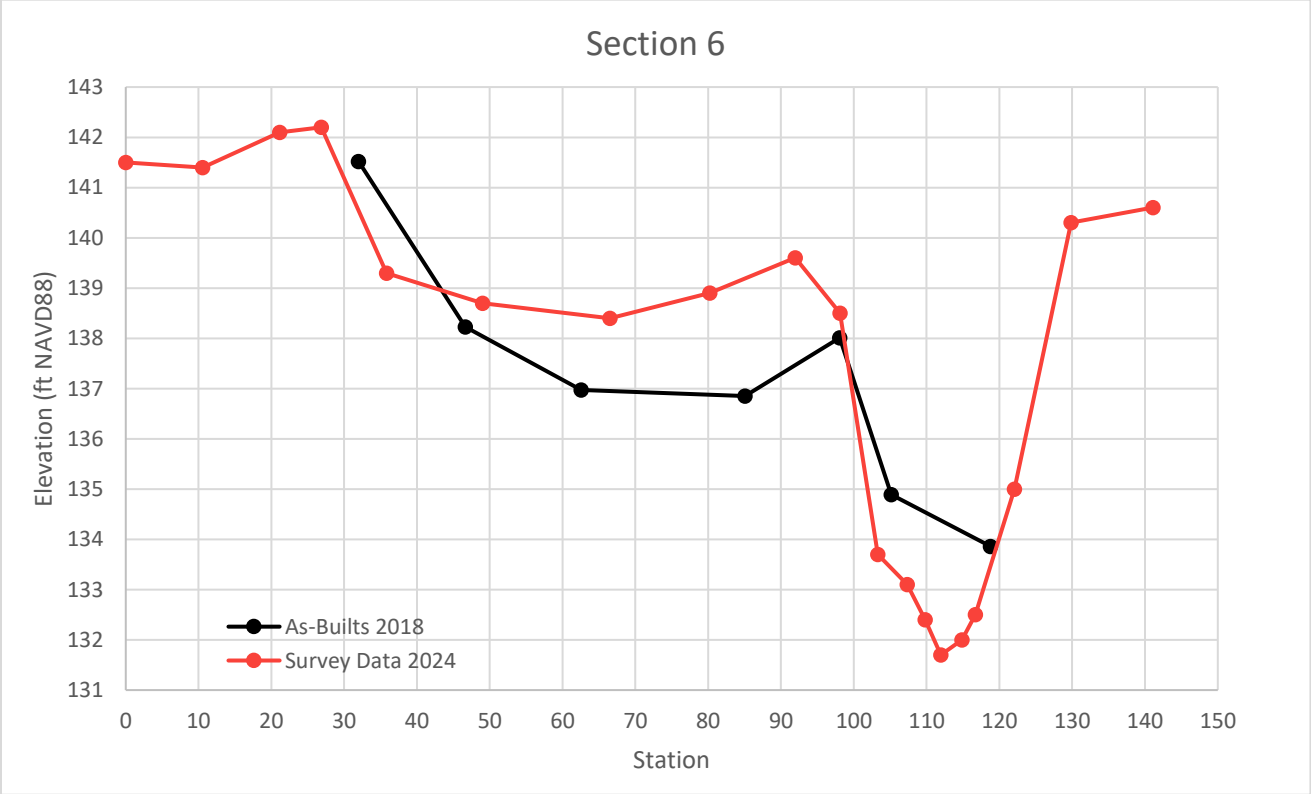
APPENDIX 1 – SURVEY DATA COMPARISON

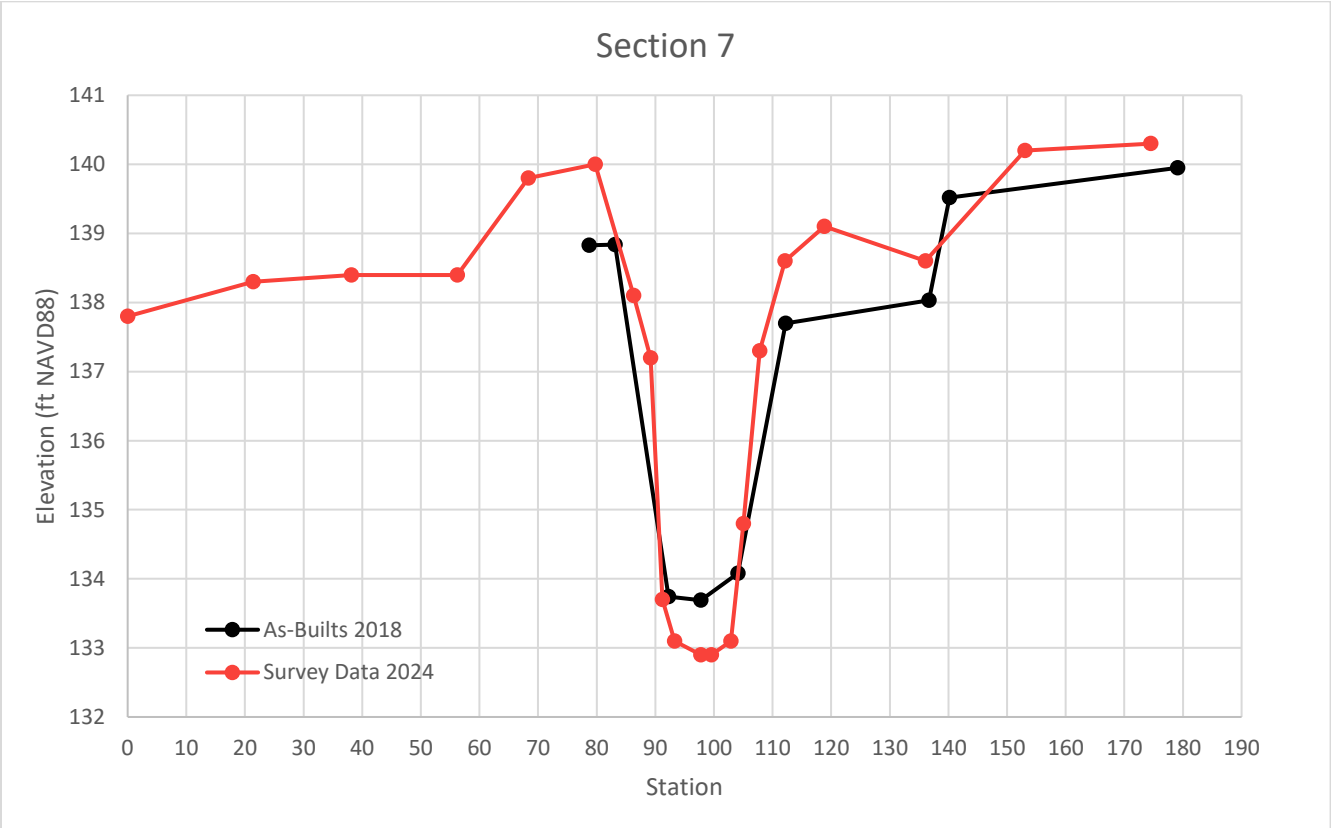
The figures below present cross-section comparisons at various locations along the Alligator Creek channel within the Edwards Bottomland parcel, comparing the survey data provided in the December 2018 as-built plans with the survey data collected for this project in November/December 2024.

