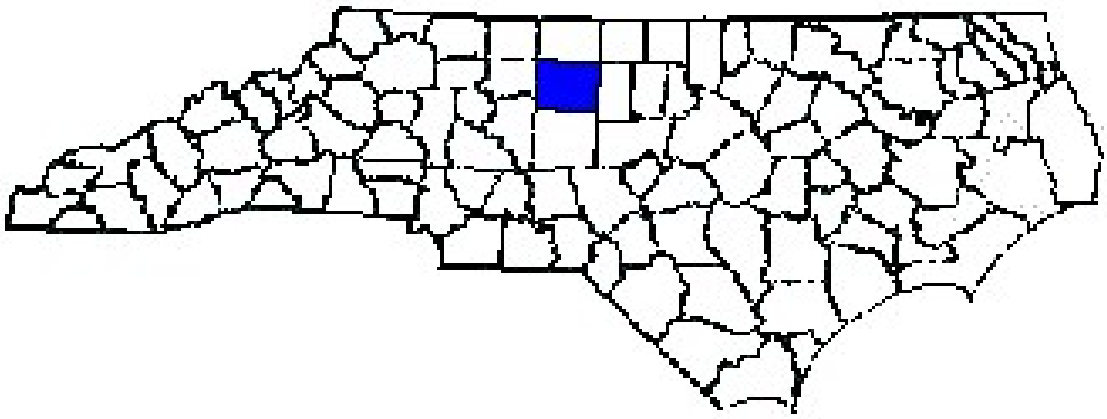
ANNUAL REPORT FOR 2020



R-2413A&B UT to Reedy Fork Creek - Site #2
Guilford County
TIP No. R-2413A&B
USACE Action ID: SAW-2013-00557
DWR Project #: 20130517 v.5

Prepared By:
Environmental Analysis Unit & Roadside Environmental Unit
North Carolina Department of Transportation
December 2020

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SUMMARY

The following report summarizes the stream monitoring activities that have occurred during 2020 at UT to Reedy Fork Creek Site #2 on the NC 68 Connector (R-2413A&B) project in Guilford County. The site was constructed during 2016 by the North Carolina Department of Transportation (NCDOT). The site was designed as stream mitigation for impacts associated with the construction of Transportation Improvement Program (TIP) number R-2413A&B and was planted in May 2016. This report provides the monitoring results for the fifth formal year of monitoring (Year 2020). The Year 2020 monitoring period is the fifth of five scheduled years of monitoring on Site #2 (See Success Criteria Section 2.1). No hydrologic monitoring is required for this project; however, vegetation monitoring is required for five years.

Based on the overall conclusions of monitoring at Site #2, the upper section of the stream site remains stable at this time. Remediation activites are scheduled for the lower section of the stream in the Spring of 2021, therefore no monitroing activities were completed in this area in 2020. The stream bank is heavily vegetated for the fifth year of monitoring.

NCDOT will continue stream monitoring at the UT to Reedy Fork Creek Site #2 in 2021.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during 2020 at the UT to Reedy Fork Creek Site #2. The site is situated about 1,000 ft south of Bunch Rd and crosses I-73 flowing from east to west through a culvert under the road corridor (see Figure 1). The site was constructed to provide mitigation for stream impacts associated with construction of TIP number R-2413A&B. The site is composed of an upper and lower reach of an Unnamed Tributary (UT) of Reedy Fork (upstream and downstream of the newly constructed roadway corridor).

The mitigation project includes 906 linear feet of Priority I&II stream restoration/relocation on both the upper and lower reaches and 71 linear feet of stream enhancement on the lower reach. Construction was completed in March 2016 by NCDOT. Stream restoration involved the installation of rock cross vanes, constructed riffles, construction of a new stream channel, relocation of the upper reach, reconnection with the adjacent floodplain in Priority I restoration reaches, and construction of the floodplain through Priority II restoration reaches to allow for overbank flooding. It also included the installation of coir fiber matting and live stakes along the streambank and bareroot seedlings in the buffer area. Stream enhancement on a portion of the lower reach included minor bank grading, installation of coir fiber matting and live stakes along the graded banks, and planting of bareroot seedlings in the floodplain.

