

UT to Town Creek Restoration Project – Option A Year 7 Monitoring Report/Closeout Report

Stanly County, North Carolina

DMS Project ID Number – 94648; NC DEQ Contract No. 003277

Yadkin Pee-Dee River Basin: 03040105060040



Project Info:

Monitoring Year: 7

Year of Data Collection: 2022

Year of Completed Construction: 2016

Submission Date: January 2023

Submitted To:

NCDEQ – Division of Mitigation Services

1625 Mail Service Center

Raleigh, NC 27699

NCDEQ Contract ID No. 003277

January 25, 2023

Harry Tsomides, Project Manager
NCDEQ, Division of Mitigation Services
2090 U.S. 70 HWY
Swannanoa, NC 28778

Subject: Response to DMS Comments for MY7 Draft Report
UT to Town Creek Mitigation Site, Stanly County
DMS Project #94648, DEQ Contract #3277

Mr. Tsomides:

Please find enclosed our responses to the NC Division of Mitigation Services (DMS) review comments received January 3, 2023 in reference to the UT to Town Creek Mitigation Site MY7/Closeout Draft Report. We have revised the document in response to the review comments as outlined below.

DMS MY7/Closeout Draft Report Comments:

- It is stated that parrot feather was treated in October 2022; if so, please record this event in the project history table.
Response: Revision have been made as requested.
- Culvert photos (upstream and downstream views) should be included in the report (e.g., main farm road, and Reach 6 culvert) to show that perching or infilling conditions are not occurring.
Response: Culverts were inspected during site visits and functioning properly but not reported in the monitoring report per requirements discussed in the June 2021 IRT site meeting.
- Please optimize/compress the report PDF if possible.
Response: Michael Baker has compressed the report PDF as much as possible.
- As a reminder, monitoring providers are responsible for checking the easement integrity across the project site for mowing/grazing encroachments, missing, bent or wobbly post markers, fence damage, etc. Please summarize the status of the easement boundary, and indicate the extent that Baker has worked with DMS and DEQ-Stewardship in 2022 to adequately prepare the site for close out following recent site visits by DMS and DEQ-stewardship. Can Baker confirm that the site boundary, marking integrity, and easement compliance was checked and found to be compliant in 2022?
Response: Michael Baker has inspected the site and completed all the checklist items compiled between DMS and DEQ-stewardship. New signs have been installed where needed and existing signage have been made visible throughout the site. Any compromises to the fencing have been addressed and no encroachments were noted throughout the easement.

Digital Support Files

- The CCPV in the report is incomplete, it appears there should be a figure 3 to include the monitoring stations on reach 6 as there are vegetation plots on that reach.
Response: Wetland credits and monitoring features within these credited areas are located on reaches 1,2 and 3. Therefore, reach 6 was not included in the figure 2 CCPV.
- The vegetation data is incomplete; the submission included 14 plots, CCPV indicates greater than 20 vegetation plots. The meeting minutes from 2021 also indicate transect data for creation area added; please submit the data. Suggest that this data is presented in greater detail in the report (species list with density).
Response: Michael Baker has added vegetation transect data to table 9 found in Appendix C.

- The photo point data is incomplete; the CCPV indicates a minimum of 41 photo points not included in the digital data submission.
Response: Not required per June 2021 IRT site meeting.
- Suggest clarifying on the CCPV that the 'jurisdictional wetlands' are wetlands that were delineated post project and not for credit.
Response: Revision have been made as requested.

As requested, two final hardcopies will be submitted to you along with a flash drive containing the report PDF along with all digital support files. Please do not hesitate to contact me should you have any questions regarding our response submittal.

Sincerely,



Andrew Powers
Project Manager

Enclosures

UT to Town Creek Restoration Project – Option A Year 7 Monitoring Report/Closeout Report

Stanly County, North Carolina

DMS Project ID Number – 94648; NC DEQ Contract No. 003277

SAW-2013-01280; DWR#14-1024

Yadkin Pee-Dee River Basin: 03040105060040

Report Prepared and Submitted by Michael Baker Engineering, Inc.

NC Professional Engineering License # F-1084

Michael Baker

I N T E R N A T I O N A L

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*Note: The figures and tables marked above with an asterisk are not included as part of this Year 7 Monitoring Report, but were left listed in the Table of Contents to explain the otherwise out-of-sequence figure/table numbering and appendix designations. For clarity, Michael Baker wishes to preserve the continuity of the labeling for these features between monitoring years to avoid confusion. These figures and tables have been included in past reports but will no longer be included again as the stream portion of this project no longer has standard stream monitoring.

1.0 EXECUTIVE SUMMARY

Michael Baker Engineering, Inc., (Michael Baker) restored 5,554 linear feet (LF) and enhanced 791 LF (447 LF of Enhancement I and 344 LF of Enhancement II) of perennial and intermittent stream along an Unnamed Tributary (UT) to Town Creek and three additional unnamed tributaries. Also as part of this Project, Michael Baker restored and created 4.12 acres of riparian wetlands and enhanced 1.00 acre of riparian wetlands and constructed two wetland best management practices (BMPs) upstream of the mitigation areas. Though no mitigation credit is being sought for wetland enhancement, additional stream mitigation credit is being sought for the inclusion of the proposed stormwater BMPs and the extended riparian buffer width within the conservation easement. This report documents and presents the Year 7 monitoring data as required during the monitoring period.

The primary goals of the Project were to improve aquatic habitat degradation by improving ecologic functions and reducing non-points source loads from agricultural run-off to the impaired areas as described in the Lower Yadkin – Pee Dee River Basin Restoration Priorities (RBRP) and as identified below:

- Improve aquatic and terrestrial habitat through increasing dissolved oxygen concentrations, reduction in nutrient and sediment loading, improving substrate and in-stream cover, and reduction of in-stream water temperature;
- Improve both aquatic and riparian aesthetics;
- Create geomorphically stable conditions along UT to Town Creek and its tributaries through the Project area;
- Prevent cattle from accessing the project area thereby protecting riparian and wetland vegetation and reducing excessive bank erosion;
- Restore historical wetlands, create new wetlands, and enhance/preserve existing wetlands to improve terrestrial habitat and reduce sediment and nutrient loading to UT to Town Creek and the Little Long Creek Watershed.

To accomplish these goals, the following objectives were identified:

- Restore, enhance, create, and protect riparian wetlands and buffers to reduce nutrient and pollutant loading by particle settling, vegetation filtering and nutrient uptake;
- Construct wetland BMPs on the upstream extent of Reaches 4 and 7 to improve water quality by capturing and retaining stormwater run-off from the adjacent cattle pastures to allow for the biological removal of nutrient pollutant loads and for sediment to settle out of the water column;
- Restore existing incised, eroding, and channelized streams by creating stable channels with access to their geomorphic floodplains;
- Improve in-stream habitat by providing a more diverse bedform with riffles and pools, creating deeper pools and areas of water re-aeration, and reducing bank erosion;
- Control invasive species vegetation within the project reaches;
- Establish native stream bank, riparian floodplain, and wetland vegetation, protected by a permanent conservation easement, to increase stormwater runoff filtering capacity, improve bank stability, shade the stream to decrease water temperature, and provide improved wildlife habitat quality.

UT to Town Creek Restoration Project – Option A (site) is located in Stanly County, approximately 1.7 miles west of the Town of New London, within cataloging unit 03040105 of the Yadkin Pee-Dee River Basin (see Figure 1). The site is located in a North Carolina Division of Mitigation Services (NCDMS) - Targeted Local Watershed (03040105060040). The Project involved stream restoration and enhancement, as well as wetland restoration, creation, and enhancement along UT to Town Creek and several of its tributaries, which had been impaired due to historical pasture conversion and cattle grazing.

On June 3rd of 2021, the IRT held an on-site meeting to review early closeout for wetland credits and normal closeout for stream credits. As detailed in the meeting minutes found in Appendix F, it was ultimately decided that the wetland portion of the project will require continued monitoring through Year 7. As a result, while the stream portion of the project was performing well and no longer requires the standard monitoring protocols, it has not officially closed-out and any subsequent damage to the system must be repaired. The monitoring report for year 7 will therefore consist of vegetation assessments within the wetland areas, wetland gauge monitoring, and invasive species management.

During Year 7 monitoring, vegetation conditions were performing at over 90% for planted acreage and close to 100% for invasive/encroachment area categories. As noted in Table 6b, an area (VPA7-1) of low herbaceous vegetation and poor growth rates has continued to persist from MY2. This area is located along Reach 2 between Vegetation Plot 14 and 13 and consists of approximately 0.06 acres. This area was supplemental planted with gallon plants, annual seed, perennial grass plugs and appropriate amount of lime in May 2020, but due to harsh temperatures and compacted clay soils this area is expected to have a high mortality. Michael Baker added lime in May 2022 in efforts to improve the soil quality. Although this area has continually been a vegetation problem area, Michael Baker has seen improvements with each monitoring year. VPA data and photographic documentation collected during Year 7 monitoring are located in Appendix B. See Tables 6a through 6b for VPA data documentation.

For Monitoring Year 7, no areas of invasive species were reported as none of the areas exceed the mapping threshold of 1,000 square feet (SF) and due to a successful treatment conducted in October 2022. A treatment session was performed in October 2022 treating primarily parrot feather (*Myriophyllum aquaticum*) in dense areas along R2. The presence of invasive species tend to occur predominantly in areas of the easement where mature woody vegetation is present and along the easement fence line with the exception of parrot feather found within the stream channel. Michael Baker intends to do a spring treatment in 2023 before closeout.

Based on data collected from the fourteen monitoring plots located within the credited wetland areas during Year 7 monitoring the density of total planted stems per plot ranges from 445 to 728 stems per acre with a tract mean of 595 stems per acre. Therefore, the Year 7 data demonstrate that the site has exceeded the minimum success criteria of 260 trees per acre by the end of Year 5 and met in Year 7. The presence of volunteer woody vegetation was noted in vegetation plots; however, these species were not included in the average vegetation plot densities calculated for assessing the project's interim success criteria. A vegetation transect was conducted within the wetland creation area that totaled 15 stems. Vegetation stem counts are summarized in Tables 7 and 9 of Appendix C.

Groundwater monitoring data collected during the growing season (March 27 through November 5) of Years 2, 3, 4, 5, 6, and 7 documented that all ten groundwater monitoring wells exhibited soil saturation within 12 inches of the ground surface for the minimum success criteria hydroperiod of nine percent (9%) or 20 consecutive days during the growing season. The available ground water data ends July 20th due to the Barometric pressure gauge malfunctioning. Unfortunately, all ground water gauges compensate to that single barometric gauge resulting in a loss of data for the remainder of the growing season. However, all ground water gauges met success criteria with the lowest hydroperiod was for well 8 at 17.1% See Appendix E for a plot of wetland gauge data as it relates to monthly precipitation for Monitoring Year 7 (Figure 6). The Monitoring Year 7 wetland restoration success results are depicted in Table 12, and a summary of wetland attainment for all ten monitoring gauges is depicted in Table 12a. See Figure 2 (CCPV) in Appendix B for a depiction of wetland mitigation areas and corresponding gauge locations.

Also, as explained in detail in the Wetland Boundary Adjustment memo found in Appendix G, a small area of additional wetland has been added as Creation (0.192 ac) as suggested by the IRT to compensate for the small area of Restoration removed (0.047 ac) following the IRT site visit in June of 2019. This new area is but a small subset of the originally expanded Creation area submitted for addition in February 2021 as part of the MY5/Closeout report. Based on IRT comments on these areas during their field visit in June of 2021, much of these have been removed. The small area retained for Creation was the wettest looking portion and was readily accepted by the IRT in the field. It is also located very near the Restoration area being removed and was the area specifically pointed out by Mac Haupt (DEQ) during the June 2019 field visit as wetlands he suggested Michael Baker add. For these reasons, only this small, revised wetland area is being requested for addition as Creation (at a 3:1 ratio) to help ensure a smooth closeout of wetland credits.

However, as a consequence of the revised Creation wetland boundary, the results from the USACE Stream Buffer Credit Calculator spreadsheet tool were affected as well. The additional credited wetland Creation area must be accounted for in the tool. As per DMS/IRT instruction, the same tool version (1/19/2018) that had been originally used for credit calculation was used here again for the revised analysis. The results indicate that by adding that small wetland Creation area, the project loses 2.68 SMUs as compared to the original analysis conducted in 2018 for the mitigation plan. For a more detailed explanation of this analysis, please see the Wetland Boundary Adjustment memo in Appendix G for the spreadsheet tool results and maps. The report e-submission provides the Excel spreadsheet and GIS shapefiles as well.

The reduction of credits from the revised buffer tool was raised with the Corps by email along with a detailed explanation of all of the revisions that lead to the change. In their response on 12/13/2021, the Corps stated that our current wetland boundary adjustment approach was acceptable and that the slight reduction in credits from the buffer tool would not result in reduced closeout stream credits (given the small number of credits involved). The email exchange is also included in the Wetland Boundary Adjustment memo in Appendix G.

Summary information/data related to the site and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report Appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report and in the Mitigation Plan available on the NCDMS website. All raw data supporting the tables and figures in the appendices is available from NCDMS upon request.

2.0 METHODOLOGY

The monitoring plan for the site includes criteria to evaluate the success of the stream, wetland, and vegetation components of the project. Complete stream and vegetation monitoring was successfully conducted for five years, while wetland monitoring has been conducted for seven years. A reduced monitoring has been conducted for the stream and vegetation portion of the project until final closeout approval with the wetlands anticipated this coming spring. Monitoring methods used follow the NCDMS Monitoring Report Template, Version 1.2.1 – 12/01/09 and are based on the design approaches and overall project goals. To evaluate success criteria associated with a geomorphically stable channel, hydrologic connectivity, and aquatic habitat diversity, geomorphic monitoring methods were conducted for project reaches that involve Restoration and Enhancement Level I mitigation. The success criteria for the proposed Enhancement Level II reaches/sections follow the methods described in sections 2.1.3, 2.1.4, and 2.2, whereas, wetland restoration and creation mitigation will follow those outlined in sections 2.3. The specific locations of monitoring features, such as vegetation plots, permanent cross-sections, reference photograph stations, ground water gauges, flow gauges, and crest gauges, are shown on the CCPV sheets found in Figure 2 of Appendix B.

Year 7 monitoring data were collected from September through October 2022. Vegetation data and plot photos were collected on October 28th of 2022.

2.1 Stream Monitoring

As noted in the meeting minutes from the June 2021 IRT field visit, the stream portion of the project has performed well and a reduced monitoring protocol consisting of visual inspections has been approved for the final two monitoring years, though the stream credits are not yet closed out. As such, any impacts to stream function (bank scour, invasive species, etc.) will still be required to be addressed.

2.2 Vegetation Monitoring

To determine if the criteria are achieved, vegetation-monitoring quadrants were installed and are monitored across the restoration site in accordance with the CVS-NCDMS Protocol for Recording Vegetation, Level 1, Version 4.2 (Lee 2008). The total number of quadrants was calculated using the CVS-NCEEP Entry Tool Database version 2.3.1 (CVS-NCEEP 2012) with twenty (20) plots established randomly within the planted riparian buffer areas. No monitoring quadrants were established within the undisturbed wooded areas of the project area. The size of individual quadrants are 100 square meters for woody tree species.

Level 1 CVS vegetation monitoring was conducted between spring, after leaf-out has occurred, and fall prior to leaf fall. Individual quadrant data provided during subsequent monitoring events includes species composition, density, survival, and stem height. Relative values were calculated, and importance values were determined. Individual seedlings were marked to ensure that they can be found in succeeding monitoring years. Mortality was determined from the difference between the previous year's living, planted seedlings and the current year's living, planted seedlings.

2.3 Wetland Monitoring

Ten groundwater monitoring stations were installed in restored, created, and enhanced wetland areas similar to those from preconstruction monitoring to document hydrologic conditions at the Project site. The wetland gauges are depicted on the CCPV figures (Figure 2) found in Appendix B. Installation and monitoring of the groundwater stations have been conducted in accordance with the USACE standard methods outlined in the *ERDC TN-WRAP-05-2* (USACE 2005). To determine if the rainfall is normal for the given year, rainfall amounts were tallied using data obtained from the Stanly County WETS Station (USDA 2021) and from the automated weather station at the North Stanly Middle School (NEWL) in New London, approximately 1.5 miles southeast of the project site on Old Salisbury Road. Data from the NEWL station was obtained from the CRONOS Database located on the State Climate Office of North Carolina's website (2021).

Success criteria for wetland hydrology is met when each wetland site is saturated within 12 inches of the soil surface for 9 percent of the growing season as documented in the approved Mitigation Plan. To document the hydrologic conditions of the restored site, each groundwater monitoring station has been monitored for five years post-construction or until wetland success criteria are met. Visual inspection of proposed wetland areas was conducted to document any visual indicators that would be typical of jurisdictional wetlands. This could include, but is not limited to, vegetation types present, surface flow patterns, stained leaves, and ponded water. Wetland plants are documented along with other visual indicators noted above. Wetland restoration and creation areas that exhibit all three wetland indicators (the presence of hydric soils, wetland hydrology, and wetland vegetation) after construction and through the monitoring period validate wetland restoration and creation success.

2.4 BMP Monitoring

The wetland BMPs located at the upstream extent of Reaches 4 and 7 will be visually monitored for vegetative survivability and permanent pool storage capacity during the remaining monitoring period. Maintenance measures will be performed as necessary.

3.0 REFERENCES

- Lee, M., Peet R., Roberts, S., Wentworth, T. 2008. CVS-EEP Protocol for Recording Vegetation Level 1-2 Plot Sampling Only. Version 4.2.
- North Carolina Division of Mitigation Services (formerly NC Ecosystem Enhancement Program). 2011. Monitoring Requirements and Performance Standards for Stream and/or Wetland Mitigation. November 7, 2011.
2009. Lower Yadkin Pee-Dee River Basin Restoration Priorities, revised January 2009. Raleigh, NC.
2009. Procedural Guidance and Content Requirements for EEP Monitoring Report, v. 1.2.1. Raleigh, NC.
- Rosgen, D. L. 1994. A Classification of Natural Rivers. *Catena* 22:169-199.
- State Climate Office of North Carolina, 2022. CRONOS Database, North Stanly Middle School (NEWL), Stanly County, NC. <http://climate.ncsu.edu/cronos/?station=NEWL&temporal=sensormeta>
- United States Department of Agriculture, 2022. WETS Table. Climate Data for Stanly County, NC. Wets Station: Albemarle, NC 0090, FIPS: 37167, 1971 - 2018. <http://agacis.rcc-acis.org/37167/wets>
- United States Army Corps of Engineers. 2005. "Technical Standard for Water-Table Monitoring of Potential Wetland Sites," WRAP Technical Notes Collection (ERDC TN-WRAP-05-2), U.S. Army Engineer Research and Development Center. Vicksburg, MS.

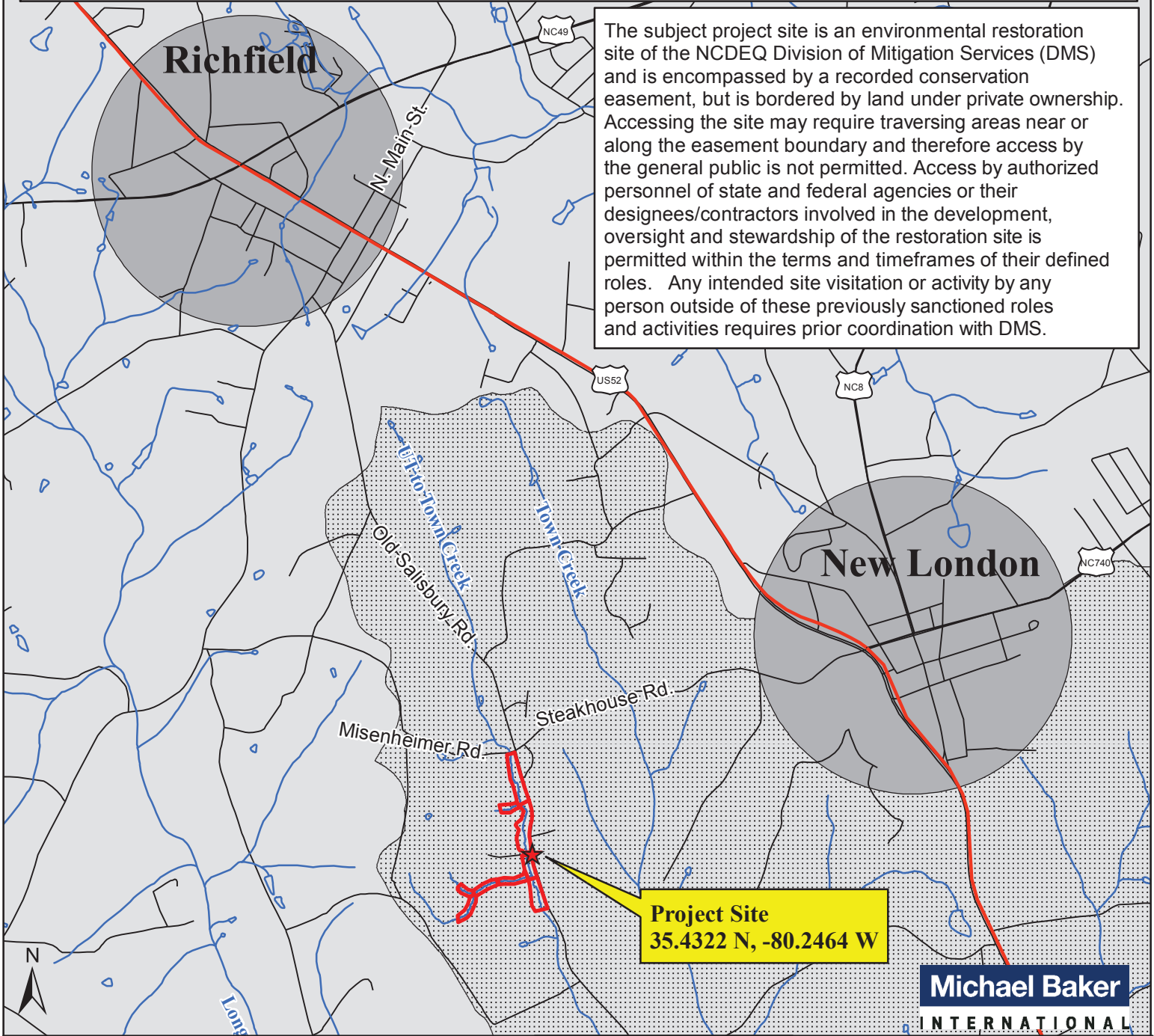
APPENDIX A

Project Vicinity Map and Background Tables

DIRECTIONS TO SITE FROM RALEIGH, NC:

Take I-40 West toward Sanford/Wake Forest. Take Exit 293 (I-440/US-64 W/US-1) toward Sanford/Wake Forest. Keep left at the fork toward US-1 S/US-64 W. Take Exit 293A for US-1 S/US-64 W toward Sanford/Asheboro. Keep left at the fork toward US-1 S/US-64 W. Continue on US-1 S/US-64 W towards Apex/Sanford/Asheboro. Take exit 98B to merge onto US-64 W towards Pittsboro/Asheboro. After 62 miles, turn left onto Connector Rd. Turn right onto NC 49 S. After 28.4 miles, take a slight left onto N Main St. After 1.1 miles, turn left onto Old Salisbury Rd. Follow Old Salisbury Rd. for approximately 2.0 miles to its intersection with Misenheimer Rd. / Steakhouse Rd. Go through the intersection and continue on Old Salisbury Rd. for approximately 0.4 miles and the Project site is on the right accessed via a dirt farm road.