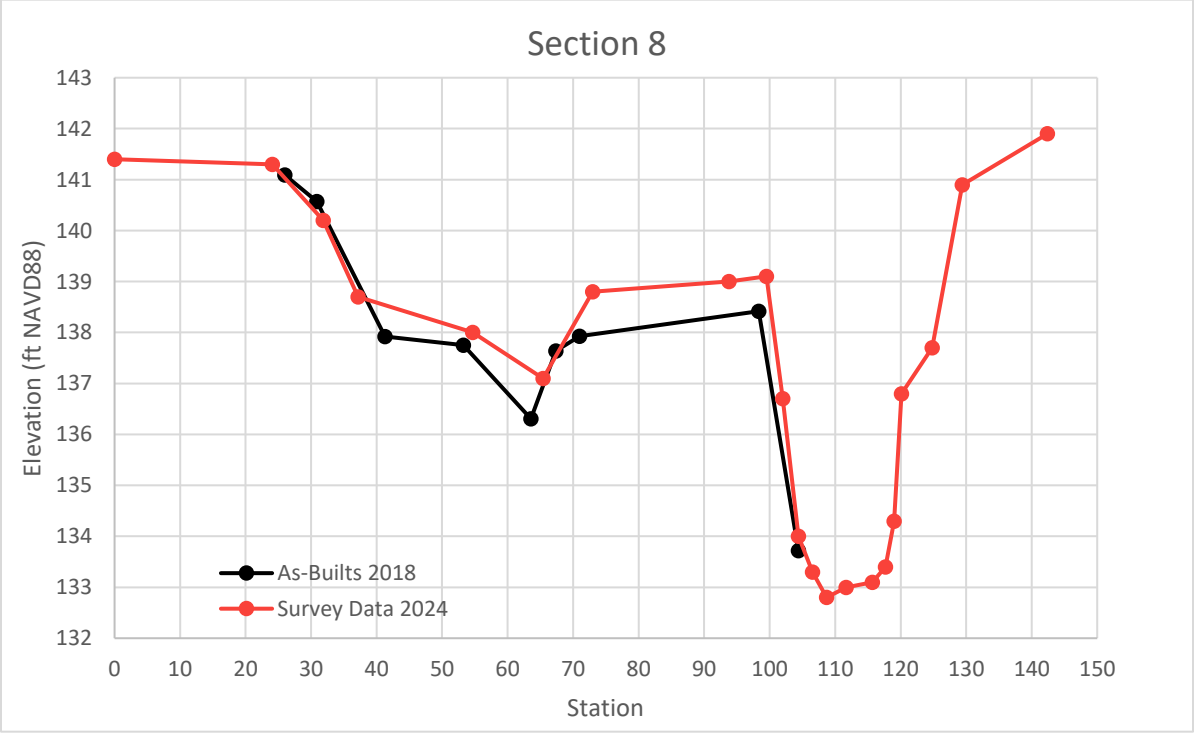


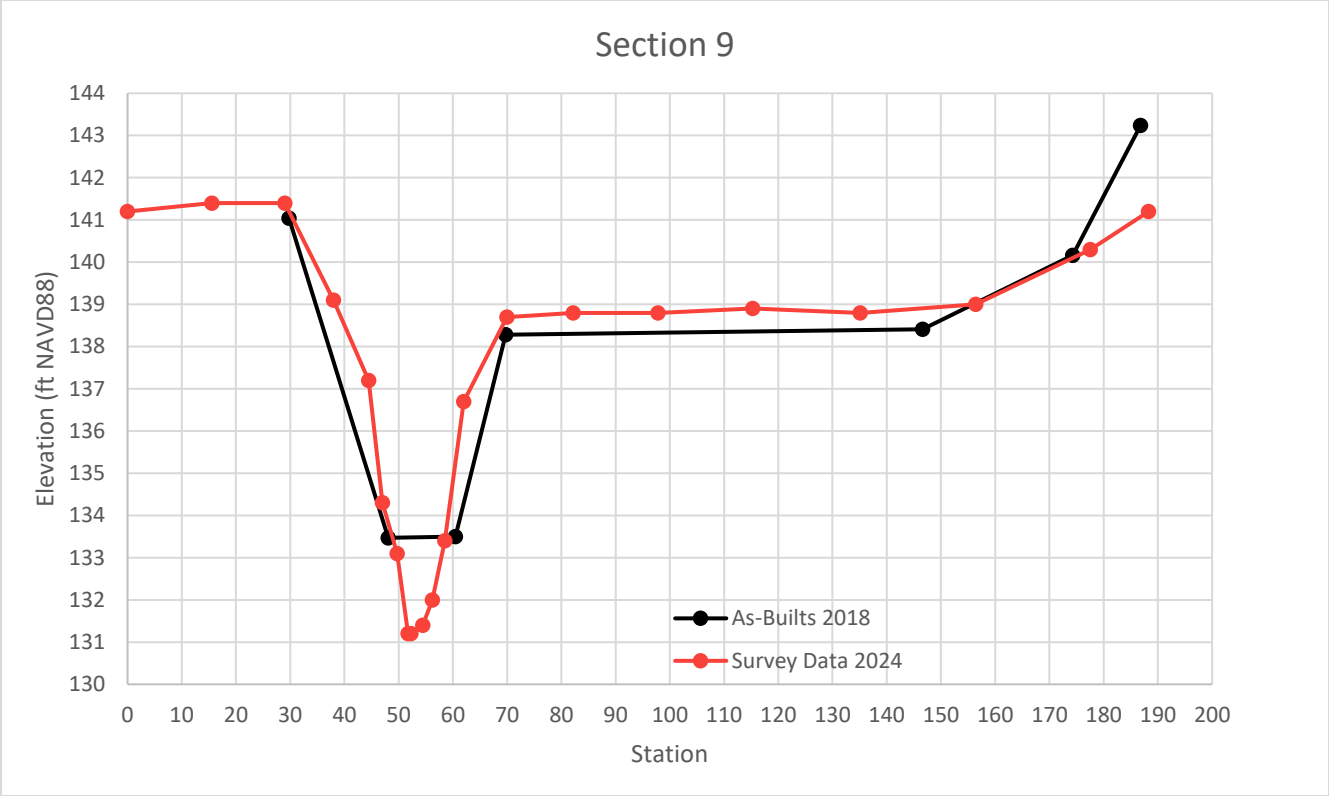



Section 5
Elevation (ft NAVD88)
146
145
144
143
142
141
140
139
138
137
136
135
134
133
0
10
20
30
40
50
60
70
80
90
100
110
Station
As-Built 2018
Survey Data 2024


Section 6
Elevation (ft NAVD88)
143
142
141
140
139
138
137
136
135
134
133
132
131
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Station
As-Built 2018
Survey Data 2024