1.2 Purpose

For a mitigation site to be considered successful, it must meet the success criteria. This report details the monitoring in 2020 at the UT to Reedy Fork Creek Site #2. Hydrologic monitoring was not required for the Site.

1.3 Project History

March 2016	Construction Completed
May 2016	Planted Live Stakes and Bareroot Seedlings
September 2016	As-Built Survey Completed
October 2016	Vegetation Monitoring (Year 1)
December 2016	Stream Channel Monitoring (Year 1)
July 2017	Vegetation Monitoring (Year 2)
August 2017	Herbicide Application on Kudzu
November 2017	Stream Channel Monitoring (Year 2)
December 2017	Site 2 Upper Supplemental Buffer Planting

June 2018	Vegetation Monitoring (Year 3)
November 2018	Stream Channel Monitoring (Year 3)
January 2019	Site 2 Live Staking @ XS #2 Right Bank
March 2019	Site 2 Lower Supplemental Buffer Planting
June 2019	Vegetation Monitoring (Year 4)
December 2019	Stream Channel Monitoring (Year 4)
July 2020	Vegetation Monitoring (Year 5)
November 2020	Stream Channel Monitoring (Year 5)

1.4 Debit Ledger

The entire UT to Reedy Fork Creek Site #2 stream mitigation site was used for the R-2413A&B project to compensate for unavoidable stream impacts.