The subject project site is an environmental restoration site of the NCDEQ Division of Mitigation Services (DMS) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with DMS.



Michael Baker
INTERNATIONAL

Figure 1. Vicinity Map

UT to Town Creek Restoration Project - Option A

Stanly County, NC

Reference: NCDOT 02 & NC One Map

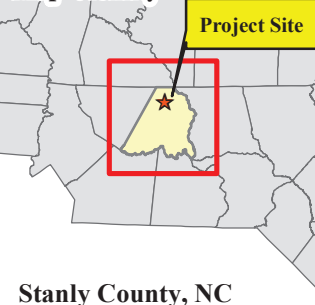
NC DMS Project No. 94648
NCDEQ Contract No. 003277

2020

0 1,500 3,000 Feet

1" = 3000'

Map Vicinity



Stanly County, NC

LEGEND

- Project Area
- Streams
- US Highways
- Roads
- Major Waterways
- Municipalities
- Yadkin (HUC 03040105060-040)

Table 1. Project Mitigation Components
UT to Town Creek Restoration Project - Option A: DMS Project No ID. 94648

Project Component (reach ID, etc.)	Wetland Position and Hydro Type	Existing Footage or Acreage	Stationing	Restored Footage, Acreage, or SF	Creditable Footage, Acreage, or SF*	Restoration Level	Approach		Mitigation Credits	Notes/Comments
							Priority Level	Mitigation Ratio (X:1)		
Reach 1		1181	10+00 - 22+04	1,204	1,204	R	PI	1:1	1204.000	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement. Mitigation ratio of 1:1.0668 for buffer widths in excess of 50-ft.
Reach 2		1672	22+04 - 40+46	1,842	1,782	R	PI	1:1	1782.000	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, Permanent Conservation Easement, and a 60-ft culverted farm road crossing. Mitigation ratio of 1:1.07 for buffer widths in excess of 50-ft.
Reach 3		721	40+46 - 48+75	829	829	R	PI	1:1	829.000	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, and Permanent Conservation Easement. Mitigation ratio of 1:1.1 for buffer widths in excess of 50-ft.
Reach 4		404	10+00 - 14+47	447	447	EI	PIII	1:1	447.000	Dimension and Profile modified in keeping with reference, Planted Buffer, Livestock Exclusion, Permanent Conservation Easement, and Headwater Constructed Wetland. Mitigation Ratio of 1:1 as result of water quality benefits from the implementation of headwater constructed wetland.
Reach 5		324	10+00 - 13+44	344	344	EII	PIV	2.5:1	137.600	Dimension modified and structure implementation in keeping with reference, Planted Buffer, Livestock Exclusion, and Permanent Conservation Easement.
Reach 6		1349	14+47 - 28+13	1,366	1,340	R	PI	1:1	1340.000	Full Channel Restoration, Planted Buffer, Exclusion of Livestock, Permanent Conservation Easement, and a 26-ft culverted farm road crossing.
Reach 7		386	10+00 - 13+99	399	399	R	PI	1:1	399.000	Headwater Constructed Wetland, Full Channel Restoration, Planted Buffer, Livestock Exclusion, and Permanent Conservation Easement.
Reach 1, 2, 3		-	-	-	-	-	-	-	265.000	Additional stream credits calculated and approved by DMS on 6/21/18 for buffers in excess of 50-ft along Reach 1 - 3.
Wetland Group 1 (WG1)	RNR	0		2.560	2.560	R		1:1	2.560	Minor floodplain grading, of 12-inches or less, to restore floodplain hydrology and remediate compaction, based on hydric soil investigation. Planted, Excluded Livestock and Permanent Conservation Easement.
Wetland Group 2 (WG2)	RNR	0		1.560	1.560	C		3:1	0.520	Floodplain grading, of 12-inches or greater, to restore relic floodplain hydrology and remediate compaction, based on hydric soil investigation. Planted, Excluded Livestock and Permanent Conservation Easement.

Length and Area Summations by Mitigation Category

Restoration Level	Stream	Riparian Wetland		Non-riparian Wetland	Credited Buffer
	(linear feet)	(acres)		(acres)	(square feet)
		Riverine	Non-Riverine		
Restoration	5554.000	2.560			
Enhancement					
Enhancement I	447.000				
Enhancement II	344.000				
Creation		1.560			
Preservation					
High Quality Pres					

* Creditable stream footage is based on as-built lengths as approved in the Mitigation Plan.

Overall Assets Summary

Asset Category	Overall Credits
Stream (ft)	6,403,600
RP Wetland (ac)	3,080

General Note - The above component table is intended to be a close complement to the asset map. Each entry in the above table should have clear distinction and appropriate symbology in the asset map.

1 - **Wetland Groups** represent pooled wetland polygons in the map with the same wetland type and restoration level. If some of the wetland polygons within a group are in meaningfully different landscape positions, soil types or have different community targets (as examples), then further segmentation in the table may be warranted. **Buffer groups** represent pooled buffer polygons with common restoration levels.

2 - **Wetland Position and Hydro Type** - Indicates Riparian Riverine, (RR), riparian non-riverine (RNR) or Non-Riverine (NR)

3 - **Restored Footage, Acreage or Square Feet (SF)**

4 - **Creditable Footage, Acreage or Square feet** - creditable amounts after

Table 2. Project Activity and Reporting History**UT to Town Creek Restoration Project - Option A: DMS Project No ID. 94648**

Activity or Report	Scheduled Completion	Data Collection Complete	Actual Completion or Delivery
Mitigation Plan Prepared	N/A	N/A	Apr-2014
Mitigation Plan Amended	N/A	N/A	Dec-2014
Mitigation Plan Approved	N/A	N/A	Dec-2014
Final Design – (at least 90% complete)	N/A	N/A	Jan-2015
Construction Begins	N/A	N/A	Jul-2015
Temporary S&E mix applied to entire project area	N/A	N/A	Jan-2016
Permanent seed mix applied to entire project area	N/A	N/A	Jan-2016
Planting of live stakes	Feb-2016	N/A	Mar-2016
Planting of bare root trees	Feb-2016	N/A	Mar-2016
Planting of herbaceous plugs	Jun-2016	N/A	May-2016
End of Construction	Dec-2016	N/A	Jan-2016
Survey of As-built conditions (Year 0 Monitoring-baseline)	Apr-2016	May-2016	Jun-2016
Baseline Monitoring Report	May-2016	Jun-2016	Nov-2016
Year 1 Monitoring	Dec-2016	Nov-2016	Dec-2016
Invasive Treatment	N/A	N/A	Mar-2017
Year 2 Monitoring	Dec-2017	Nov-2017	Dec-2017
Additional Riparian Planting	N/A	N/A	Mar-2018
Invasive Treatment	N/A	N/A	Apr-2018
Year 3 Monitoring	Dec-2018	Nov-2018	Dec-2018
Year 4 Monitoring	Dec-2019	Nov-2019	Jan-2020
Additional Riparian Planting	N/A	N/A	Sep-2019
Invasive Treatment	N/A	N/A	Jun-2019
Year 5 Monitoring	Dec-2020	Dec-2020	Jan-2021
Additional Riparian Planting	N/A	N/A	Jan-2020
Invasive Treatment	N/A	N/A	Apr-2020
Year 6 Wetland Monitoring	Dec-2021	Nov-2021	Dec-2021
Invasive Treatment	N/A	N/A	Apr-2021
Year 7 Wetland Monitoring	Dec-2022	Nov-2022	Dec-2022
Invasive Treatment	N/A	N/A	Oct-2022
Parrot Feather Treatment	N/A	N/A	Oct-2022

MICHAEL BAKER ENGINEERING, INC.

UT TO TOWN CREEK RESTORATION PROJECT – OPTION A (DMS PROJECT NO. 94648)

YEAR 7 MONITORING REPORT - 2022

Table 3. Project Contacts	
UT to Town Creek Restoration Project - Option A: DMS Project ID No. 94648	
Designer	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 <u>Contact:</u> Kathleen M. McKeithan, PE, Tel. 919-481-5703 Scott King, PWS, Tel. 828-412-6102
Construction Contractor	
Wright Contracting, LLC.	160 Walker Road Lawndale, NC 28090 <u>Contact:</u> Joe Wright, Tel. 919-663-0810
Planting Contractor	
H.J. Forest Service	P.O. Box 458 Holly Ridge, NC 28445 <u>Contact:</u> Matt Hitch, Tel. 910-512-1743
Seeding Contractor	
Wright Contracting, LLC.	160 Walker Road Lawndale, NC 28090 <u>Contact:</u> Joe Wright, Tel. 919-663-0810
Seed Mix Sources	Green Resources, Tel. 336-855-6363 Mellow Marsh Farm, Tel. 919-742-1200
Nursery Stock Suppliers	Mellow Marsh Farm, Tel. 919-742-1200 Foggy Mountain Nursery, Tel. 336-384-5323 ArborGen, Tel. 843-528-3203
Monitoring Performers	
Michael Baker Engineering, Inc.	8000 Regency Parkway, Suite 600 Cary, NC 27518 <u>Contact:</u>
Stream Monitoring Point of Contact	Andrew Powers, Tel. 919-481-5732
Vegetation Monitoring Point of Contact	Andrew Powers, Tel. 919-481-5732

Table 4. Project Attributes							
UT to Town Creek Restoration Project - Option A: DMS Project ID No. 94648							
Project County	Stanly						
Physiographic Region	Piedmont						
Ecoregion	Carolina Slate Belt						
Project River Basin	Yadkin - Pee Dee						
USGS HUC for Project (14 digit)	03040105060040						
NCDWQ Sub-basin for Project	03-07-13						
Within Extent of DMS Watershed Plan	Lower Yadkin RBRP, 2009						
WRC Class (Warm Cool Cold)	Warm						
% Project Easement Fenced/Demarcated	100%						
Beaver activity observed during design phase	No activity observed						
Restoration Component Attribute Table							
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7
Drainage Area (ac.)	532.1	616.6	766.7	53.7	48.9	127.8	29.2
Stream Order	2	2	3	1	1	2	1
Restored Length (LF)	1,204	1,782	829	447	344	1,340	399
Perennial (P)/Intermittent (I)	P	P	P	I	I	I	I
Watershed Type (Rural, Urban, etc.)	R	R	R	R	R	R	R
Watershed LULC Distribution							
Rural Residential	6%	1%	0%	1%	2%	0%	0%
Ag-Row Crop	8%	0%	0%	14%	4%	0%	10%
Ag-Livestock	57%	85%	70%	59%	17%	88%	64%
Forested	8%	0%	0%	17%	62%	0%	21%
Other/Open Area	8%	0%	0%	0%	9%	0%	0%
Commercial	10%	0%	0%	0%	0%	0%	0%
Roadway	3%	4%	2%	3%	<1%	0%	0%
Wooded-Livestock	0%	10%	28%	6%	4%	12%	5%
Open Water	0%	0%	0%	0%	<1%	0%	0%
Watershed Impervious Cover (%)	19%	5%	2%	4%	<4%	<1%	<1%
NCDWR AU/Index#	13-17-31-1-1						
NCDWQ Classification	C						
303(d) Listed	No						
303 (d) Listing Stressor	N/A						
Total Acreage of Easement	5.35	8.01	3.79	1.97	1.06	3.55	1.36
Total Vegetated Easement Acreage	4.81	6.97	3.48	1.63	0.94	3.22	1.26
Total Planted Acreage for Restoration	4.81	6.97	3.48	1.63	0.94	3.22	1.26
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7
Rosgen Classification (existing)	E4	E4	E4	B4	B4	B4	B4a
Rosgen Classification (as-built)	C4	C4	C4	B4	B4	C4b	B4a
Valley Type	VIII	VIII	VIII	II	II	II	II
Valley Slope	0.0092	0.0092	0.0089	0.023	0.0447	0.0243	0.0495
Trout Waters Designation	No						
Species of Concern, endangered etc. (Y/N)	No*, Yes**						
Dominant Soil Series and Characteristics							
Series	OaA	OaA	OaA	GoF	GoF	GoF	BaD
Depth	46"	46"	46"	36"	36"	36"	40"
Clay %	10-35%	10-35%	10-35%	5-27%	5-27%	5-27%	Oct-55
K	0.28	0.28	0.28	0.05	0.05	0.05	0.15-0.24
T	4	4	4	4	4	4	3
* Bald Eagle (<i>Haliaeetus leucocephalus</i>) a BGEPA species is listed as occurring in Stanly County; however, suitable habitat is not located within the Project area or within two miles of the Site.							
** Schweinitz's Sunflower (<i>Helianthus schweinitzii</i>) A federally endangered species is listed as occurring within Stanly County and though suitable habitat is present, a field study was conducted and no species were located within the Project area. NCNHP database indicated there are no known populations of these species within two miles of the study area.							
(NRCS, 2010a; NCDENR, 2007 & 2008; USFWS, 2012; NCNHP, 2012)							

MICHAEL BAKER ENGINEERING, INC.

UT TO TOWN CREEK RESTORATION PROJECT – OPTION A (DMS PROJECT NO. 94648)

YEAR 7 MONITORING REPORT - 2022

APPENDIX B

Visual Assessment Data

Fig 2A

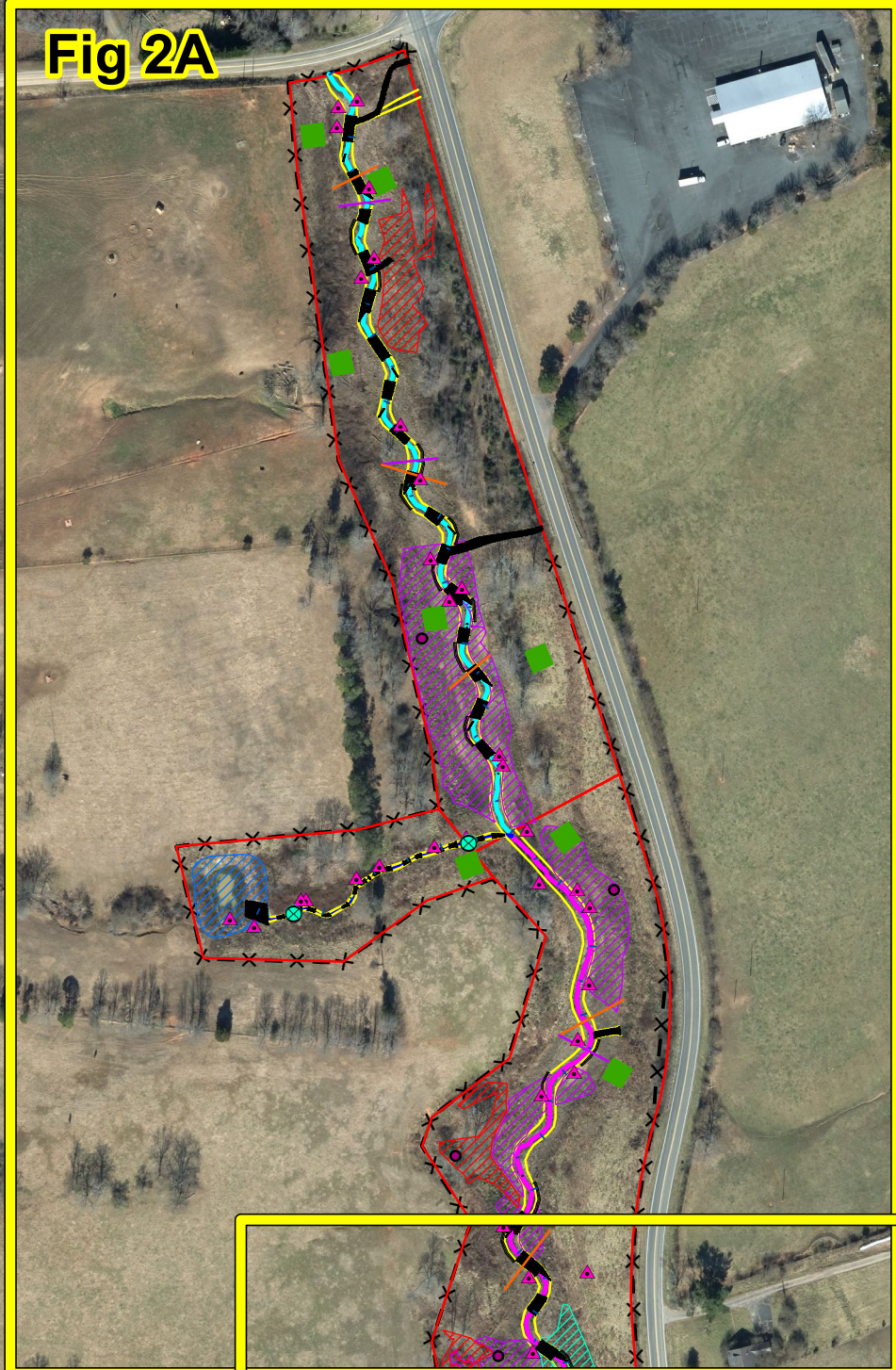
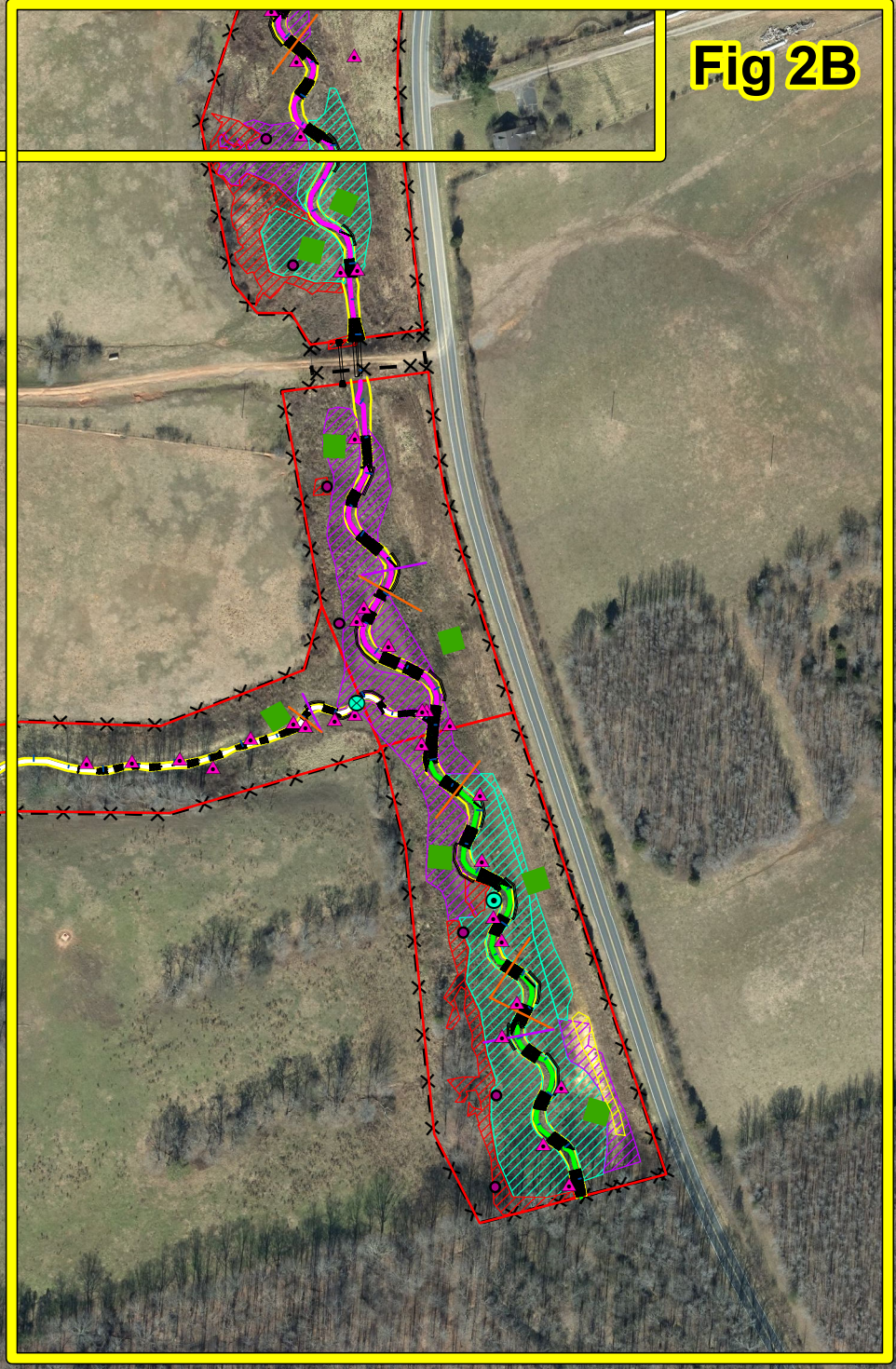