Section 7
Elevation (ft NAVD88)
141
140
139
138
137
136
135
134
133
132
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190
Station
As-Built 2018
Survey Data 2024


Section 8
Elevation (ft NAVD88)
143
142
141
140
139
138
137
136
135
134
133
132
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Station
As-Built 2018
Survey Data 2024


Section 9
Elevation (ft NAVD88)
144
143
142
141
140
139
138
137
136
135
134
133
132
131
130
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
Station
As-Builts 2018
Survey Data 2024

APPENDIX 2 – COMPARISON OF 10%, 4%, 2%, AND 0.2% FLOOD ELEVATIONS

The tables below present a comparison of pre-project, post-project (as permitted), and post-project (as constructed) flood elevations for the 10%, 4%, 2%, and 0.2% floods.

Table 2 - Comparison of 10% Flood Elevations

Location	Pre-Project Condition, ft	Post-Project Condition (As Permitted), ft	Post-Project Condition (As Constructed), ft	Post-Project Condition (Existing), ft	Post-Project Condition (No EB), ft
Alligator Creek					
US Hwy 301	138.97	138.97	138.97	139.43	139.43
Confluence with Unknown Trib1	141.38	141.38	141.38	141.81	141.88
DS Edwards Bottomlands	143.38	143.38	143.38	143.83	143.96
Edwards Bottomlands	144.17	143.85	143.79	144.15	144.67
US Edwards Bottomlands	146.23	146.07	146.10	146.54	146.87
S. Water St	148.70	148.67	148.67	148.79	148.90
E. Call St	152.22	152.22	152.22	152.68	152.65
Confluence with Unnamed Trib	154.78	154.78	154.78	155.12	155.12
Unnamed Tributary					
Thomas Street	154.38	154.36	154.36	154.85	154.86

Table 3 - Comparison of 4% Flood Elevations

Location	Pre-Project Condition, ft	Post-Project Condition (As Permitted), ft	Post-Project Condition (As Constructed), ft	Post-Project Condition (Existing), ft	Post-Project Condition (No EB), ft
Alligator Creek					
US Hwy 301	139.08	139.08	139.08	139.58	139.58
Confluence with Unknown Trib1	141.50	141.50	141.50	141.96	142.02
DS Edwards Bottomlands	143.49	143.49	143.49	143.94	144.06
Edwards Bottomlands	144.28	143.96	143.9	144.26	144.77
US Edwards Bottomlands	146.38	146.24	146.25	146.72	147.04
S. Water St	148.86	148.83	148.83	148.98	149.08
E. Call St	152.42	152.42	152.42	152.85	152.82
Confluence with Unnamed Trib	154.94	154.94	154.94	155.25	155.25
Unnamed Tributary					
Thomas Street	154.55	154.54	154.54	155.21	155.20

Table 4 - Comparison of 2% Flood Elevations

Location	Pre-Project Condition, ft	Post-Project Condition (As Permitted), ft	Post-Project Condition (As Constructed), ft	Post-Project Condition (Existing), ft	Post-Project Condition (No EB), ft
Alligator Creek					
US Hwy 301	139.22	139.22	139.22	139.70	139.72
Confluence with Unknown Trib1	141.62	141.62	141.62	142.09	142.14
DS Edwards Bottomlands	143.58	143.58	143.58	144.06	144.14
Edwards Bottomlands	144.38	144.06	144.00	144.39	144.86
US Edwards Bottomlands	146.51	146.38	146.39	146.87	147.18
S. Water St	149.00	148.98	148.97	149.15	149.26
E. Call St	152.59	152.59	152.59	153.03	152.98
Confluence with Unnamed Trib	155.08	155.08	155.08	155.41	155.39
Unnamed Tributary					
Thomas Street	154.70	154.70	154.70	155.12	155.10

Table 5 - Comparison of 0.2% Flood Elevations

Location	Pre-Project Condition, ft	Post-Project Condition (As Permitted), ft	Post-Project Condition (As Constructed), ft	Post-Project Condition (Existing), ft	Post-Project Condition (No EB), ft
Alligator Creek					
US Hwy 301	139.75	139.75	139.75	140.38	140.40
Confluence with Unknown Trib1	142.32	142.32	142.32	142.87	142.93
DS Edwards Bottomlands	144.26	144.26	144.26	144.76	144.83
Edwards Bottomlands	145.04	144.75	144.70	145.10	145.56
US Edwards Bottomlands	147.38	147.27	147.26	147.88	148.13
S. Water St	150.06	150.05	150.04	150.44	150.51
E. Call St	153.69	153.69	153.69	154.12	154.12
Confluence with Unnamed Trib	156.05	156.05	156.05	156.41	156.43
Unnamed Tributary					
Thomas Street	155.74	155.74	155.74	156.34	156.36