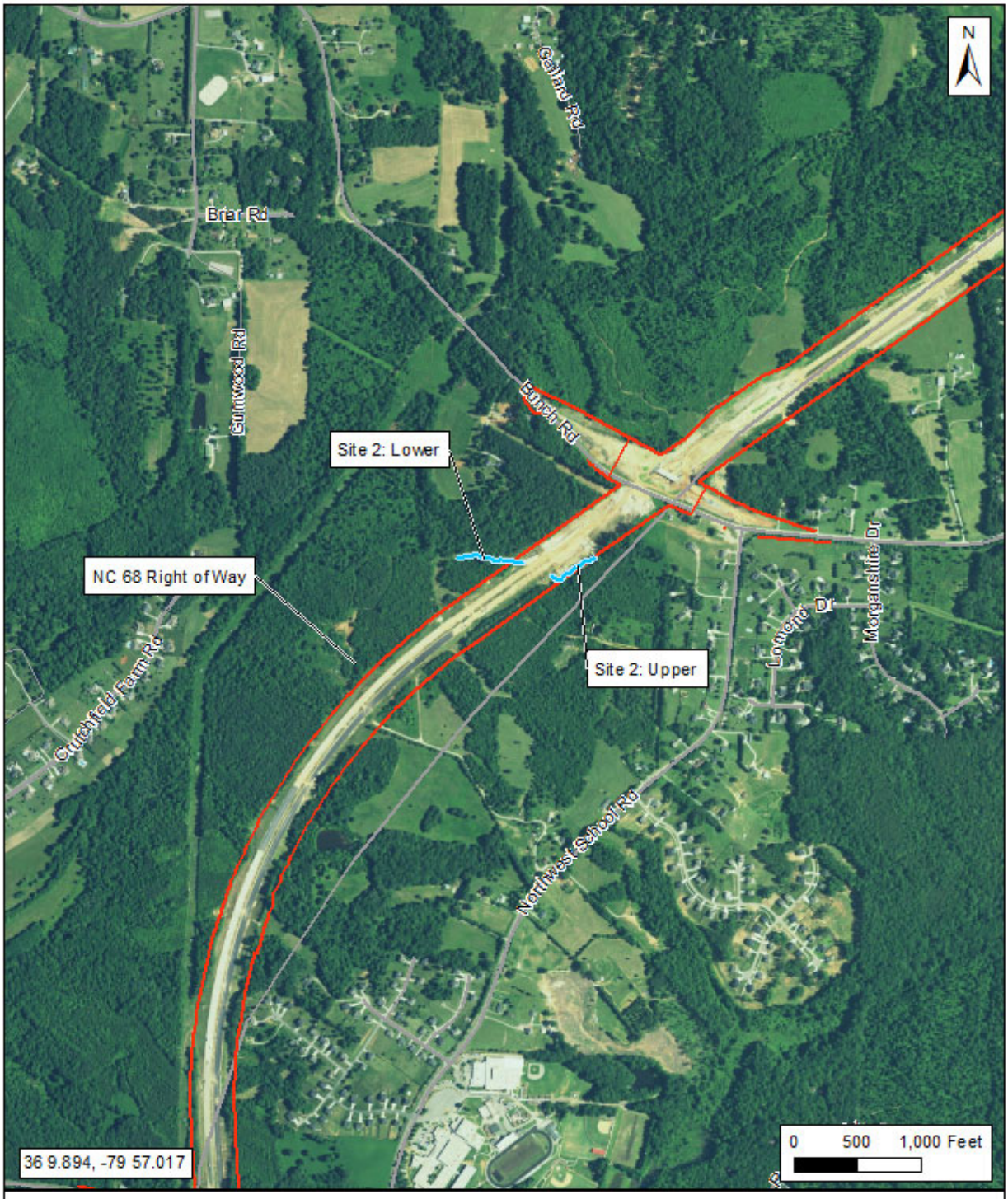


Figure 1: Project Vicinity Map
R-2413A UT to Reedy Creek Site #2 Stream Mitigation
Guilford County, SC

2.0 STREAM ASSESSMENT

2.1 Success Criteria

The stream mitigation site shall be monitored for five years or until success criteria are satisfied. Monitoring protocols shall follow the Monitoring Level I outlined in the Stream Mitigation Guidelines, April 2003. NCDOT will evaluate the success of the stream relocation project based on guidance provided by the Stream Mitigation Guidelines disseminated by the United States Army Corps of Engineers-Wilmington District. The survey of channel dimension will consist of permanent cross sections placed at three cross sections (two riffles and one pool). Annual photographs showing both banks and upstream and downstream views will be taken from permanent, mapped photo points. The survey of the longitudinal profile will represent distinct areas of restoration and will cover a cumulative total of approximately 906 linear feet of channel. The entire restored length of stream will be investigated for channel stability and in-stream structure functionality. Any evidence of channel instability will be identified, mapped and photographed. Pebble counts shall not be conducted. The monitoring shall be conducted annually for a minimum of five (5) years after final planting. The monitoring results shall be submitted to DWR in a final report within sixty (60) days after completing monitoring. After 5 years, the NCDOT shall contact the DWR to schedule a site visit to "close out" the mitigation site.

Vegetation Success

The success of vegetation and plantings will be measured through stem counts. Permanent quadrants will be used to sample the riparian buffer and restoration wetlands. Survival of the live stakes will be determined by visual observation throughout the five-year monitoring period.

Bare root vegetation will be evaluated using two staked survival plots. Plots will be 50ft. by 50ft. If site conditions prevent a 50ft. by 50ft. plot, then the plot will have varying dimensions to encompass an area of 2,500 ft^2. All flagged stems will be counted in those plots. Success will be defined as 320 stems per acre after three years and 260 stems per acre after five years. All vegetation monitoring will be conducted during the growing season.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The mitigation project covers approximately 906 linear feet of Priority I&II stream restoration/relocation and 71 linear feet of stream enhancement. Construction was completed in March 2016 by NCDOT. Stream restoration involved the installation of rock cross vanes, constructed riffles, construction of a new stream channel, relocation of the

upper reach, reconnection with the adjacent floodplain in Priority I restoration reaches, and construction of the floodplain through Priority II restoration reaches to allow for overbank flooding. It also included the installation of coir fiber matting and live stakes along the streambank and bareroot seedlings in the buffer area. Stream enhancement on a portion of the lower reach included minor bank grading, installation of coir fiber matting and live stakes along the graded banks, and planting of bareroot seedlings in the floodplain.