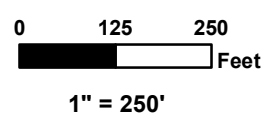
Fig 2B



- Stream Flow Cameras
- Crest Gauge
- Flow Pressure Transducers
- Groundwater Monitoring Wells
- ▲ Photo ID Points
- Cross Section - Pool
- Cross Section - Riffle
- ▨ BMPs
- Successful Vegetation Plots
- ▨ Vegetation Problem Area
- Wetland Type**
- ▨ Wetland Restoration
- ▨ Wetland Creation
- ▨ Jurisdictional Wetlands
- Stream Top of Bank
- Reach 1 (Restoration)
- Reach 2 (Restoration)
- Reach 3 (Restoration)
- Reach 4 (Enhancement I)
- Reach 5 (Enhancement II)
- Reach 6 (Restoration)
- Reach 7 (Restoration)
- ▭ Conservation Easement
- × — × Fenceline

NC Center for Geographic Information & Analysis, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

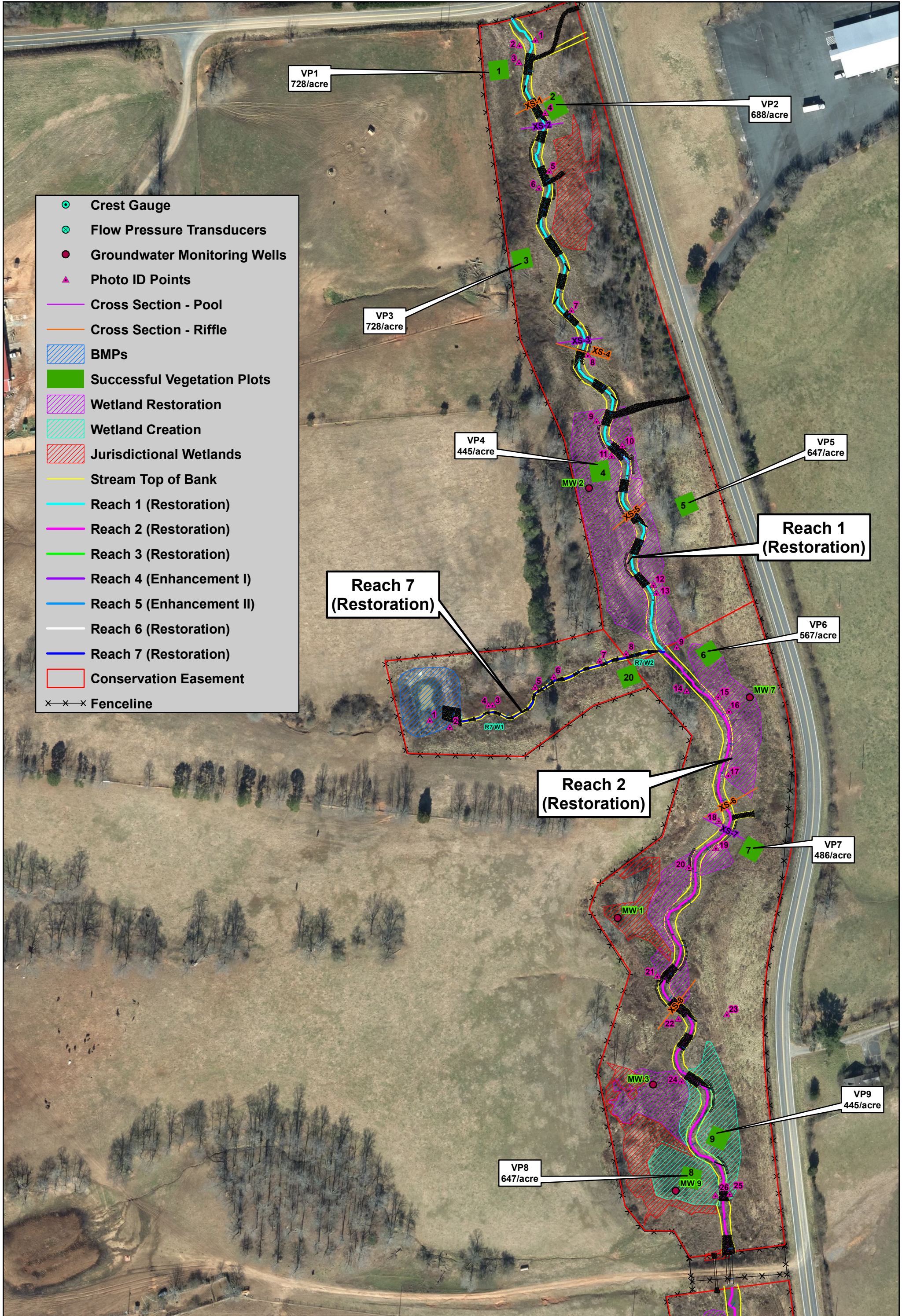
North Carolina
Division of
Mitigation
Services



**Figure 2 Overview
Current Condition Plan View**

UT to Town Creek Restoration Project - Option A
Stanly County, NC

DMS Project No. 94648
Monitoring Year: 7
Drawn By: ADP
Date: 2022
Sheet: 1 of 3



- Crest Gauge
- ⊗ Flow Pressure Transducers
- Groundwater Monitoring Wells
- ▲ Photo ID Points
- Cross Section - Pool
- Cross Section - Riffle
- BMPs
- Successful Vegetation Plots
- Wetland Restoration
- Wetland Creation
- Jurisdictional Wetlands
- Stream Top of Bank
- Reach 1 (Restoration)
- Reach 2 (Restoration)
- Reach 3 (Restoration)
- Reach 4 (Enhancement I)
- Reach 5 (Enhancement II)
- Reach 6 (Restoration)
- Reach 7 (Restoration)
- Conservation Easement
- ××× Fenceline

**Reach 7
(Restoration)**

**Reach 1
(Restoration)**

**Reach 2
(Restoration)**

VP1
728/acre

VP2
688/acre

VP3
728/acre

VP4
445/acre

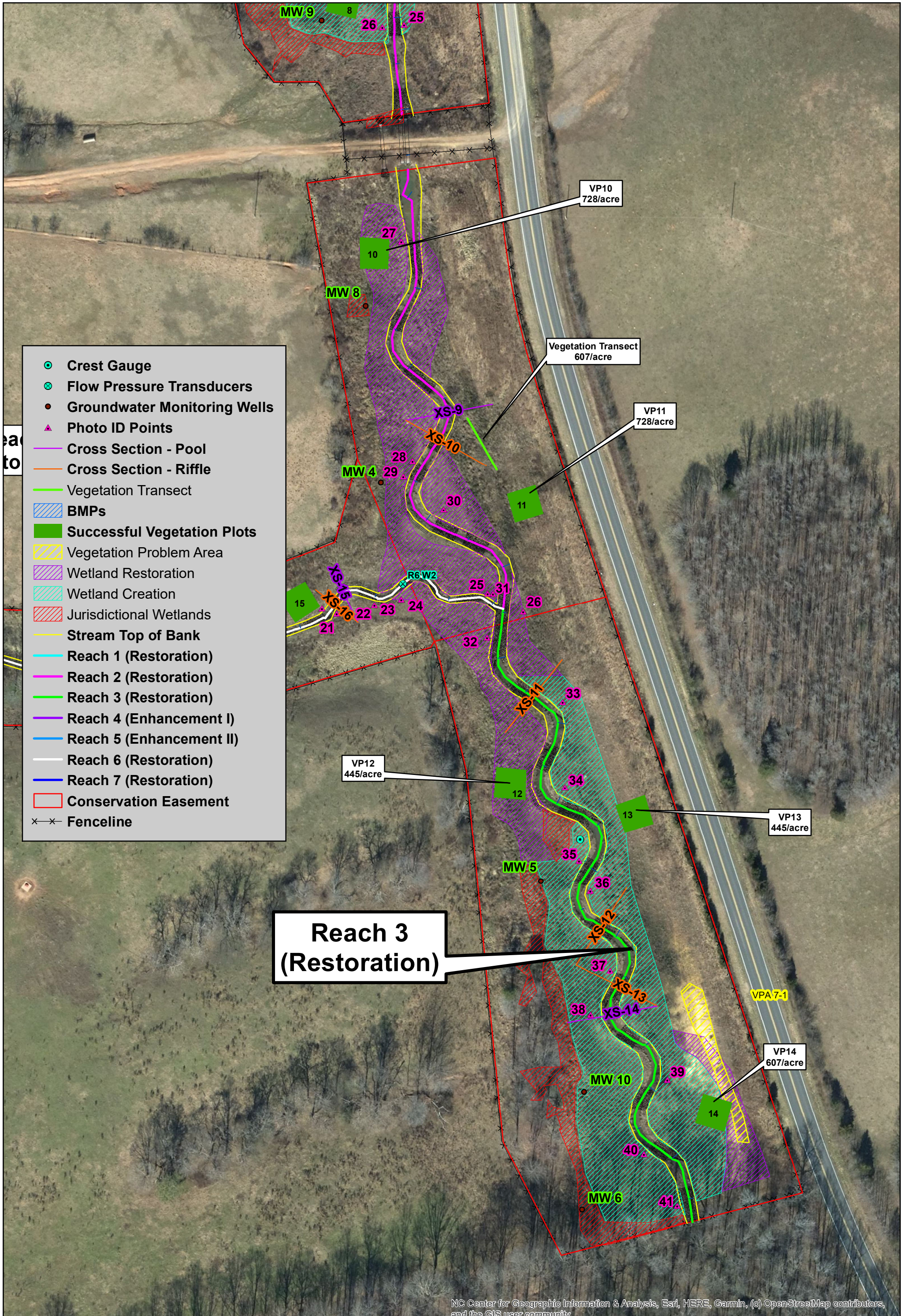
VP5
647/acre

VP6
567/acre

VP7
486/acre

VP9
445/acre

VP8
647/acre



- Crest Gauge
- ⊗ Flow Pressure Transducers
- Groundwater Monitoring Wells
- ▲ Photo ID Points
- Cross Section - Pool
- Cross Section - Riffle
- Vegetation Transect
- BMPs
- Successful Vegetation Plots
- Vegetation Problem Area
- Wetland Restoration
- Wetland Creation
- Jurisdictional Wetlands
- Stream Top of Bank
- Reach 1 (Restoration)
- Reach 2 (Restoration)
- Reach 3 (Restoration)
- Reach 4 (Enhancement I)
- Reach 5 (Enhancement II)
- Reach 6 (Restoration)
- Reach 7 (Restoration)
- Conservation Easement
- x-x Fenceline

**Reach 3
(Restoration)**

NC Center for Geographic Information & Analysis, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Table 6a. Vegetation Condition Assessment						
UT to Town Creek Restoration Project: Project No. 94648						
Reach ID	Reaches 1 - 7					
Planted Acreage	22.31					
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	VPA7-1	1	0.06	0.3%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY5 stem count criteria.	0.1 acres	N/A	0	0.00	0.0%
Total				1	0.06	0.4%
3. Areas of Poor Growth Rates or Vigor*	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	VPA7-1	1	0.06	0.3%
Cumulative Total				2	0.12	0.7%
Easement Acreage 25.09						
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000 SF	N/A	0	0.00	0.0%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	N/A	N/A	0	0.00	0.0%

Table 6b. Vegetation Problem Areas			
UT to Town Creek Restoration Project: Project No. 94648			
Reach 1			
Feature Issue	Station No.	Suspected Cause	Problem Area / Photo Number
Invasive/Exotic Populations	Reachwide in various locations	Myriophyllum aquaticum (parrot feather) growing in various locations along the channel reach due low flow conditions present during the monitoring assessment.	No VPA was associated with this problem area because it is a reachwide issue that's been treated since MY3.
Reach 2			
Feature Issue	Station No.	Suspected Cause	Problem Area / Photo Number
Invasive/Exotic Populations	Reachwide in various locations	Myriophyllum aquaticum (parrot feather) growing in various locations along the channel reach due low flow conditions present during the monitoring assessment.	No VPA was associated with this problem area because it is a reachwide issue that's been treated since MY3.
Reach 3			
Feature Issue	Station No.	Suspected Cause	Problem Area / Photo Number
Invasive/Exotic Populations	Reachwide in various locations	Myriophyllum aquaticum (parrot feather) growing in various locations along the channel reach due low flow conditions present during the monitoring assessment.	No VPA was associated with this problem area because it is a reachwide issue that's been treated since MY3.
Bare Areas	46+50 - 48+60	Poor soils noted in an area where supplemental seeding were installed during MY7.	VPA 7-1
Poor growth rates	46+50 - 48+60	Poor growth rates were noted in this area with very dense compacted clay soils.	VPA 7-1
Reach 4			
Feature Issue	Station No.	Suspected Cause	Problem Area / Photo Number
Invasive/Exotic Populations	N/A	<i>Ligustrum sinense</i> (Chinese privet)	No VPA was associated with this problem area because very minimal amounts are scattered throughout the reach with continual treatments.
Reach 5			
Feature Issue	Station No.	Suspected Cause	Problem Area / Photo Number
Invasive/Exotic Populations	N/A	<i>Ligustrum sinense</i> (Chinese privet)	No VPA was associated with this problem area because very minimal amounts are scattered throughout the reach with continual treatments.
Reach 6			
Feature Issue	Station No.	Suspected Cause	Problem Area / Photo Number
Invasive/Exotic Populations	N/A	<i>Ligustrum sinense</i> (Chinese privet)	No VPA was associated with this problem area because very minimal amounts are scattered throughout the reach with continual treatments.
Reach 7			
Feature Issue	Station No.	Suspected Cause	Problem Area / Photo Number
Invasive/Exotic Populations	N/A	<i>Ligustrum sinense</i> (Chinese privet)	No VPA was associated with this problem area because very minimal amounts are scattered throughout the reach with continual treatments.
Note: The first digit in the Photo Number column references the monitoring year and the second digit references the problem area or photo (which would be identical to a prior years problem area/photo number when persisting from a previous monitoring year).			

Vegetation Problem Area Photos



**VPA 7-1– Photo of poor growth rates.
(3/10/22)**



**VPA 7-1 – Photo of poor growth rates.
(5/17/22)**



**VPA 7-1 – Photo of bare areas and areas of
poor growth rates.
(7/21/22)**



**VPA 7-1 Photo of poor growth rates.
(10/27/22)**

APPENDIX C

Vegetation Plot Data

Table 7. Vegetation Plot Mitigation Success Summary
UT to Town Creek Restoration Project: Project No. 94648

Wetland/Stream Vegetation Totals (per acre)				
Plot #	Stream/Wetland Stems²	Volunteers³	Total⁴	Success Criteria Met?
VP1	728	607	1335	Yes
VP2	688	162	850	Yes
VP3	728	162	890	Yes
VP4	445	486	890	Yes
VP5	647	0	647	Yes
VP6	567	283	850	Yes
VP7	486	121	607	Yes
VP8	647	324	971	Yes
VP9	445	243	688	Yes
VP10	728	40	769	Yes
VP11	728	81	769	Yes
VP12	445	283	728	Yes
VP13	445	486	931	Yes
VP14	607	162	769	Yes
Project Avg	595	246	841	Yes

¹Buffer Stems: Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.

²Stream/ Wetland Stems: Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines.

³Volunteers: Native woody stems. Not planted. No vines.

⁴Total: Planted + volunteer native woody stems. Includes live stakes.

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

Table 8. CVS Vegetation Plot Metadata	
Report Prepared By	Drew Powers
Date Prepared	11/7/2022 14:37
database name	UTtoTown_84648_MY7_cvs-eep-entrytool-v2.3.1_2022.mdb
database location	C:\Users\Andrew.Powers\Desktop
computer name	CARYLAPOWERS1
file size	51433472
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes. Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Proj, total stems	
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY-----	
Project Code	94648
project Name	UT to Town Creek Restoration Project - Option A
Description	This project proposes to restore 5,597 linear feet (LF) and enhance 791 LF (444 LF of Enhancement I and 347 LF of Enhancement II) of stream along an Unnamed Tributary (UT) to Town Creek and three additional unnamed tributaries and to restore, enhance, and
River Basin	Yadkin-Pee Dee
length(ft)	
stream-to-edge width (ft)	
area (sq m)	101576
Required Plots (calculated)	20
Sampled Plots	20

**Table 9. CVS Stem Count of Planted Stems by Plot and Species
UT to Town Creek Restoration Project: Project No. 94648**

			Current Plot Data (MY7 2022)																											
Scientific Name	Common Name	Species Type	94648-KS&DH-0001			94648-KS&DH-0002			94648-KS&DH-0003			94648-KS&DH-0004			94648-KS&DH-0005			94648-KS&DH-0006			94648-KS&DH-0007			94648-KS&DH-0008						
			P	V	T	P	V	T	P	V	T	P	V	T	P	V	T	P	V	T	P	V	T	P	V	T				
Acer negundo	boxelder	Tree							1		1																			
Acer rubrum	red maple	Tree										5	5							1	1									
Alnus serrulata	hazel alder	Shrub																												
Asimina triloba	pawpaw	Tree																												
Baccharis	baccharis	Shrub																			4	4						1	1	
Betula nigra	river birch	Tree	1		1	1		1	4		4	2		2	2		2		4		4									
Callicarpa americana	American beautyberry	Shrub	1		1														2		2	5		5						
Carpinus caroliniana	American hornbeam	Tree	1		1	2		2	1		1	2		2																
Carya glabra	pignut hickory	Tree																												
Cephalanthus occidentalis	common buttonbush	Shrub																												
Cercis canadensis	eastern redbud	Tree																			1		1							
Cornus amomum	silky dogwood	Shrub										3		3							4		4							
Cornus florida	flowering dogwood	Tree																												
Diospyros virginiana	common persimmon	Tree	4	3	7	3		3							4		4									1		1		
Fraxinus pennsylvanica	green ash	Tree										1		1																
Juniperus virginiana	eastern redcedar	Tree		4	4		1	1												1	1		1	1						
Liquidambar	sweetgum	Tree																												
Liquidambar styraciflua	sweetgum	Tree		7	7							1	1							1	1		1	1			3	3		
Liriodendron tulipifera	tuliptree	Tree		1	1		2	2				1	2	2																
Nyssa sylvatica	blackgum	Tree											1	1																
Pinus taeda	loblolly pine	Tree																												
Platanus occidentalis	American sycamore	Tree	1		1	1		1	4		4	1		1	2		2	4		4						12		12		
Populus deltoides	eastern cottonwood	Tree					1	1				2	2																	
Quercus alba	white oak	Tree																				2		2						
Quercus falcata	southern red oak	Tree	2		2	1		1																						
Quercus lyrata	overcup oak	Tree	1		1													1		1										
Quercus michauxii	swamp chestnut oak	Tree	5		5				2		2						1		1											
Quercus pagoda	cherrybark oak	Tree				3		3	1		1			1	1															
Quercus phellos	willow oak	Tree	2		2	6		6	5		5						6		6	3		3				2		2		
Quercus rubra	northern red oak	Tree																												
Rhus copallinum	flameleaf sumac	shrub																												
Rhus glabra	smooth sumac	shrub																												
Salix nigra	black willow	Tree											2	2												1		1		
Sambucus canadensis	Common Elderberry	Shrub																												
Sambucus nigra	European black elderberry	Shrub									2	2																		
Ulmus alata	winged elm	Tree																												
Ulmus americana	American elm	Tree																								1	1		4	4
Unknown		Shrub or Tree																												
	Stem count		18	15	33	17	4	21	18	4	22	11	12	22	16	0	16	14	7	21	12	3	15	16	8	24				
	size (ares)		1			1			1			1			1			1			1			1						
	size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02						
	Species count		9	4	12	7	3	10	7	2	9	7	6	12	6	0	6	5	4	9	4	3	7	4	3	7				
	Stems per ACRE		728	607	1335	688	162	850	728	162	890	445	486	890	647	0	647	567	283	850	486	121	607	647	324	971				

Exceeds requirements by 10%
 Exceeds requirements, but by less than 10%
 Fails to meet requirements, by less than 10%
 Fails to meet requirements by more than 10%

P = Planted
 V = Volunteers
 T = Total

Table 9. CVS Stem Count of Planted Stems by Plot and Species - Continued
 UT to Town Creek Restoration Project: Project No. 94648

		Current Plot Data (MY 7 2022)																						
Scientific Name	Common Name	Species Type	94648-KS&DH-0009			94648-KS&DH-0010			94648-KS&DH-0011			94648-KS&DH-0012			94648-KS&DH-0013			94648-KS&DH-0014			Veg Transect			
			P	V	T	P	V	T	P	V	T	P	V	T	P	V	T	P	V	T	P	V	T	
Acer negundo	boxelder	Tree																						
Acer rubrum	red maple	Tree		4	4																			
Alnus serrulata	hazel alder	Shrub																						
Asimina triloba	pawpaw	Tree																						
Baccharis	baccharis	Shrub												4	4				1	1				
Betula nigra	river birch	Tree									3		3											
Callicarpa americana	American beautyberry	Shrub				2		2																
Carpinus caroliniana	American hornbeam	Tree	2		2																			
Carya glabra	pignut hickory	Tree																						
Cephalanthus occidentalis	common buttonbush	Shrub							5		5	2		2									6	
Cercis canadensis	eastern redbud	Tree				1		1																
Cornus amomum	silky dogwood	Shrub	1		1	2		2	1		1			1		1	3		3				2	
Cornus florida	flowering dogwood	Tree	3		3																			
Diospyros virginiana	common persimmon	Tree							3		3					6		6					3	
Fraxinus pennsylvanica	green ash	Tree	1		1	8		8			2		2	2		2	2		2					
Juniperus virginiana	eastern redcedar	Tree												2		2								
Liquidambar	sweetgum	Tree														2		2						
Liquidambar styraciflua	sweetgum	Tree		2	2								1	1		2		2		1	1		2	
Liriodendron tulipifera	tuliptree	Tree	1		1				1	2	2	2	1	3				3		3			1	
Nyssa sylvatica	blackgum	Tree				1		1	3		3	2		2	1		1		1		1			
Pinus taeda	loblolly pine	Tree												1		1								
Platanus occidentalis	American sycamore	Tree							1		1							3		3				
Populus deltoides	eastern cottonwood	Tree																						
Quercus alba	white oak	Tree	1		1	2		2																
Quercus falcata	southern red oak	Tree	1		1																			
Quercus lyrata	overcup oak	Tree	1		1											1		1		1				
Quercus michauxii	swamp chestnut oak	Tree																						
Quercus pagoda	cherrybark oak	Tree							4		4							2		2			1	
Quercus phellos	willow oak	Tree														1		1		1				
Quercus rubra	northern red oak	Tree																						
Rhus copallinum	flameleaf sumac	shrub														2		2						
Rhus glabra	smooth sumac	shrub																						
Salix nigra	black willow	Tree										5		5										
Sambucus canadensis	Common Elderberry	Shrub																						
Sambucus nigra	European black elderberry	Shrub				2		2																
Ulmus alata	winged elm	Tree																						
Ulmus americana	American elm	Tree					1	1											1	1				
Unknown	Shrub or Tree																							
	Stem count		11	6	17	18	1	19	18	2	19	11	7	18	11	12	23	15	4	19	0	0	15	
	size (ares)		1			1			1			1			1			1			1			
	size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02			0.02			
	Species count		8	2	10	7	1	8	7	1	7	5	3	7	5	6	11	7	4	11	0	0	6	
	Stems per ACRE		445	243	688	728	40	769	728	81	769	445	283	728	445	486	931	607	162	769	0	0	607	

Exceeds requirements by 10%
 Exceeds requirements, but by less than 10%
 Fails to meet requirements, by less than 10%
 Fails to meet requirements by more than 10%

P = Planted
 V = Volunteers
 T = Total

**Table 9. CVS Stem Count of Planted Stems by Plot and Species - Continued
UT to Town Creek Restoration Project: Project No. 94648**

			Annual Totals																										
Scientific Name	Common Name	Species Type	MY7 (2022)			MY6 (2021)			MY5 (2020)			MY4 (2019)			MY3 (2018)			MY2 (2017)			MY1 (2016)			MY0 (2016)					
			P	V	T	P	V	T	P	V	T	P	V	T	P	V	T	P	V	T	P	V	T	P	V	T			
Acer rubra	Red Maple	Tree		10	10			1	1			5	5																
Acer negundo	boxelder	Tree	1		1	1		1		1	2	3	1	1	2	1	1	2	1		1								
Alnus serrulata	hazel alder	Shrub											1	1	1														
Asimina triloba	pawpaw	Tree								3		3	3		3	3		3	2		2	6		6	5	5			
Baccharis	baccharis	Shrub		10	10			8	8																				
Betula nigra	river birch	Tree	17		17	15	1	16	18		18	18		18	17		17	17		17	18		18	21	21				
Calliandra americana	American beautyberry	Shrub	10		10	10	1	11	10		10	10		10	10		13	13		13	16		16	7	7				
Carpinus caroliniana	American hornbeam	Tree	8		8	6		6	9		9	10		10	10	2	12	10		10	10		10	16	16				
Carya glabra	pignut hickory	Tree											1	1															
Cephalanthus occidentalis	common buttonbush	Shrub	7		7	7		7	11		11	11		11	11		11	10		10	8		8	5	5				
Cercis canadensis	eastern redbud	Tree	2		2	2		2	15	2	17	18		18	18		18	20		20	24		24	29	29				
Cornus amomum	silky dogwood	Shrub	15		15	12		12	29		29	29	1	30	30	1	31	30		30	29		29	31	31				
Cornus florida	flowering dogwood	Tree	3		3	3		3	5		5	7		7	7		7	9		9	13		13	21	21				
Diospyros virginiana	common persimmon	Tree	21	2	24	22	6	28	34	1	35	35	4	39	34		39	32		32	29		29	7	7				
Fraxinus pennsylvanica	green ash	Tree	16		16	15		15	37	2	39	39	5	44	39	2	41	39		39	40		40	43	43				
Juniperus virginiana	cedar	Tree		9	9																								
Liquidambar styraciflua	Sweetgum	Tree		19	19			18	18		1	1																	
Liriodendron tulipifera	tuliptree	Tree	8	6	14	8	12	20	11	4	15	13	16	29	14	21	35	12		12	11		11	12	12				
Nyssa sylvatica	blackgum	Tree	7	2	9	7	3	10	12	5	17	12	2	14	11		11	13		13	12		12	9	9				
Pinus taeda	loblolly pine	Tree		1	1																								
Platanus occidentalis	American sycamore	Tree	29		29	28		28	31	6	37	31	1	32	31	1	32	30		30	29		29	31	31				
Populus deltoides	eastern cottonwood	Tree		3	3		4	4																					
Quercus alba	white oak	Tree	5		5	5		5	8		8	9		9	9		9	10		10	10		10	12	12				
Quercus falcata	southern red oak	Tree	6		6	5	1	6	7	2	9	7		7	7		7	7		7	19		19	15	15				
Quercus lyrata	overcup oak	Tree	5		5	5		5	6		6	7		7	7	1	8	15		15	10		10	16	16				
Quercus michauxii	swamp chestnut oak	Tree	8		8	8		8	9		9	9		9	9		9	9		9	14		14	29	29				
Quercus pagoda	cherrybark oak	Tree	10	1	11	11		11	11	1	12	11	1	12	11		11	8		8	4		4						
Quercus phellos	willow oak	Tree	25	1	26	25	1	26	32		32	33		33	33		33	32		32	29		29	27	27				
Quercus rubra	northern red oak	Tree																			2		2						
Rhus copallinum	sumac	Shrub		7	7																								
Rhus glabra	smooth sumac	Shrub								1	1																		
Salix nigra	black willow	Tree	1	7	8	1	6	7	1		1	1		1	1	8	9	1		1									
Sambucus canadensis	Common Elderberry	Shrub																			6		6	19	19				
Sambucus nigra	European black elderberry	Shrub	2	2	4	2	3	5	4		4	5		5	5		5	11		11	7		7						
Ulmus alata	Winged elm	Tree							8	8																			
Ulmus americana	American elm	Tree		7	7		7	7				3	3																
Unknown	Shrub or Tree																							7	7				
Stem count			206	87	289	198	72	270	304	40	344	319	36	355	318	42	360	331	0	331	346	0	346	365	0	365			
size (ares)			14			14			20			20			20			20			20			20			20		
size (ACRES)			0.35			0.35			0.49			0.49			0.49			0.49			0.49			0.49			0.49		
Species count			21	15	29	21	14	26	7	1	7	22	11	25	22	9	22	22	0	22	22	0	22	21	0	21			
Stems per ACRE			595	251	835	572	208	780	615	81	696	645	73	718	643	85	728	670	0	670	700	0	700	739	0	739			

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

P = Planted
V = Volunteers
T = Total

Vegetation Plot Photos

UT to Town Creek – Reach 1



Vegetation Plot 1 (10/28/2022)



Vegetation Plot 2 (10/28/2022)



Vegetation Plot 3 (10/28/2022)



Vegetation Plot 4 (10/28/2022)



Vegetation Plot 5 (10/28/2022)

UT to Town Creek – Reach 2



Vegetation Plot 6 (10/28/2022)



Vegetation Plot 7 (10/28/2022)



Vegetation Plot 8 (10/28/2022)



Vegetation Plot 9 (10/28/2022)



Vegetation Plot 10 (10/28/2022)



Vegetation Plot 11 (10/28/2022)

UT to Town Creek – Reach 3



Vegetation Plot 12 (10/28/2022)



Vegetation Plot 13 (10/28/2022)



Vegetation Plot 14 (10/28/2022)

Appendix D

Stream Survey Data

***No Stream Survey monitoring was required for Year 7.**

Appendix E

Hydrologic Data

Figure 6. Wetland Gauge Graphs

UT to Town Creek Restoration Project - Option A: Project No. 94648

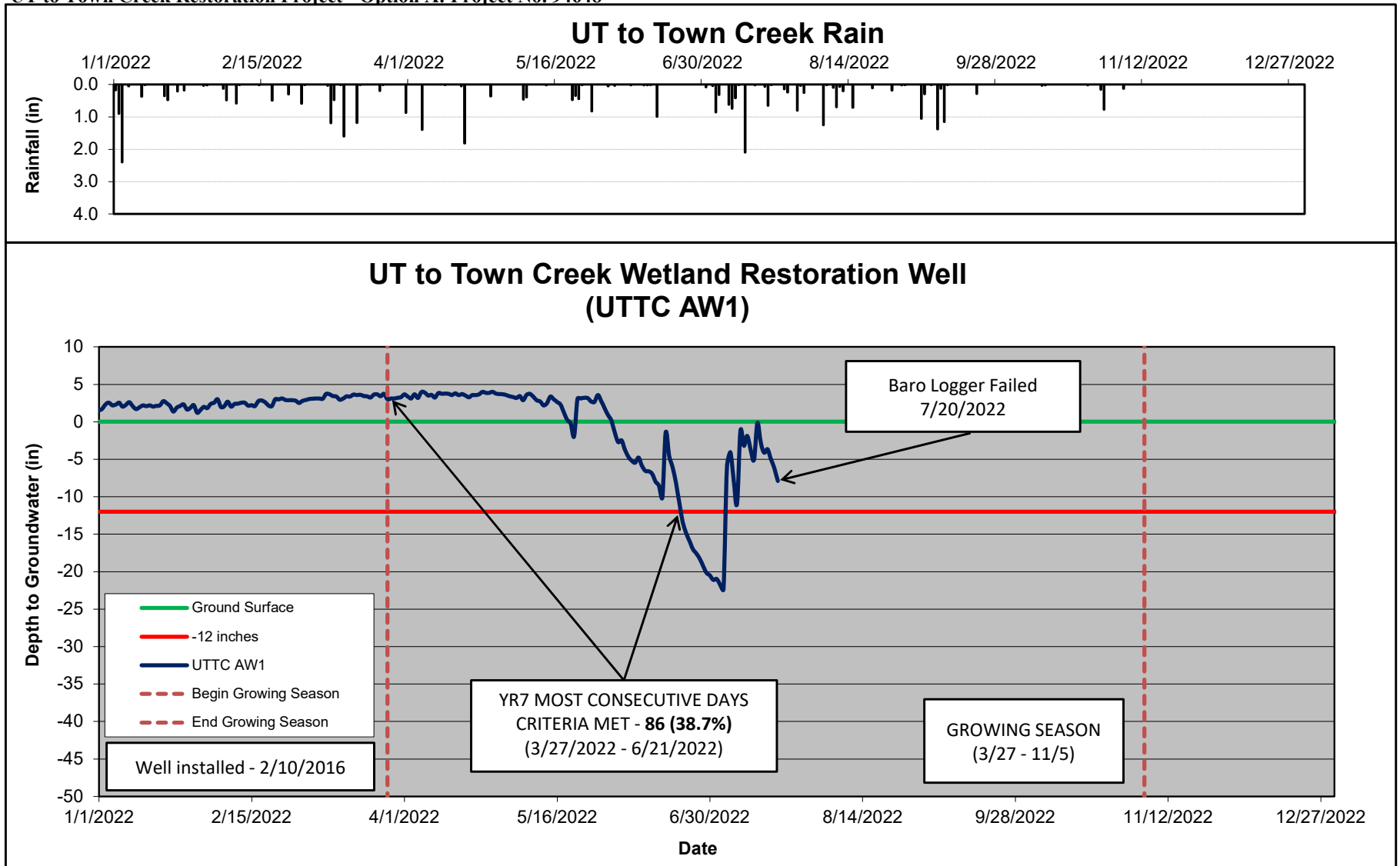


Figure 6 Cont. Wetland Gauge Graphs
UT to Town Creek Restoration Project - Option A: Project No. 94648

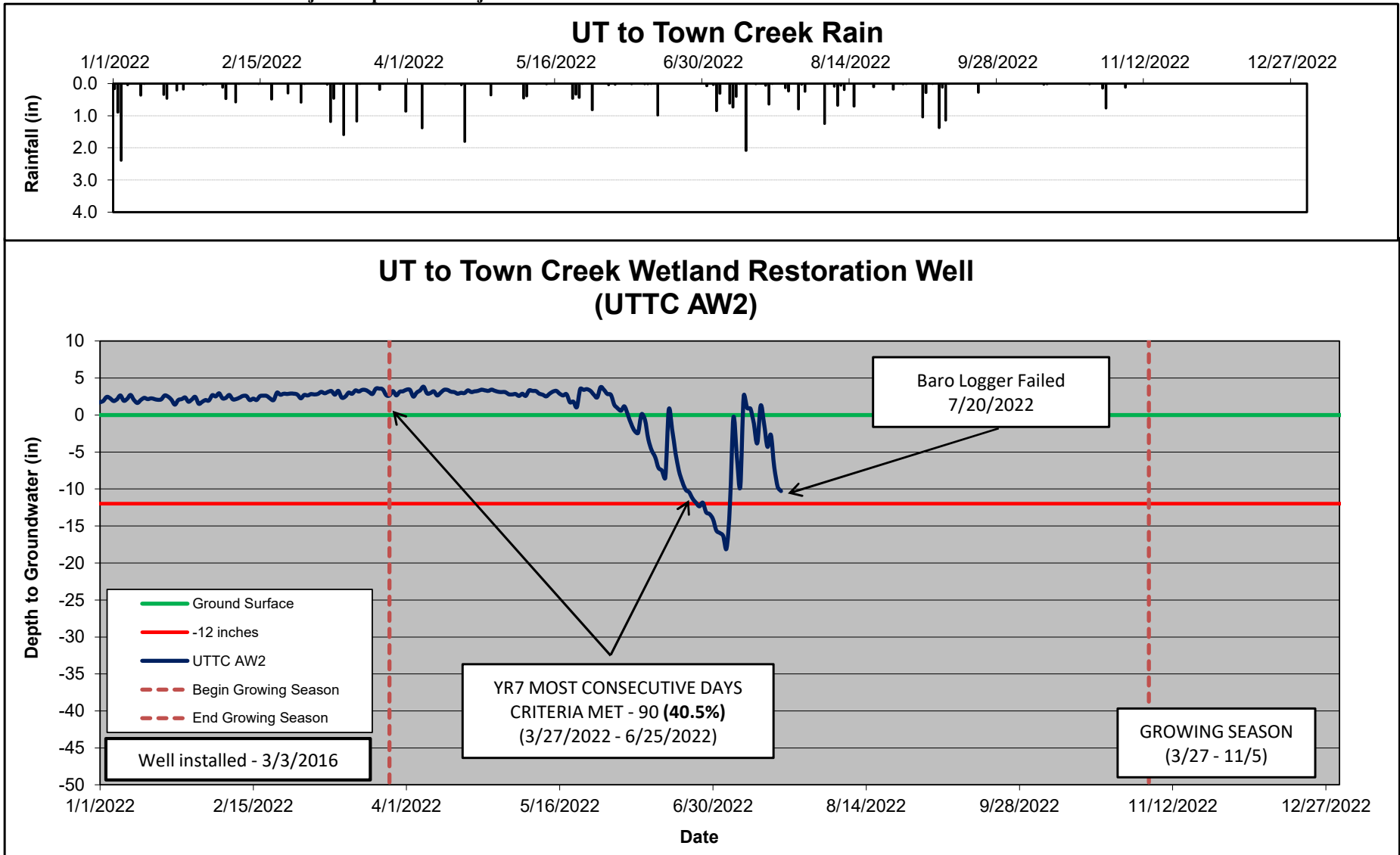


Figure 6 Cont. Wetland Gauge Graphs
UT to Town Creek Restoration Project - Option A: Project No. 94648

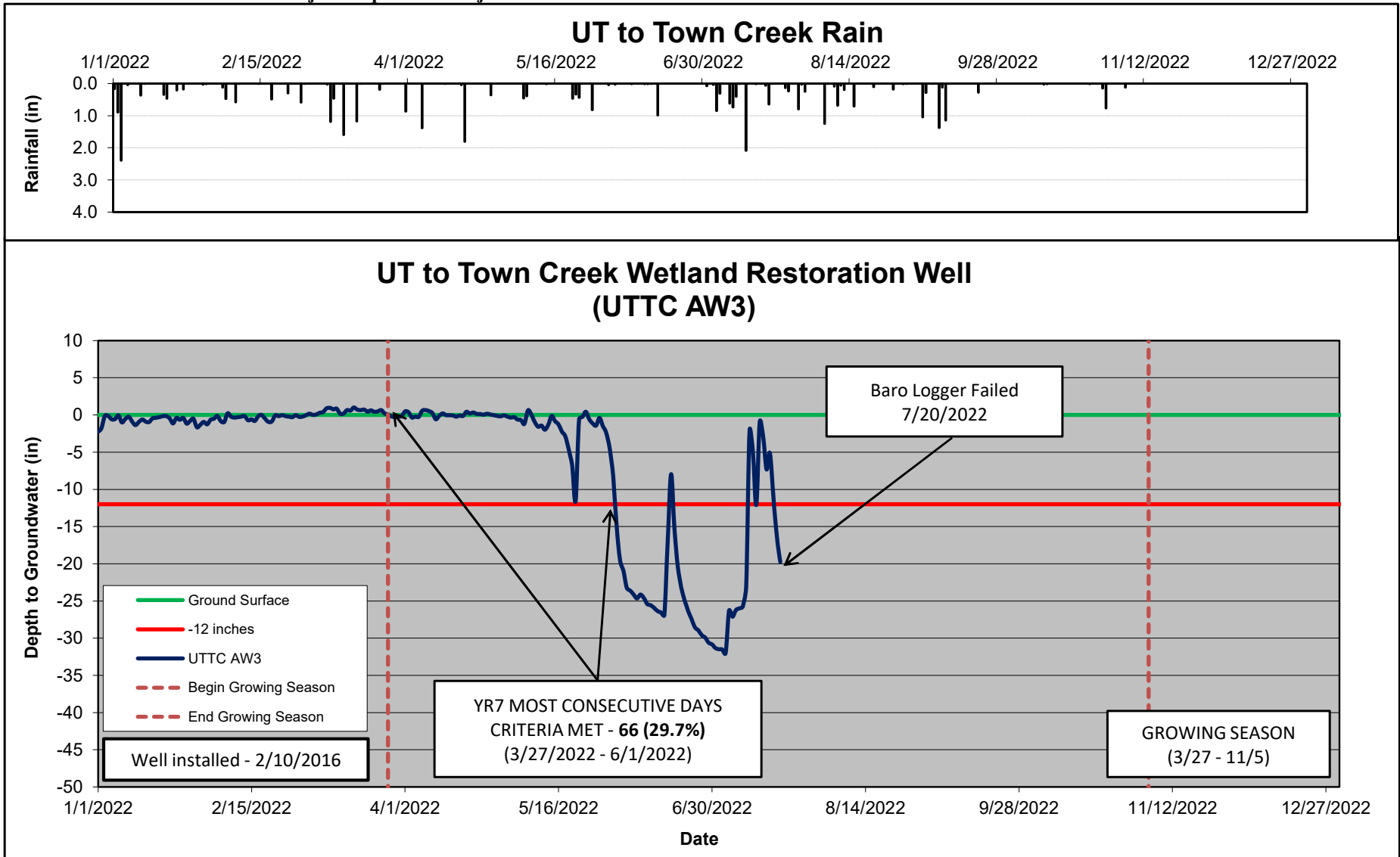


Figure 6 Cont. Wetland Gauge Graphs
UT to Town Creek Restoration Project - Option A: Project No. 94648