2.2.2 Monitoring Conditions

The objective of the UT to Reedy Fork Creek Site #2 restoration was to build a C5 stream type as identified in the Rosgen's Applied River Morphology. A total of three cross sections (one on the upper reach and two on the lower reach) were surveyed. For this report, only the riffle cross sections were used in the comparison of channel morphology in Table 1.

2.3 Results of the Stream Assessment

R-2413A&B - Site 2 Cross Sections #1 and #3											
Variable	Proposed	As-built		Monitoring Year 1 - 2016		Monitoring Year 2 – 2017		Monitoring Year 3 – 2018		Monitoring Year 4 – 2019	
		Cross Section #1 (Upper-Riffle)	Cross Section #3 (Lower-Riffle)	Cross Section #1 (Upper-Riffle)	Cross Section #3 (Lower-Riffle)	Cross Section #1 (Upper-Riffle)	Cross Section #3 (Lower-Riffle)	Cross Section #1 (Upper-Riffle)	Cross Section #3 (Lower-Riffle)	Cross Section #1 (Upper-Riffle)	Cross Section #3 (Lower-Riffle)
Drainage Area (mi^2)	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Bankfull Width (ft)	7.6	8.4	7.95	8.23	8.02	8.54	7.69	8.56	7.95	10.91	8.00
Bankfull Mean Depth (ft)	0.5	0.48	0.63	0.64	0.59	0.5	0.5	0.53	0.92	0.53	0.83
Width/Depth Ratio	13.9	17.5	12.62	12.86	13.59	17.08	15.38	16.15	8.64	20.58	9.64
Bankfull Cross Sectional Area (ft^2)	4.2	4.02	5.03	5.25	4.76	4.23	3.87	4.56	7.32	5.83	6.64
Maximum Bankfull Depth (ft)	0.8	0.86	1.1	1	1.3	0.91	1.2	0.94	2.66	1.07	2.57
Floodprone Area (ft)	34	43	37	44	38	43	38	43	42	43.97	41.91
Entrenchment Ratio	4.5	5.12	4.66	5.3	4.71	5.01	5	5.05	5.27	4.03	5.24

*Drainage Area, Floodprone Width, and Slope are averaged values only.
*Riffle values are used for classification purposes.

R-2413A&B - Site 2 Cross Sections #1 and #3					
Variable	Proposed	As-built		Monitoring Year 5 - 2020	
		Cross Section #1 (Upper-Riffle)	Cross Section #3 (Lower-Riffle)	Cross Section #1 (Upper-Riffle)	Cross Section #3 (Lower-Riffle)
Drainage Area (mi^2)	0.09	0.09	0.09	0.09	0.09
Bankfull Width (ft)	7.6	8.4	7.95	8.54	N/A
Bankfull Mean Depth (ft)	0.5	0.48	0.63	0.48	N/A
Width/Depth Ratio	13.9	17.5	12.62	17.79	N/A
Bankfull Cross Sectional Area (ft^2)	4.2	4.02	5.03	4.12	N/A
Maximum Bankfull Depth (ft)	0.8	0.86	1.1	0.90	N/A
Floodprone Area (ft)	34	43	37	42.57	N/A
Entrenchment Ratio	4.5	5.12	4.66	4.99	N/A

2.3.1 Site Data

The assessment included the survey of 3 cross sections and the longitudinal profile of UT to Reedy Fork Creek Site #2 established by the NCDOT after construction. The length of the surveyed profile along the upper reach of Site #2 was approximately 424 linear feet. The length of the surveyed profile along the lower reach of Site #2 was approximately 482 linear feet. Three cross sections were established during the 2016 as-built survey/monitoring. Cross section locations were subsequently based on the stationing of the longitudinal profile and are presented below. The locations of the cross sections and longitudinal profiles are shown in Appendix A.