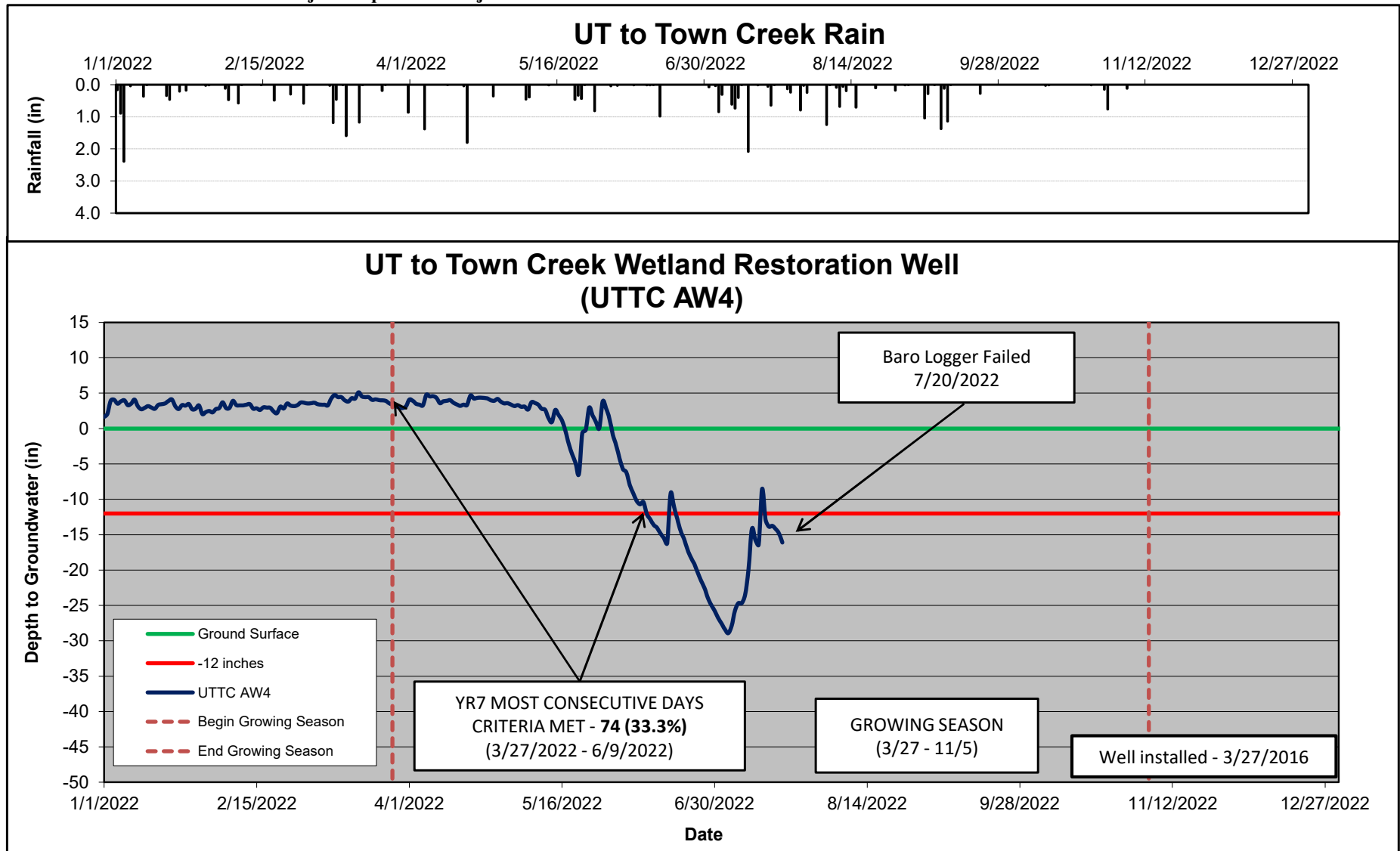


Figure 6 Cont. Wetland Gauge Graphs
UT to Town Creek Restoration Project - Option A: Project No. 94648

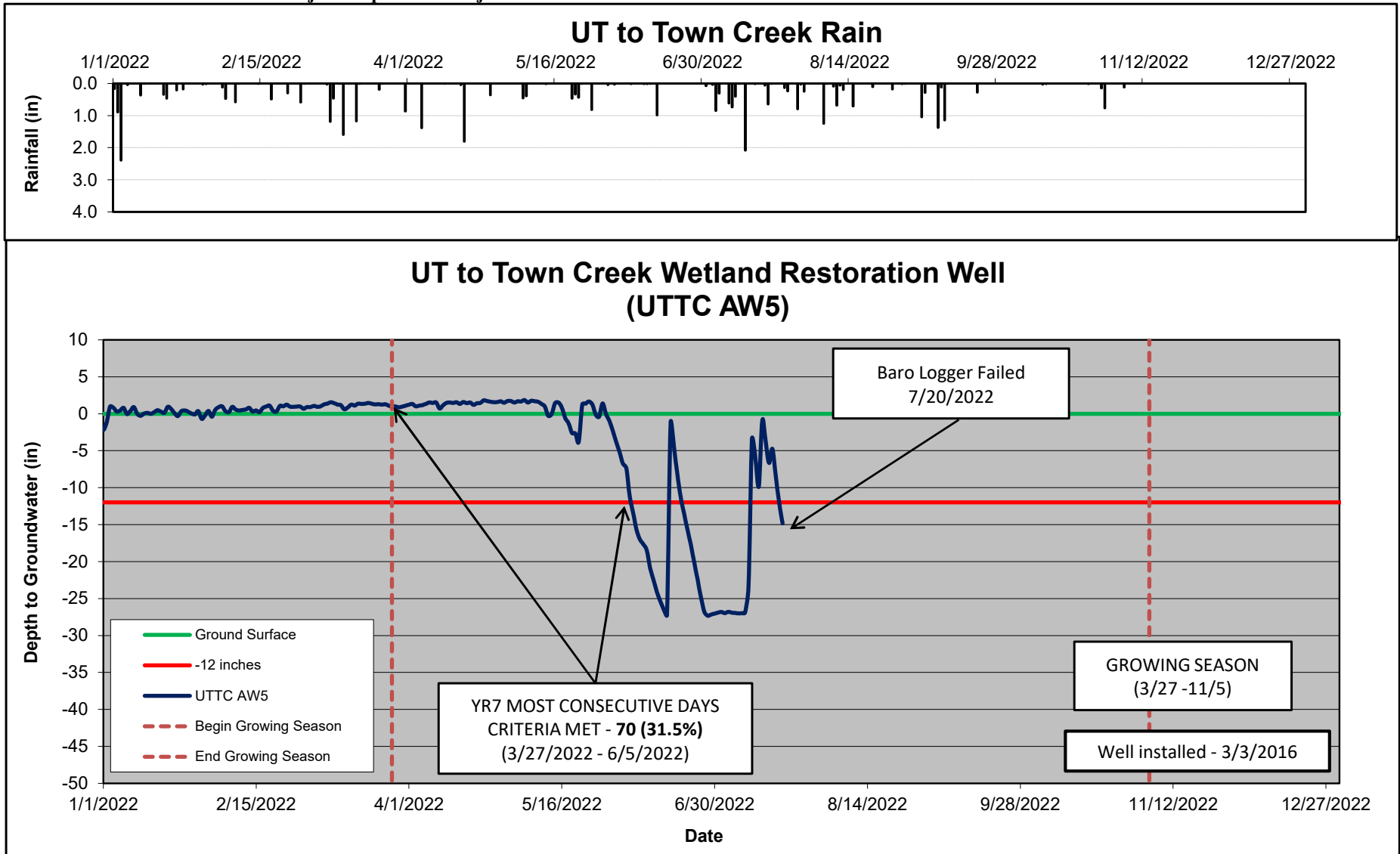


Figure 6 Cont. Wetland Gauge Graphs
UT to Town Creek Restoration Project - Option A: Project No. 94648

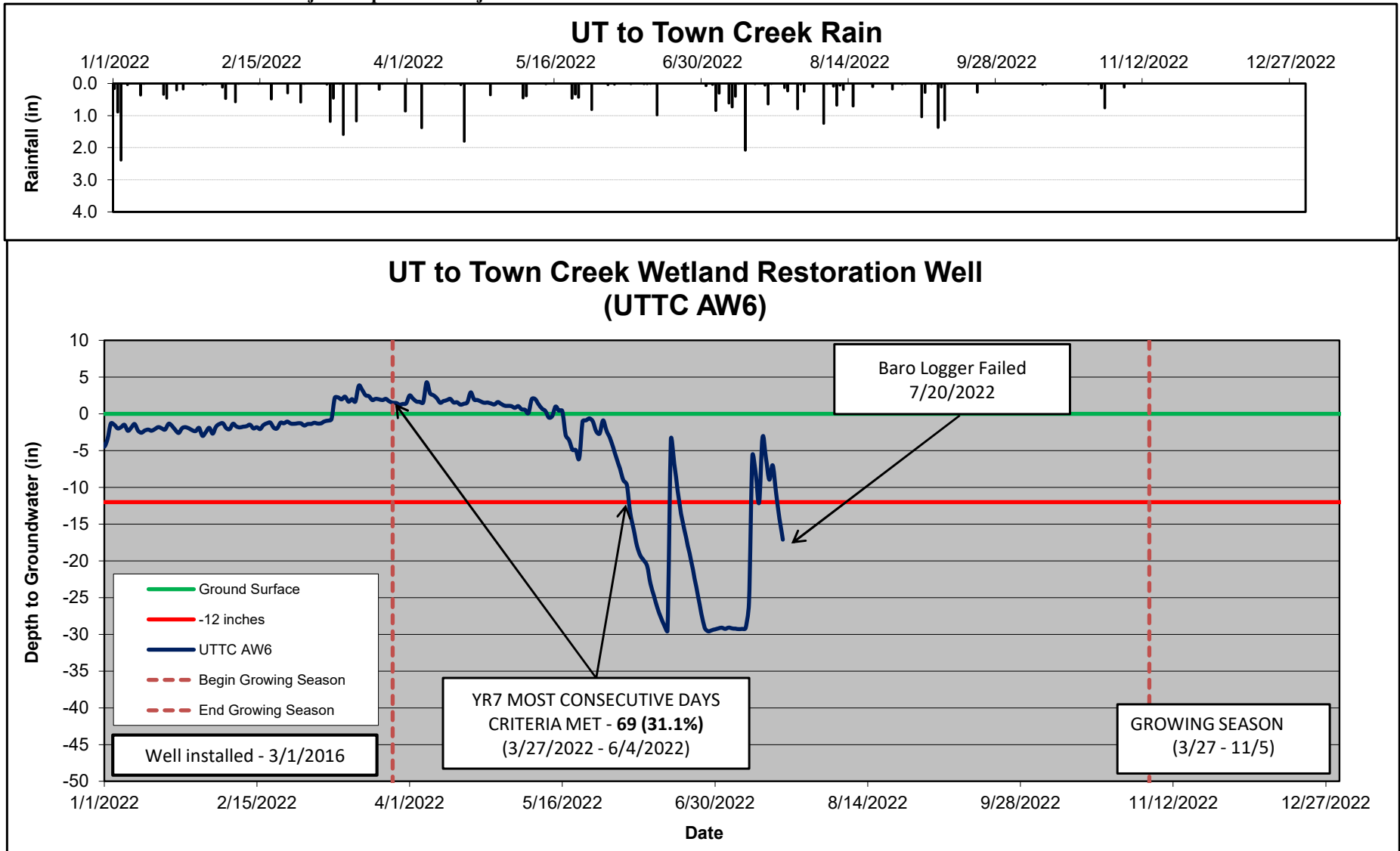


Figure 6 Cont. Wetland Gauge Graphs
UT to Town Creek Restoration Project - Option A: Project No. 94648

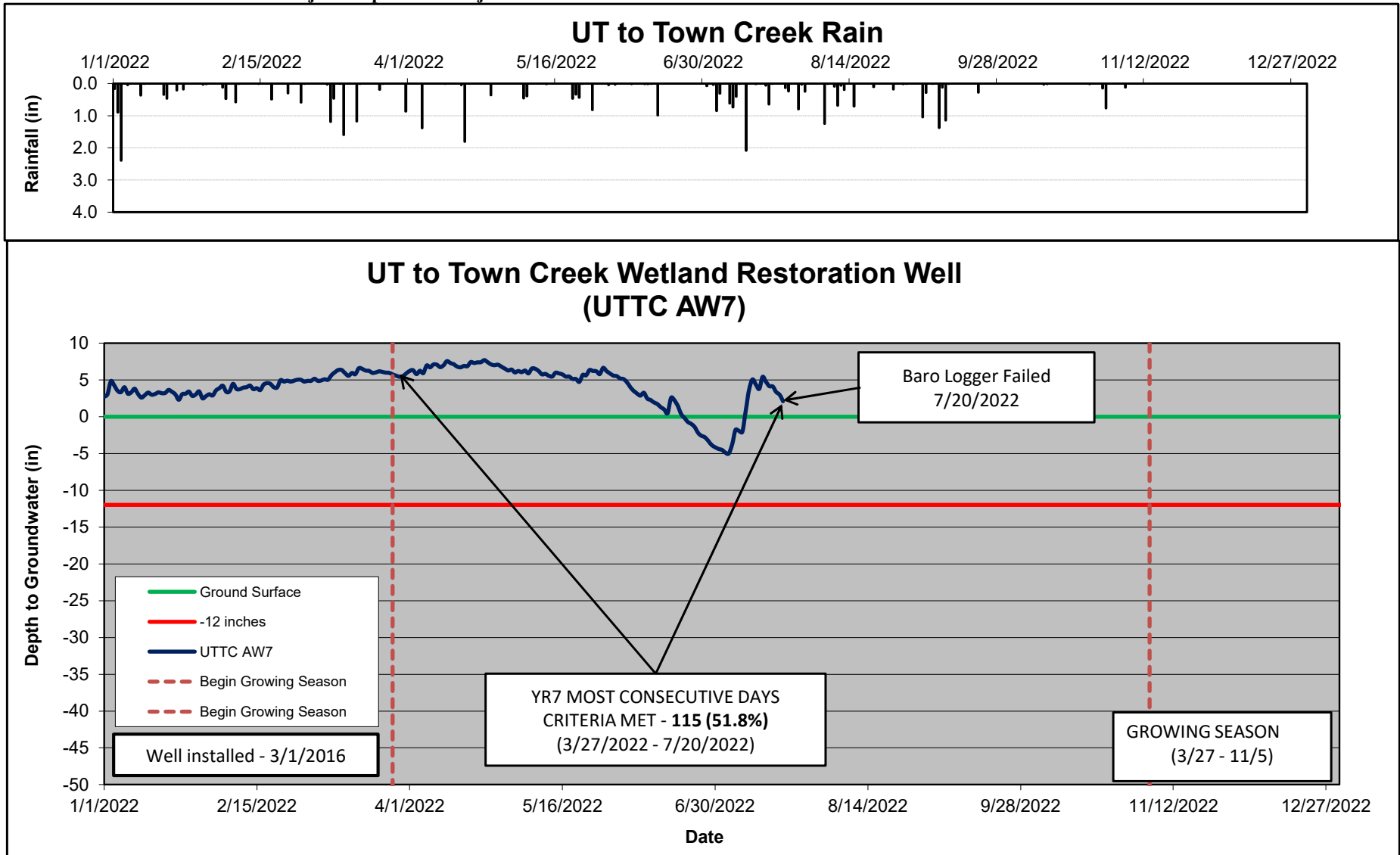


Figure 6 Cont. Wetland Gauge Graphs
UT to Town Creek Restoration Project - Option A: Project No. 94648

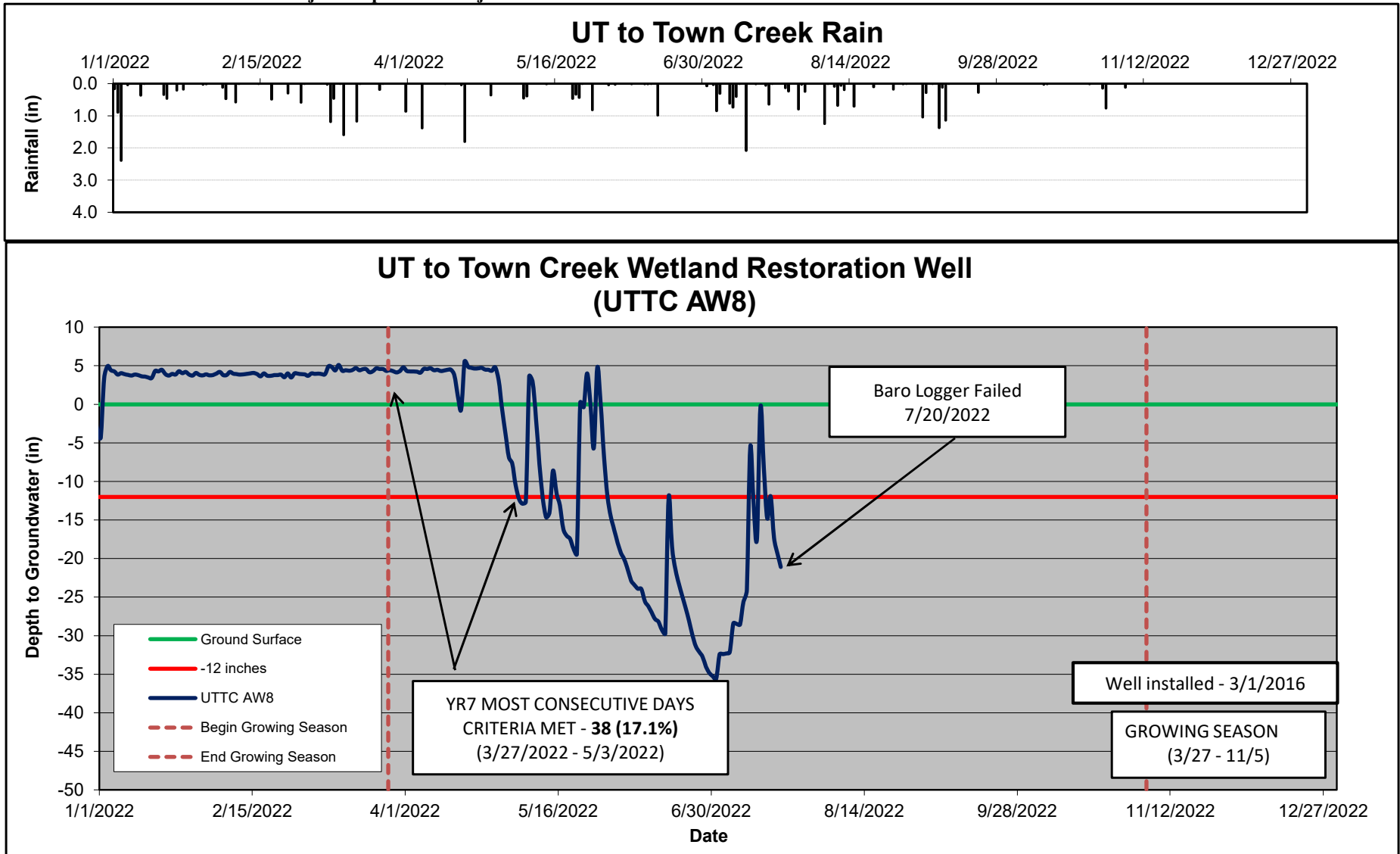


Figure 6 Cont. Wetland Gauge Graphs
UT to Town Creek Restoration Project - Option A: Project No. 94648

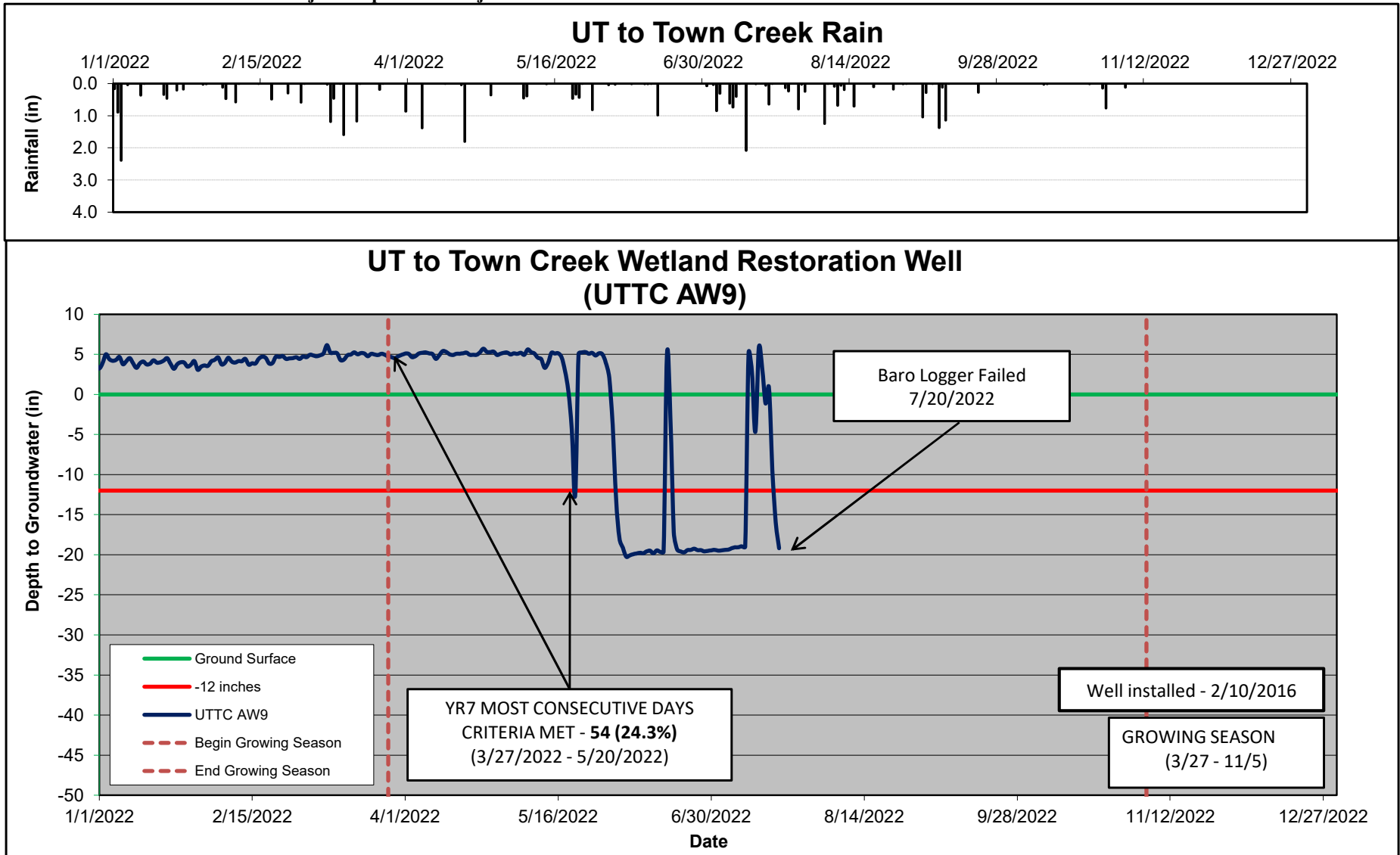


Figure 6 Cont. Wetland Gauge Graphs
UT to Town Creek Restoration Project - Option A: Project No. 94648

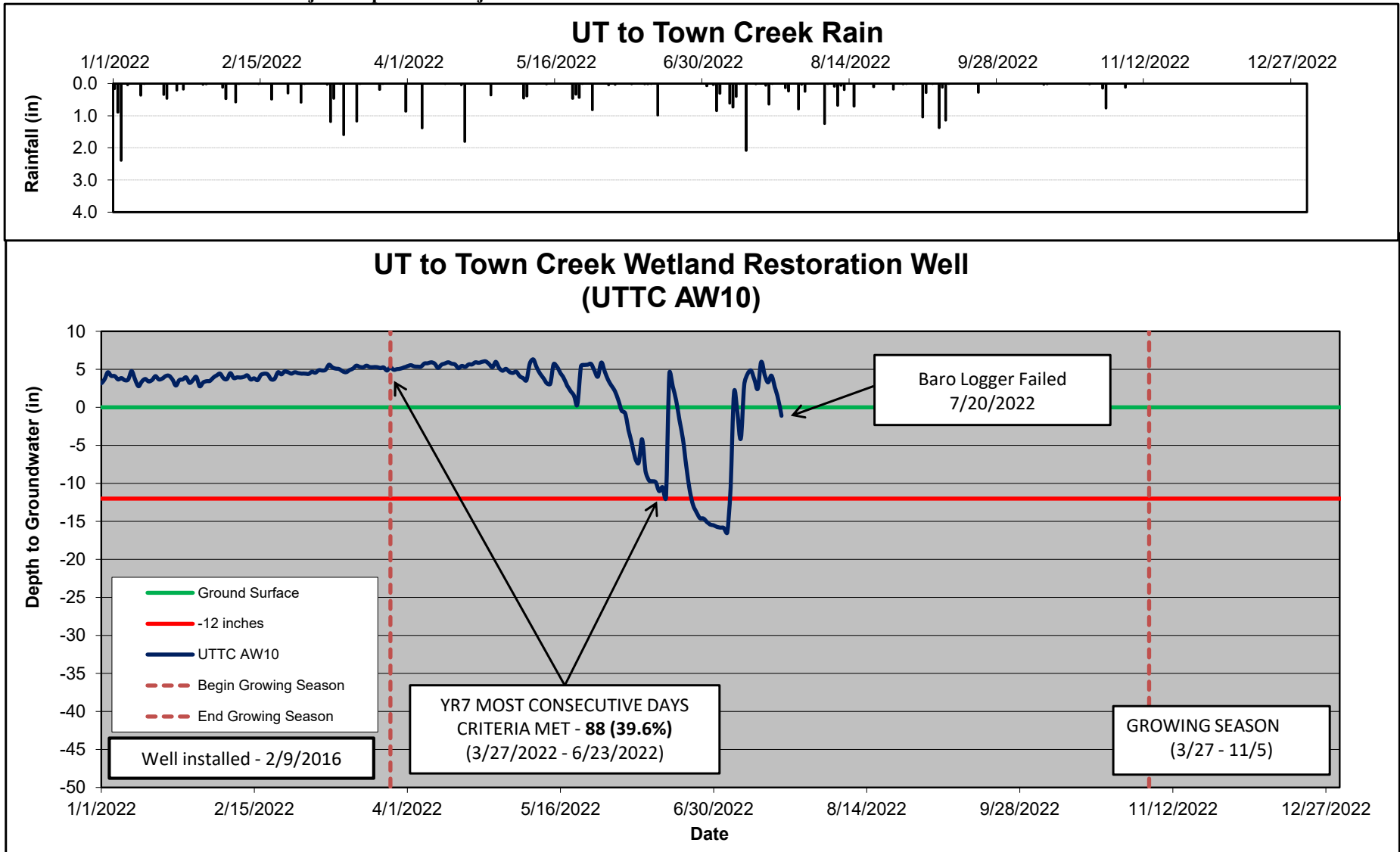


Figure 6 Cont. Wetland Gauge Graphs

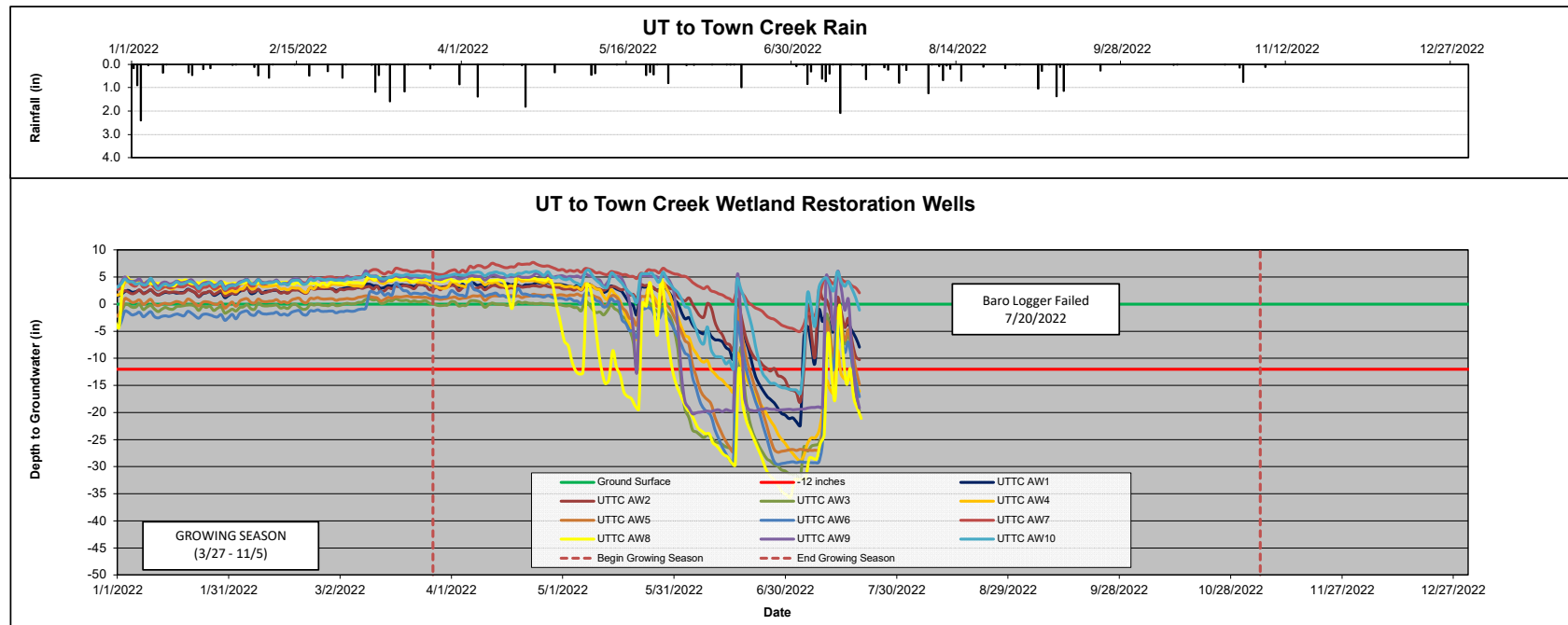
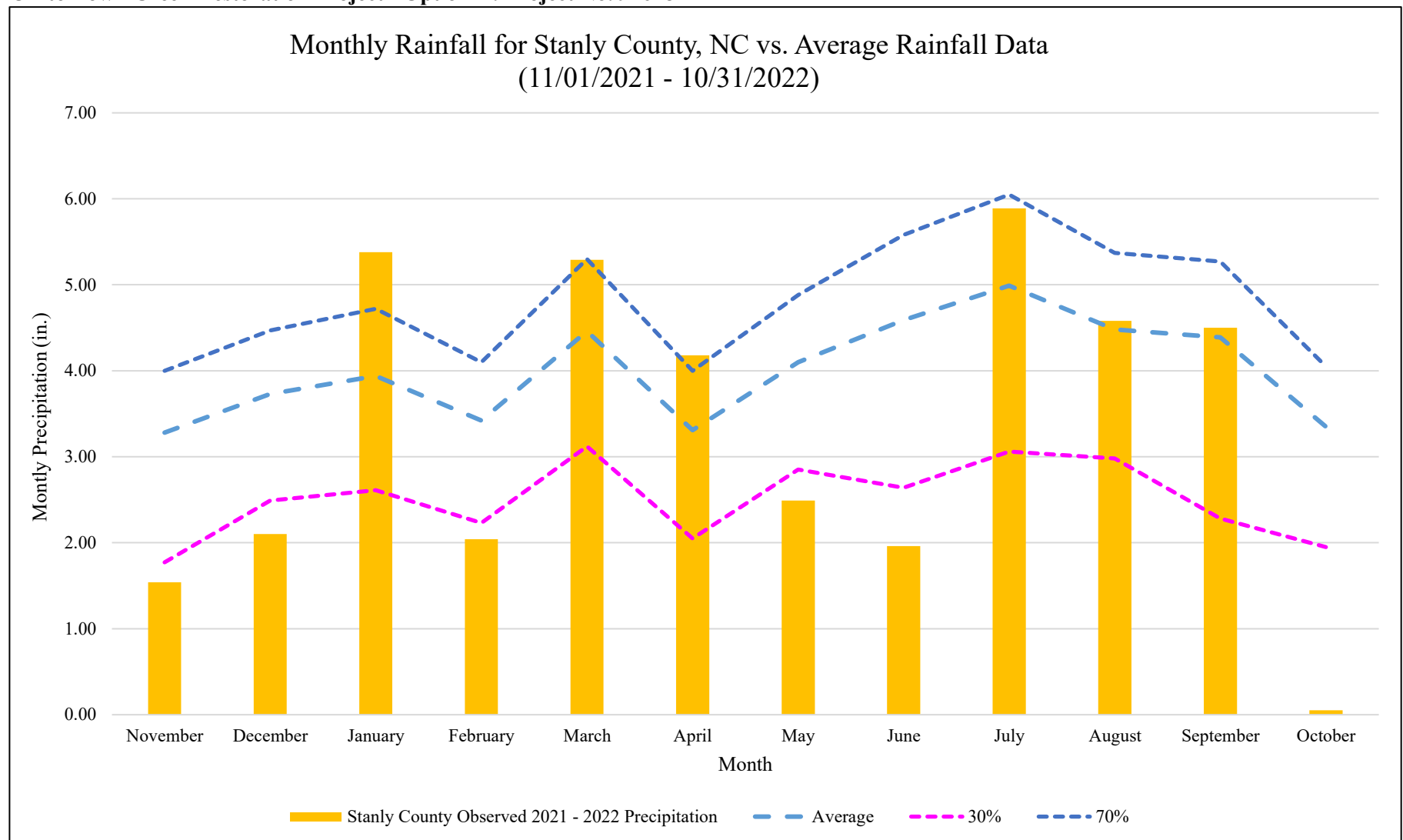


Figure 8. Monthly Rainfall Data
UT to Town Creek Restoration Project - Option A: Project No. 94648



Historic rainfall data from WETS Station : ALBEMARLE, NC0090

Observed 2021 - 2022 Precipitation from CHRONOS Station NEWL, North Stanly Middle School

Table 12. Wetland Restoration Area Well Success

UT to Town Creek Restoration Project - Option A: Project No. 94648

Well ID	Automated Well Type	Wetland Mitigation Type	*Percentage of Consecutive Days <12 inches from Ground Surface ¹	Most Consecutive Days Meeting Criteria ²	*Percentage of Cumulative Days <12 inches from Ground Surface ¹	Cumulative Days Meeting Criteria ³	Number of Instances where Water Table rose to <12 inches from Ground Surface ⁴
Cross-sectional Well Arrays							
UTTC AW1	Reference	Jurisdictional	38.7	86.0	45.9	102.0	2
UTTC AW2	Groundwater	Restoration	40.5	90.0	47.7	106.0	3
UTTC AW3	Groundwater	Restoration	29.7	66.0	33.3	74.0	4
UTTC AW4	Groundwater	Restoration	33.3	74.0	34.7	77.0	3
UTTC AW5	Groundwater	Creation	31.5	70.0	36.9	82.0	3
UTTC AW6	Reference	Jurisdictional	31.1	69.0	34.2	76.0	4
UTTC AW7	Groundwater	Restoration	51.8	115.0	51.8	115.0	1
UTTC AW8	Groundwater	Restoration	17.1	38.0	25.7	57.0	7
UTTC AW9	Groundwater	Creation	24.3	54.0	33.8	75.0	10
UTTC AW10	Groundwater	Creation	39.6	88.0	46.8	104.0	2

Notes:

¹Indicates the percentage of most consecutive number of days within the monitored growing season with a water 12 inches or less from the soil surface.

²Indicates the most consecutive number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

³Indicates the cumulative number of days within the monitored growing season with a water table 12 inches or less from the soil surface.

⁴Indicates the number of instances within the monitored growing season when the water table rose to 12 inches or less from the soil surface.

Growing season for Stanly County is from March 27 to November 5 and is 222 days long.

Growing season percentage for success is 9% of 222 days = 20 days; where water table is 12 inches or less from the ground surface

HIGHLIGHTED indicates wells that *did not* to meet the success criteria for the most consecutive number of days within the monitored growing season with a water 12 inches or less from the soil surface.

All In-Situ groundwater monitoring dataloggers stopped compensating after 7/20/2022 due to barometer failing.

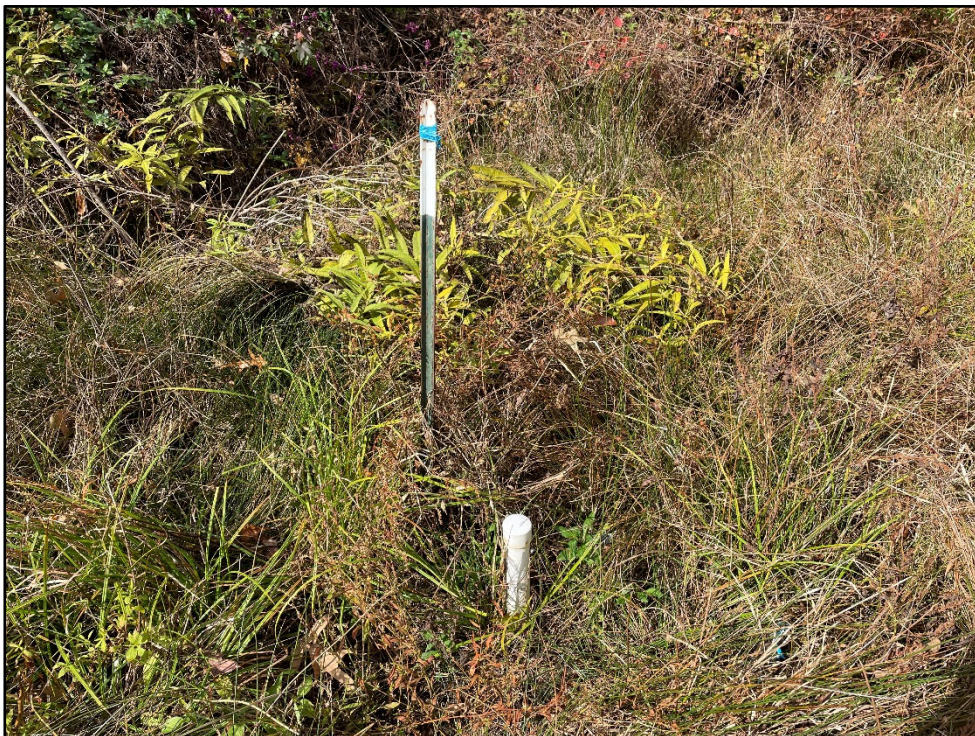
All In-Situ groundwater monitoring dataloggers were installed by 3/27/2016. Installation of the dataloggers was completed following construction in Spring 2016 when groundwater levels are normally closer to the ground surface.

Table 12a. Wetland Gauge Attainment Data							
UT to Town Creek Restoration Project - Option A: Project No. 94648							
Summary of Groundwater Gauge Results for MY1-MY7							
Gauge	Success Criteria						
	MY 1 (2016)	MY2 (2017)	MY3 (2018)	MY4 (2019)	MY5 (2020)	MY6 (2021)	MY7 (2022)
UTTC AW1	No/10 days (5%)	Yes/25 days (12%)	Yes/ 110.0 days (49.5%)	Yes/ 114 days (51.1%)	Yes/ 222 days (100%)	Yes/ 125 days (56.3%)	Yes/ 86 days (38.7%)
UTTC AW2	Yes/218 days (100%)	Yes/218 days (100%)	Yes/ 115.5 days (52%)	Yes/ 95 days (42.6%)	Yes/ 222 days (100%)	Yes/ 123 days (55.4%)	Yes/ 90 days (40.5%)
UTTC AW3	Yes/188 days (86%)	Yes/218 days (100%)	Yes/ 73.5 days (33.1%)	Yes/ 64 days (28.6%)	Yes/ 121 days (54.5%)	Yes/ 61 days (27.5%)	Yes/ 66 days (29.7%)
UTTC AW4	Yes/200 days (92%)	Yes/218 days (100%)	Yes/ 97.5 days (43.9%)	Yes/ 67 days (30.0%)	Yes/ 222 days (100%)	Yes/ 59 days (26.6%)	Yes/ 74 days (33.3%)
UTTC AW5	No/10 days (5%)	Yes/25 days (12%)	Yes/ 79.5 days (35.8%)	Yes/ 69 days (30.9%)	Yes/ 222 days (100%)	Yes/ 64days (28.8%)	Yes/ 70days (31.5%)
UTTC AW6	Yes/218 days (100%)	Yes/218 days (100%)	Yes/ 108.5 days (48.9%)	Yes/ 116 days (52.0%)	Yes/ 222 days (100%)	Yes/ 186 days (83.8%)	Yes/ 69 days (31.1%)
UTTC AW7	Yes/188 days (86%)	Yes/218 days (100%)	Yes/ 222.0 days (100%)	Yes/ 186 days (83.6%)	Yes/ 222 days (100%)	Yes/ 186 days (83.8%)	Yes/ 115 days (51.8%)
UTTC AW8	Yes/200 days (92%)	Yes/218 days (100%)	Yes/ 52.0 days (23.4%)	Yes/ 51 days (22.7%)	Yes/ 79 days (35.6%)	Yes/ 28 days (12.6%)	Yes/ 38 days (17.1%)
UTTC AW9	Yes/188 days (86%)	Yes/218 days (100%)	Yes/ 72.5 days (32.7%)	Yes/ 63 days (28.2%)	Yes/ 121 days (54.5%)	Yes/ 58 days (26.1%)	Yes/ 54 days (24.3%)
UTTC AW10	Yes/200 days (92%)	Yes/218 days (100%)	Yes/ 82.5 days (37.2%)	Yes/ 90 days (40.3%)	Yes/ 222 days (100%)	Yes/ 124 days (55.9%)	Yes/ 88 days (39.6%)
*Gauge 1 and 5 were not working properly during much of the 2016 growing season.							
**Growing season percentage for success is 9% of 222 days = 20 days							

UT to Town Creek – Wetland Photos



UTTC AW1 – (10/28/2022)



UTTC AW2 – (10/28/2022)



UTTC AW3 – (10/28/2022)



UTTC AW4 – (10/28/2022)



UTTC AW5 – (10/28/2022)



UTTC AW6 – (10/28/2022)



UTTC AW7 – (10/28/2022)



UTTC AW8 – (10/28/2022)



UTTC AW9 – (10/28/2022)



UTTC AW10 – (10/28/2022)

Appendix F
IRT Meeting Minutes

Meeting Minutes

UT to TOWN RESTORATION PROJECT

DMS Project ID. 94648
NC DEQ Contract# 003277
USACE Action ID: 2008-02655
Yadkin Pee-Dee River Basin: 03040105060040

Date Prepared:	June 13, 2019
Meeting Date, Time, Location:	June 11, 2019, 2:00 PM On-site (Stanly County, NC)
Attendees:	USACE – Todd Tugwell, Steve Kichefski DWR – Mac Haupt DMS – Matthew Reid, Paul Wiesner Baker – Drew Powers, Katie McKeithan, Scott King
Subject:	Credit release site walkover with IRT
Recorded By:	Drew Powers, Katie McKeithan, Scott King

An on-site meeting was held on June 11th, 2019 at 2:00 PM to discuss UT to Town Restoration Project (Full Delivery) in Stanly County, NC. The purposes of this meeting were to:

1. Discuss credits to be released and to get ready for project closeout; and
2. Identify and discuss potential concerns/issues based on field observations.

General recent weather conditions have been hot and dry for several weeks in the area apart from a few recent afternoon showers.

The group met at the entrance of the path leading to the site off Old Salisbury Road (in the middle of the project) in Albemarle, NC. A general site overview and map orientation was provided and discussed.

Reach 4

The group then started walking into the site towards the top of Reach 4 to discuss the intermittent flow and overall condition of the wetland BMP. Upon assessing Reach 4 it was noted that there was minimum vegetation growing in the stream bed and sediment is being flushed out of the system. Mac, Todd, and Steve discussed with Scott that it will be helpful to install either a flow gauge or flow camera to help document the flow of Reach 4 and 5, about ¾ of the way up each reach.

We then walked up the reach to look at the BMP. It was commented that the concrete level spreaders are no longer the preferred method for BMP outlets, but that it appears to be functioning well. There was a significant amount of clear, standing water present within the deep pool section of the BMP. No gullies or rills were observed flowing into the BMP, and established vegetation is present all around the BMP. Upon observation in this low-water condition the group did not feel the functioning of the BMP was threatened by excess sedimentation and no maintenance was suggested. The group did express some

concern that the BMP was fairly deep, and that it may be reducing the amount of water flowing into its downstream system.

We then walked downstream to the confluence of Reaches 4 and 5 to look at the flow gauge and the stream condition. There was no water present in the stream, but staining on the PVC pipe and streambed along with a general lack of streambed vegetation implies that water is routinely in the channel.

Reach 6

The group congregated at the pipe crossing where Travis Wilson (WRC) had a concern with the installation of the pipe. In the as-built plans it was noted that the pipe was installed on top of bedrock; and therefore the pipe is perched above the downstream water surface. DMS, USACE, and DWR all agreed that there is not much that we can do about the situation now and that resetting the pipe would not be needed. It was also commented that for future sites that a bottomless pipe could be a good option, though the general consensus was that in this specific case it does not appear that would have helped as the native bedrock in this section appears to be naturally perched in this location. The group continued down the reach to the confluence of Reach 6 and 3.

Reach 3

When looking at Reach 3 it was commented that the vegetation looked good, especially for the slate belt region. It was apparent that many of the trees were growing with good height for a 4-year project and the smaller trees were ones that were supplemental planted in 2018. A bare area located on the left bank at the bottom of Reach 3 was noted in the MY3 report shown as a vegetation problem area (VPA). We commented that we have reseeded and replanted it and will continue to monitor this area. Mac took a soil sample on the left flood plain in a wetland area upstream of the confluence with Reach 6 and down to ~6 inches did not see the expected hydric soils. He commented that we will need to revisit the site and do a thorough inspection of our wetland boundaries prior to closeout, adjusting the exact, final boundaries to our field assessments. Mac pointed out that final boundaries may have shifted some and pointed out areas that looked wetter near where he took his soil boring. Todd then inspected nearby Well 5 and saw no issues with the installation of the well and measured 11 inches to water surface in the well. Mac did another soil sample near the well and saw very hydric soils throughout the sample. Paul stated that the well success criteria is 9% and all wells for this site have met that criteria for all monitoring years. We then walked upstream to the double culverts located at the break of Reach 2 and 3 where Todd and Mac commented that they did not like how wide the downstream section of channel was constructed and asked this be avoided in the future. However, we showed that both the construction and as-built plans indicated it was built as designed and the stream was stable. It was noted that this section of channel is all bedrock.

Paul Wiesner pointed out that problem areas of invasive species (privet and parrot feather) were noted in the MY3 report, primarily along sections of the main channel. We replied that two treatment efforts have been made so far this year starting in March 2019 to address all invasive species throughout the site, and we plan to continue to monitor and treat these species for the life of the project.

Reach 7

The group then headed to Reach 7 to inspect the intermittent channel and wetland BMP. Towards the middle of the reach water was flowing in the channel with good vegetation establishing along the banks

and within the buffer. We then walked to the top of the reach to the BMP. Harry had commented on the MY3 report that he had observed turbid water and potential sedimentation following a rain event during his winter inspection, and asked how Michael Baker planned to monitor the BMP for any potential maintenance needs. The group inspected the BMP under the current, low water-level conditions and noted that there is only a small amount of sediment (roughly 6" of a primarily silt/clay material) captured in the deeper pool portion of the BMP. The standing water that was present at the bottom of the pool was quite turbid. However, after observation in this low-water condition the group did not feel the functioning of the BMP was threatened by excess sedimentation and no maintenance was suggested at this time. No gullies or rills were observed flowing into the BMP, and established vegetation is present all around the BMP. Scott explained that both of the project BMPs were designed to a depth in anticipation of some sedimentation for the period after construction before vegetation could establish when some amount of erosion can usually be expected. Scott also mentioned that we will keep an eye on the sedimentation/fill and confirm that ample storage room is maintained within both of the project BMP's. We can do that through visual inspections in the dry season when remaining storage capacity can be directly observed. The group also expressed some concern that the BMP may be reducing the amount of water flowing into its downstream system, though given the flowing water observed in the channel downstream this was not as much of a concern here.

Paul brought up that it was noted on the MY3 report that a tree or two was down on Reach 1 and we confirmed that they have been cleaned up and that all fencing is in good condition.

This concluded the walkover and below are a few notes that were discussed back at the vehicles before departure.

- Credit release: Todd and Mac agreed to all credits being released for MY3
- A gauge or flow camera should be installed on Reach 4 and 5 (about ¾ of the way up)
- The wetland boundaries need to be re-evaluated to represent the actual boundaries in the field, particularly with regard to hydric soil formation
- The pipe crossing on Reach 6 is sufficient
- A photo point of each project culvert location will be added to the monitoring report

This represents Michael Baker Engineering's best interpretation of the meeting discussions. If anyone should find any information contained in these meeting notes to be in error and/or incomplete based on individual comments or conversations, please notify me with corrections/additions as soon as possible.

Most sincerely,



Andrew Powers
Michael Baker Engineering, Inc.
8000 Regency Parkway, Suite 600
Cary, NC 27518
Phone: 919-481-5732
Email: Andrew.Powers@mbakerintl.com

Meeting Minutes

UT to Town Creek Restoration Project

DMS Project ID. 94648
NC DEQ Contract# 003277
USACE Action ID: SAW-2013-01280
DWR# 20141024
Yadkin Pee-Dee River Basin: 03040105-060040

Meeting Date, Time, Location:	June 3, 2021, 9:00 AM On-site (Stanly County, NC)
Attendees:	USACE – Todd Tugwell, Casey Haywood DEQ – Erin Davis DMS – Melonie Allen, Paul Wiesner, Harry Tsomides Baker – Katie McKeithan, Drew Powers, Scott King
Subject:	Closeout site walkover with IRT
Recorded By:	Scott King and Katie McKeithan

An on-site meeting was held on June 3, 2021 at 9:00 AM to review the UT to Town Creek site for closeout of stream credits and early closeout for wetland credits. Recent weather conditions have been hot and dry throughout the spring and summer in this area. For your convenience, please find included here figures from the most recent CCPV from MY5 along with the wetlands map from the wetland adjustment report.

The group met at the crossing between Reaches 2 and 3 and began by walking down Reach 3, inspecting both the stream and the adjusted wetland area proposed in the MY5 monitoring report. The wetlands added to the credited area (all as Creation) in the report were closely evaluated by the IRT. The areas added adjacent to the existing Restoration areas (upstream of XS-11 roughly) were well received by the group. Those added below this point and adjacent to the existing Creation areas were considered more questionable. The existing Creation area located closer to the channel is noticeably wetter with some standing water observed and more herbaceous wetland species present. Tree vigor is clearly lower in this area, though there is no height requirement with this project. Plant density was also noticeably lower here than other portions of the project but is still well above the MY5 performance standard of 260 stems/acre (based on all veg plot data and transects conducted by Baker). Hydric soil was found within both the original and newly added Creation areas, though Todd correctly noted that this was an area where a floodplain was cut so the hydric soils may not be indicative of a high water table (this is why this area was originally classified as Creation and not Restoration). Todd investigated a couple of riffle sections in Reach 3 and noted good channel bed features in both but found a pocket of parrot feather in one. Baker has treated this twice a year for several years and have reduced the parrot feather

present to a remarkable degree. Harry noted that the system had been choked with it before we began treatment.

We then began walking up Reach 6 for a relatively short distance before turning back after a brief inspection that met to everyone's satisfaction. The group then hiked outside the easement up to Reach 7, hopped the fence to inspect the middle of Reach 7 (which was flowing and quickly deemed to be acceptable) then moved downstream to its confluence with Reach 2. We then walked downstream back to the vehicles at the crossing, moving between the left and right floodplains. The stream was noted to be in good condition and accepted by the group. Some of the wetlands along the left floodplain had visual similarities to those at the lower section of Reach 3, though Scott emphatically noted that this area appears much wetter throughout the winter and into spring, with significant standing water present for extended periods. The trees are notably shorter here than in other areas (again, no height requirement on this project) but their density is good. Herbaceous vegetation is present here but not as thick as most of the rest of the site. Other wetland areas along the right floodplain looked very good to the group, though notably they are usually so wet as to be nearly impassable with deep muddy conditions. The very dry spring clearly resulted in all wetland areas visually appearing much different than is normal. Scott noted that this project is located within the Slate Belt, which under normal conditions will dry up quickly during the spring and summer. Thus, many of the wetlands did not 'present themselves' visually as well as they do normally. However, the combined acreage of the questioned wetland areas make up only a small portion of the overall wetlands and a very small portion of the project as a whole. All of the groundwater wells met their performance standards, with hydrology percentages averaging 30-50% for the past three years (for MY5 virtually 100%), far exceeding the set success criteria of 12%.

The group then stopped near the crossing to discuss the project evaluation and IRT conclusions and then left to meet at the Town Creek project located close by.

Summary Points:

- The remaining Stream Credits are approved for closeout by the IRT, though DMS will still withhold 10% of the total stream credits until final project closeout. All stream monitoring may cease, though any subsequent damage to the system that occurs until complete project closeout must be repaired.
- The remaining Wetland Credits are not released for early closeout and should be monitored for the remaining two years (MY6 and MY7). If the Creation wetlands of concern (those areas added adjacent to the original Creation areas roughly below XS-11) are used for credit in the final revised wetland adjustment, then the IRT will require the installation of a groundwater well to demonstrate hydrology. However, Baker intends to remove all of those questionable Creation areas (cited above) that had been added in the wetland adjustment report to facilitate a smoother closeout. Baker will submit a final, revised wetland credited area adjustment report with the MY6 monitoring report for IRT review.
- The MY6 report will also include a revised calculation of additional stream credits for wider buffers using the same January 2018 methodology that was previously used to determine the credits (the previous calculation has been subsequently affected by the modification of credited wetland boundaries).

- Treatment of invasive species, particularly parrot feather, will continue until complete project closeout.
- While MY6 monitoring typically focuses on a more visual inspection (with the reduced monitoring requirements found in MY4 and MY6) Baker will still monitor all wetlands in full and will run vegetation transects within all newly added wetland credit areas.
- Vegetation data collected for MY7 can focus on the veg plots located within and adjacent to the wetland areas.
- This represents Baker's best interpretation of the meeting discussions. If anyone should find any information contained in these meeting notes to be in error and/or incomplete based on individual comments or conversations, please notify me with corrections/additions as soon as possible.

Most sincerely,

A handwritten signature in blue ink that reads "Scott King". The signature is written in a cursive, flowing style.

Scott King, LSS, PWS

Scott.King@mbakerintl.com
919-219-6339

Appendix G
Wetland Boundary
Adjustment

Memorandum

UT to Town Creek Restoration Project: Wetland Boundary Adjustment

DMS Project ID. 94648
NC DEQ Contract# 003277
USACE Action ID: SAW-2013-01280, DWR# 14-1024
Yadkin Pee-Dee River Basin: 03040105-060040

Date Prepared:	November 24, 2021
Subject:	Revisions to wetland boundary adjustment
Recorded By:	Scott King

This memo serves as a revision to the previous wetland boundary adjustment submitted on 1/15/21. The UT to Town Creek Restoration Project originally proposed to Restore a total of 2.56 acres of wetlands and Create an additional 1.56 acres of wetlands within the floodplains along both sides of Reaches 1, 2, and 3. The groundwater well monitoring conducted over the previous five years has demonstrated that all the wetlands have clearly met the hydrology success criteria of 9% as stated in the mitigation plan (often by a substantial margin – the lowest performing well in MY5 had a hydroperiod of 35%). However, during an IRT field visit during the monitoring phase on 6/11/19 a few soil borings dug in the general vicinity of groundwater well #4 appeared to be more marginal to upland in appearance. The borings were dug in this location as the area appeared to be less ‘wet’ overall than the rest of the surrounding wetland area and had dense/gravelly soil. The IRT suggested conducting a closer review of the wetlands prior to closeout to adjust the boundary as needed. It was suggested that while some of the area of concern seemed likely to be removed as credited wetland, there certainly appeared to be plenty of wet areas adjacent to these potentially removed areas. Figure 1 shows the original wetland boundaries for the southern portion of project around the area in question. The IRT encouraged Baker to look for and add any new wetland areas to make up for any upland area that required removal. As such, Baker conducted a thorough field and GIS evaluation of the area and modified the wetland boundary to remove the questionable area and add new wetland area (as Creation) as detailed in the original boundary adjustment memo dated 1/15/21.

However, during the IRT site visit as part of project closeout activities on 6/3/21, a portion of the newly added areas of Wetland Creation at the southern extent (below XS-11) were questioned by the IRT. These areas did not appear as ‘wet’ as the other areas added and the IRT requested that if they were ultimately to be included as credited wetland area, they would require additional groundwater monitoring. The meeting minutes from that site visit were approved on 7/7/21 and provide a more detailed summary of the discussion that day. They can be found in the Appendix of the MY6 report.

Given the feedback from that IRT walkover, Baker elected to remove all of the Wetland Creation area that was considered questionable, as well as much of the rest of the newly added Wetland Creation area, excepting a small portion of the very wet area around XS-10 and Veg Plot 11. This area is actually quite near the Restored wetlands being removed from crediting, and was the original area specifically

pointed out by Mac Haupt (of DEQ) during the first IRT walkover in 2019 as being what he would recommend Baker add as recompense for any lost wetlands. It is also by far the wettest portion of the added Wetland Creation area, has abundant tall vegetation, and was readily accepted by the IRT during the walkover in June of 2021. At an area of 0.192 acres, it adequately covers the credits lost from the removal of the nearby Restored wetlands. Figure 2 shows this final area as well as all of the previously added Creation areas (which have subsequently been removed from consideration) and their previous soil borings. This very limited area of Wetland Creation (only a small subset of the original) is being submitted for the purpose of facilitating a smoother closeout after MY7. Photos of this area were collected during the previous field investigation in January 2021 and have been included again here, while more recent photos were taken of this area in November 2021 and are also included here.

Additionally, as per IRT request during the field visit in June 2021, the revised Creation area addition was assessed for vegetation through the collection of 2 temporary vegetation transects, each approximately the size of a standard monitoring veg plot. As noted above and as documented in the photolog, the area as a whole has quite tall, abundant vegetation consisting of sycamore, persimmon, blackgum, green ash, swamp chestnut oak, willow oak, box elder, tulip poplar, buttonbush, silky dogwood, and black willow, with thick herbaceous vegetation dominated by tearthumb, soft rush, and woolgrass (amongst other rushes and sedges). These species are overwhelmingly rated as wet for their facultative indicator status for the Eastern Mountains and Piedmont region. The first vegetation transect identified 14 stems (for a density of 566 stems/ac), all but 3 of which were well over 6 ft tall. The second vegetation transect identified 15 stems (for a density of 607 stems/ac), of which 8 were well over 6 ft tall (and the remainder averaging about 4 ft tall). Figure 3 shows the approximate location of the transects within the revised Creation area.

As previously noted in the original wetland adjustment memo, the Creation Wetland area being added will be credited at a 3:1 ratio, while the Restored Wetland area being removed was credited at a 1:1 ratio. The newly revised wetlands on the project total 2.513 acres for the Restoration component and 1.752 acres for the Creation component, for a total of 3.097 Riparian Wetland Credits. Baker is contracted for 3.0 wetlands credits. The revised wetland credits are shown below in Table 1:

Table 1. Adjusted Wetland Areas

	Area (ac)	Ratio	Credits
Original Wetlands			
Riparian, Restoration	2.56	1:1	2.560
Riparian, Creation	1.56	3:1	0.520
Total Credits			3.080
Adjusted Wetlands			
Riparian, Restoration	2.513	1:1	2.513
Riparian, Creation	1.752	3:1	0.584
Total Credits			3.097
Riparian Wetland Credit Difference			+0.017

It should also be noted that there are an additional ~1 acre of existing jurisdictional wetlands on the project that were enhanced for *no credit* on the project. These wetlands had cattle excluded, were

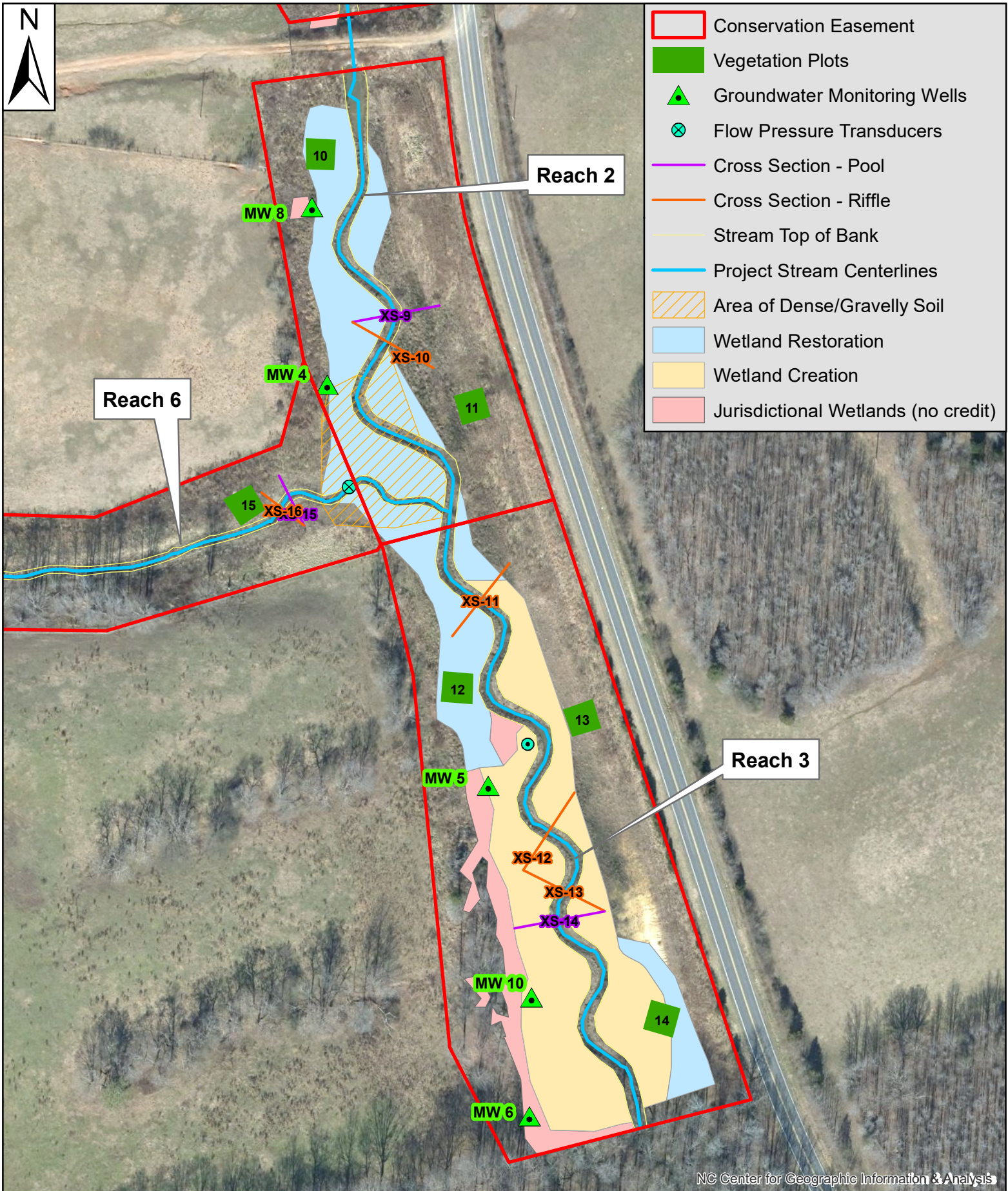
planted, and almost certainly experienced improved hydrology along with the adjacent restored wetlands.

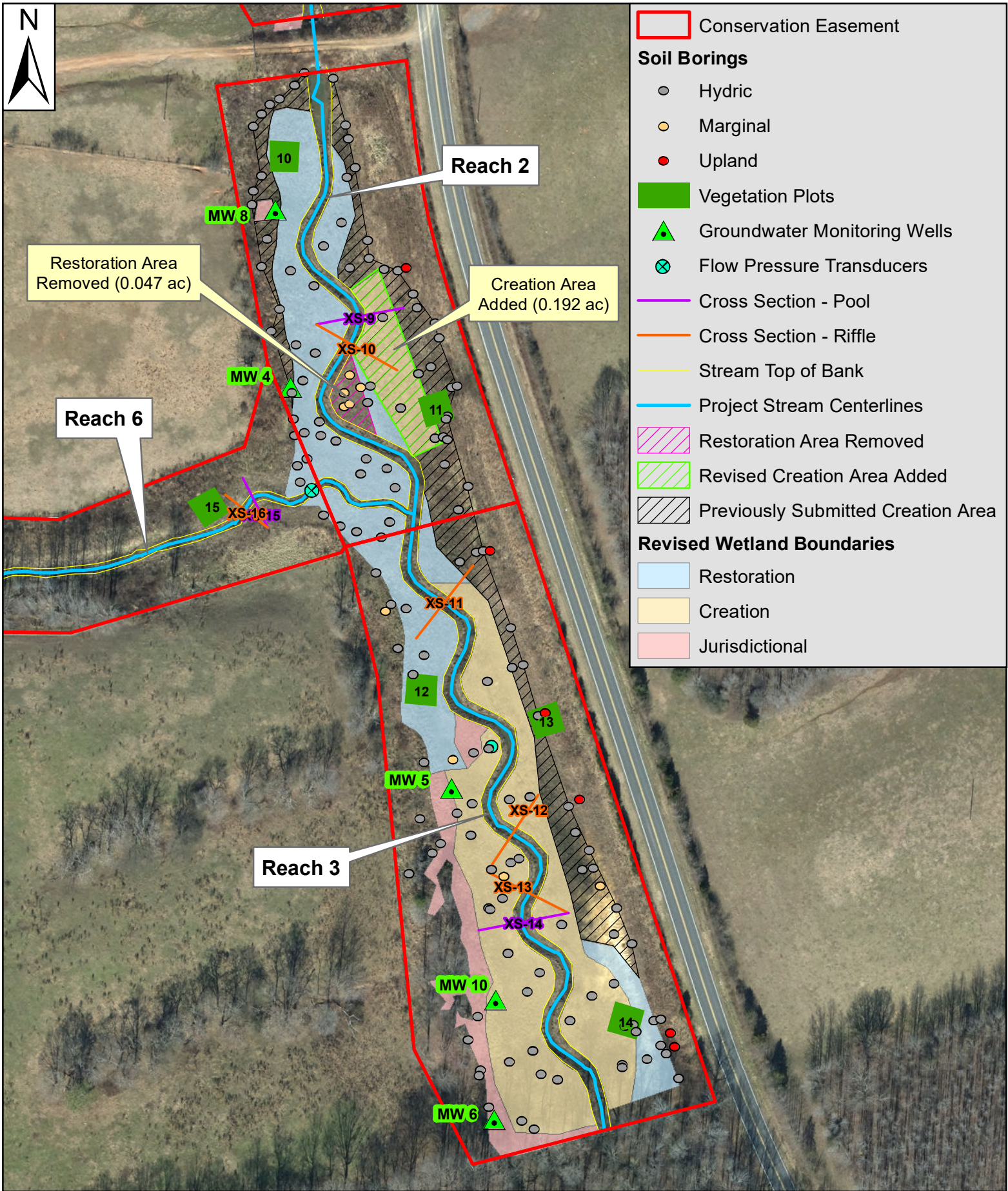
Most sincerely,

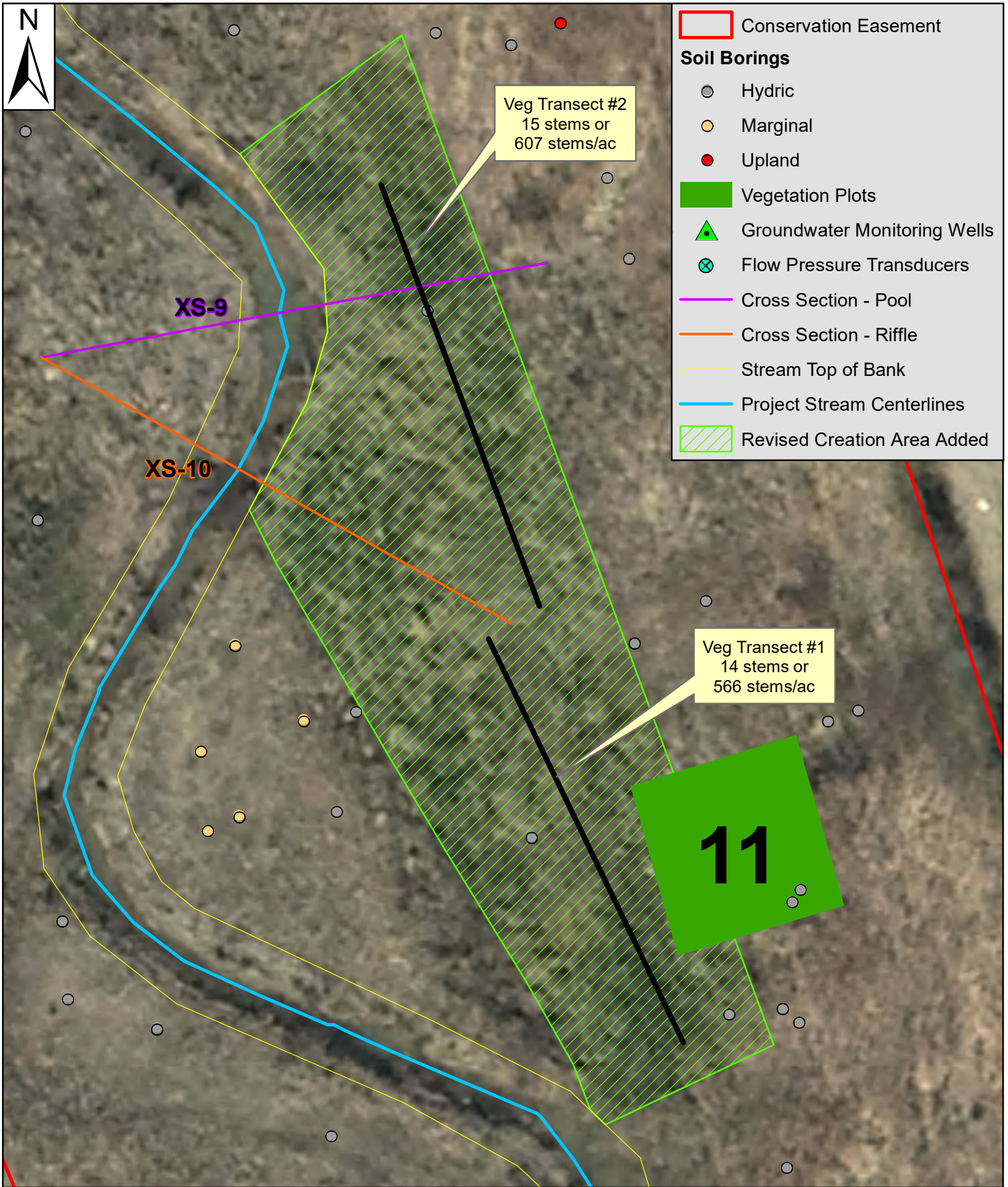
A handwritten signature in blue ink that reads "Scott King". The signature is written in a cursive style with a large, looped "S" and a "K" that extends upwards.

Scott King, LSS, PWS

Scott.King@mbakerintl.com
919-219-6339 [M]







UT to Town Creek: Wetland Boundary Adjustment Photographs (from 1/12/21)



Soft rush in area with shallow standing water



Wetland vegetation and standing water in floodplain



Wetland vegetation and standing water in floodplain



Hydric soil



Wetland vegetation and standing water in floodplain



Hydric soil

UT to Town Creek: Wetland Boundary Adjustment Photographs (from 11/23/21)



Abundant, tall, diverse vegetation present



Abundant, tall, diverse vegetation present (buttonbush in foreground)



Abundant, tall, diverse vegetation present (buttonbush and sycamore in foreground)



Vegetation Transect #1



Vegetation Transect #2



Hydric soil present throughout

UT to Town Creek: Wetland Boundary Adjustment Photographs (from 11/23/21)



Abundant, tall, diverse vegetation present



Abundant, tall, diverse vegetation present



Dense herbaceous layer present dominated by tearthumb and various rushes and sedges



Dense herbaceous layer present dominated by tearthumb and various rushes and sedges



Abundant, tall, diverse vegetation present (silky dogwood in foreground)



Abundant, tall, diverse vegetation present

Wilmington District Stream Buffer Credit Calculator

Site Name:	UT to Town Creek
USACE Action ID:	SAW-2013-1280
NCDWR Project Number:	14-1024
Sponsor:	Michael Baker Engineering, Inc. - NCDMS
County:	Stanly
Minimum Required Buffer Width ¹ :	50

Mitigation Type	Mitigation Ratio Multiplier ²	Creditable Stream Length ³	Baseline Stream Credit
Restoration (1:1)	1	5527	5527.00
Enhancement I (1.5:1)	1.5		
Enhancement II (2.5:1)	2.5	347	138.80
Preservation (5:1)	5		
Other (7.5:1)	7.5		
Other (10:1)	10		
Custom Ratio 1	1	444	444.00
Custom Ratio 2			
Custom Ratio 3			
Custom Ratio 4			
Custom Ratio 5			
Totals		6318.00	6109.80

Buffer Width Zone (feet from Ordinary High Water Mark)

Buffer Zones	less than 15 feet	>15 to 20 feet	>20 to 25 feet	>25 to 30 feet	>30 to 35 feet	>35 to 40 feet	>40 to 45 feet	>45 to 50 feet	>50 to 75 feet	>75 to 100 feet	>100 to 125 feet	>125 to 150 feet
Max Possible Buffer (square feet) ⁴	189540	63180	63180	63180	63180	63180	63180	63180	315900	315900	315900	315900
Ideal Buffer (square feet) ⁵	188765.5232	63169.9440	63076.3311	62775.7326	62337.4710	62106.2104	61917.4823	61752.6464	306392.9452	304924.3718	305134.0046	306325.7583
Actual Buffer (square feet) ⁶	185521.2138	61481.6639	61082.9021	60471.6938	60193.8776	59895.3844	59584.1328	58991.4484	178961.0580	106711.2722	54593.0759	14600.9280
Zone Multiplier	50%	10%	10%	10%	5%	5%	5%	5%	7%	5%	4%	4%
Buffer Credit Equivalent	3054.90	610.98	610.98	610.98	305.49	305.49	305.49	305.49	427.69	305.49	244.39	244.39
Percent of Ideal Buffer	98%	97%	97%	96%	97%	96%	96%	96%	58%	35%	18%	5%
Credit Adjustment	-52.50	-16.33	-19.31	-22.42	-10.50	-10.87	-11.51	-13.66	249.81	106.91	43.73	11.65

Total Baseline Credit	Credit Loss in Required Buffer	Credit Gain for Additional Buffer	Net Change in Credit from Buffers	Total Credit
6109.80	-157.12	412.09	254.97	6364.77

¹Minimum standard buffer width measured from the top of bank (50 feet in piedmont and coastal plain counties or 30 feet in mountain counties)

²Use the Custom Ratio fields to enter non-standard ratios, which are equal to the number of feet in the feet-to-credit mitigation ratio (e.g., for a preservation ratio of 8 feet to 1 credit, the multiplier would be 8)

³Equal to the number of feet of stream in each Mitigation Type. If stream reaches are not creditable, they should be excluded from this measurement, even if they fall within the easement

⁴This amount is the maximum buffer area possible based on the linear footage of stream length if channel were perfectly straight with full buffer width. This number is not used in calculations, but is provided as a reference.

⁵Maximum potential size (in square feet) of each buffer zone measured around all creditable stream reaches, calculated using GIS, including areas outside of the easement. The inner zone (0-15') should be measured from the top of the OHWM or the edge of the average stream width if OHWM is not known. Non-creditable stream reaches within the easement should be removed prior to calculating this area with GIS.

⁶Square feet in each buffer zone, as measured by GIS, excluding non-forested areas, all other credit type (e.g., wetland, nutrient offset, buffer), easement exceptions, open water, areas failing to meet the vegetation performance standard, etc. Additional credit is given to 150 feet in buffer width, so areas within the easement that are more than 150 feet from creditable streams should not be included in this measurement. Non-creditable stream reaches within the easement should be removed prior to calculating this area with GIS

UT to Town Creek Buffer Tool

Reach	As-Built Footage	Approach	Ratio Factor	SMU
1	1192	R	1	1192
2	1783	R	1	1783
3	803	R	1	803
4	444	EI	1	444
5	347	EII	2.5	139
6	1350	R	1	1350
7	399	R	1	399

Total **6318** **6110**

	Creditable Stream Length (ft)	Baseline Stream Credit
Restoration (1:1)	5527	5527
Enhancement I (1:1)	444	444
Enhancement II (2.5:1)	347	139
Total	6318	6110

Buffer Zones Jan2018

Buffer Zone	Ideal Buffer (sq ft)	Actual Buffer (sq ft)
<15 ft.	188765.5232	185521.2234
>15-20 ft.	63169.9440	61481.6639
>20-25 ft.	63076.3311	61082.9021
>25-30 ft.	62775.7326	60471.6938
>30-35 ft.	62337.4710	60193.8776
>35-40 ft.	62106.2104	59895.3844
>40-45 ft.	61917.4823	59584.0931
>45-50 ft.	61752.6464	59164.6369
>50-75 ft.	306392.9452	184069.5392
>75-100 ft.	304924.3718	108881.0473
>100-125 ft.	305134.0046	54814.3114
>125-150 ft.	306325.7583	14611.8397
>150 ft.	615548.9857	3764.6359

Buffer Zones 11Nov2021

Buffer Width	Actual Buffer rev2	Difference from Ideal Buffer	Difference from Jan 2018
15	185521.2138	3244.3094	0.0096
20	61481.6639	1688.2801	0.0000
25	61082.9021	1993.4290	0.0000
30	60471.6938	2304.0389	0.0000
35	60193.8776	2143.5934	0.0000
40	59895.3844	2210.8260	0.0000
45	59584.1328	2333.3495	-0.0397
50	58991.4484	2761.1980	173.1885
75	178961.0580	127431.8872	5108.4812
100	106711.2722	198213.0996	2169.7751
125	54593.0759	250540.9287	221.2355
150	14600.9280	291724.8302	10.9116
200	3764.6288	611784.3569	0.0070

Contracted Credits: 6465
 From Mit Plan: 6109
 From Mit Plan (including additional SMUs from buffer tool): 6414

Original Total Credits (Jan 2018): 6375.12
 Difference from Mit Plan: **38.88**
 Difference from Contract: **89.88**

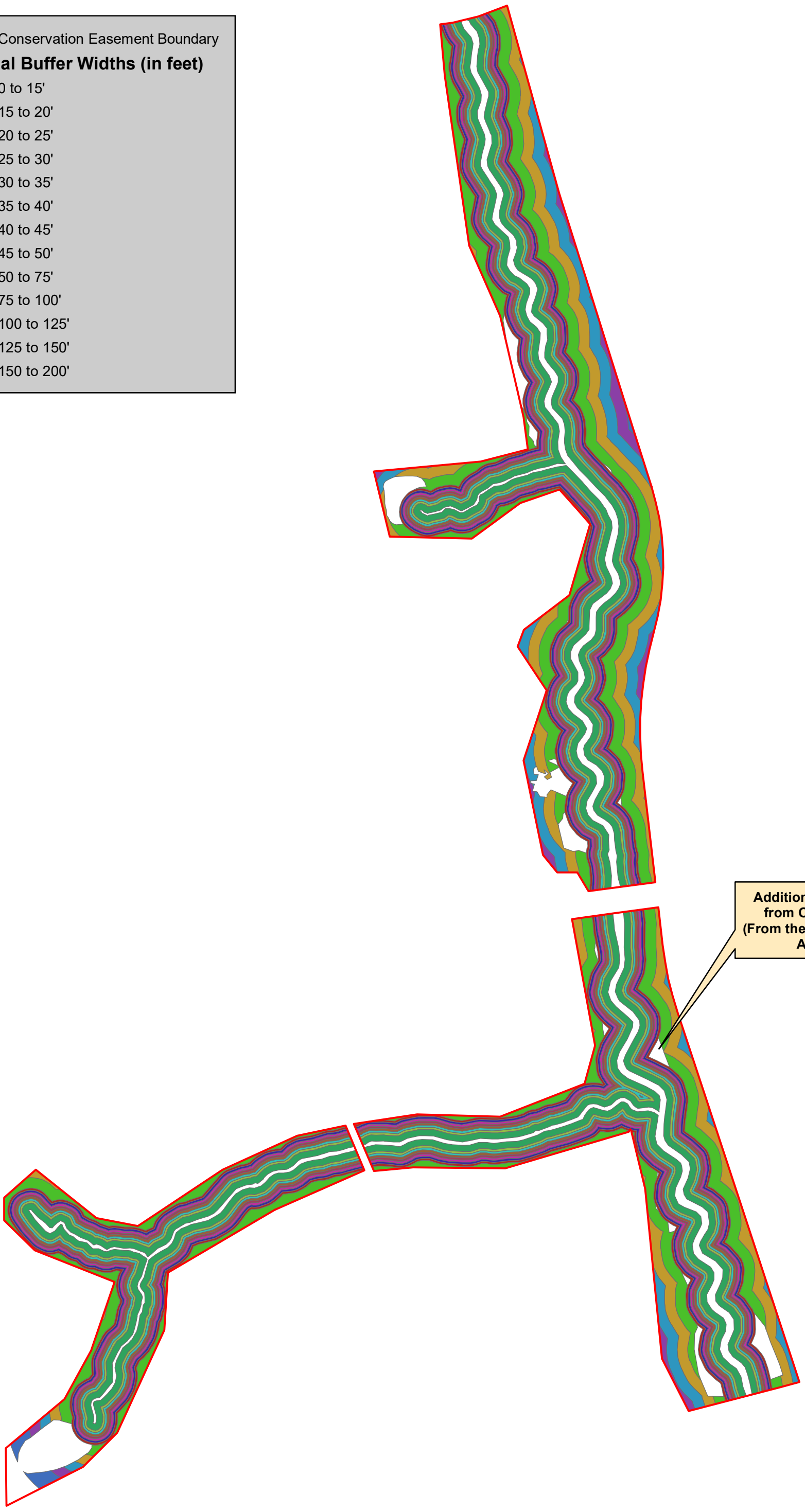
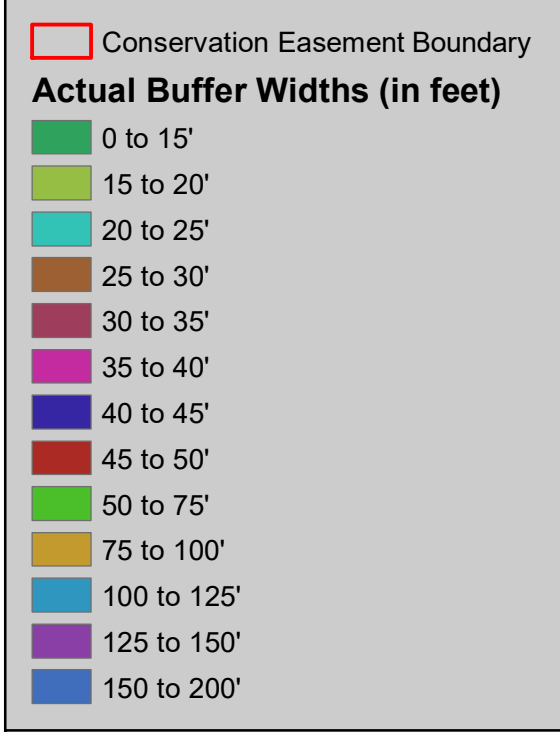
Revised Total Credits (Nov 2021): 6364.77
 Difference from Original Credits (Jan 2018): **10.35**

Conservation Easement Boundary
 Stream Channel
 Constructed BMPs
Credited Wetland Boundaries (revised)
 Restoration
 Creation



Location of Added Creation Area from Wetland Boundary Adjustment as Compared to Original Analysis





Additional Area Removed
 from Original Analysis
 (From the Wetland Boundary
 Adjustment)