- Cross Section #1: Upper Reach, Station 202+08 linear feet, midpoint of riffle
- Cross Section #2: Lower Reach, Station 252+73 linear feet, midpoint of pool
- Cross Section #3: Lower Reach, Station 254+43 linear feet, midpoint of riffle

Based on visual assessment and comparisons of the as-built, MY1 (2016), MY2 (2017), MY3 (2018), MY4 (2019) and MY5 (2020) monitoring data, XS-1 and the channel in the upper reach of the site appears stable. Remediation activites are scheduled for the lower section of the stream in the Spring of 2021, therefore no monitoring activities were completed in this area in 2020. The graph of cross section #1 is presented in Appendix A. Photo point 1 presented in Appendix B shows steady growth of herbaceous and woody vegetation. Pebble counts were not required per the permit conditions and therefore were not completed. All other monitoring activities will continue to be completed by NCDOT throughout the five-year monitoring period.

An on-site stream gauge was installed at the site in March 2019. There was one bankfull event documented by the on-site stream gauge at UT to Reedy Fork Creek Site #2 during the 2020 monitoring year. Graphs of the stream gauge data is presented in Appendix A.

3.0 VEGETATION: UT TO REEDY FORK CREEK - SITE #2 (YEAR 5 MONITORING)

3.1 Success Criteria

Mitigation Plan: Success for vegetation monitoring within the riparian buffer and wetland areas is based on the survival of at least 320 stems at year three and 260 stems of five year old trees at year five. NCDOT will attempt to suppress the Kudzu within the ROW of the mitigation sites by herbicide applications prior to reforestation and during the required post construction monitoring period.

3.2 Description of Species

The following live stake species were planted in the Streambank Area (Type I):

Salix nigra, Black Willow
Cornus amomum, Silky Dogwood

The following tree species were planted in the Buffer Area (Type II):

Liriodendron tulipifera, Tulip Poplar
Platanus occidentalis, American Sycamore
Fraxinus pennsylvanica, Green Ash
Quercus phellos, Willow Oak
Betula nigra, River Birch
Quercus michauxii, Swamp Chestnut Oak

3.3 Results of Vegetation Monitoring

Plot #	Tulip Poplar	Sycamore	Green Ash	Willow Oak	River Birch	Swamp Chestnut Oak	Total (Year 5)	Total (at planting)	Density (Trees/Acre)
1			25	4	8	23	60	60	680
2	10	5	10	2	7		34	44	525
Year 5 Average Density (Trees/Acre)									**603**
Year 4 Average Density (Trees/Acre)									634
Year 3 Average Density (Trees/Acre)									527
Year 2 Average Density (Trees/Acre)									374
Year 1 Average Density (Trees/Acre)									408

Site Notes: Black Willow and Silky Dogwood live stakes that were planted along the streambank were surviving. Lespedeza is very thick within the Site 2 Upper portion of the site, but the planted seedlings continue to survive in high numbers. Other vegetation noted onsite included baccharis, lespedeza, cattail, pokeberry, sweetgum, briars, elm, white oak, jewelweed, blackberry, pine, and various grasses.

3.4 Conclusions

There is a total of 2 vegetation monitoring plots established throughout the buffer area. The 2020 vegetation monitoring of the site revealed an average tree density of 603 trees per acre. This average is above the minimum success criteria of 260 trees per acre for Year 5. NCDOT will continue vegetation monitoring at UT to Reedy Creek – Site 2 in 2021 due to the possibility of stream replanting along the lower portion for future stream repairs.

4.0 Overall Conclusions and Recommendations

The UT to Reedy Fork Creek Site #2 has not met the required stream monitoring protocols for the fifth formal year of monitoring. Based on comparing the monitoring data to the as-built, the stream channel on the upper section remains stable at this time. Remediation activites are scheduled for the lower section of the stream in the Spring of 2021, therefore no monitroing activities were completed in this area in 2020. The streambank and buffer plantings are meeting the planted vegetation success criteria for the fifth year of monitoring.

NCDOT will continue stream and vegetation monitoring at the UT to Reedy Fork Creek Site #2 in 2021.

5.0 References

On-Site Stream Mitigation Plan for R-2413 A NC 68 Connector from SR 2011 to the Haw River; Guilford County, NC, T.I.P. Number R-2413 A&B, WBS No's: 34429.1.1, 34429.2.2, 34429.2.3, June 25, 2013.

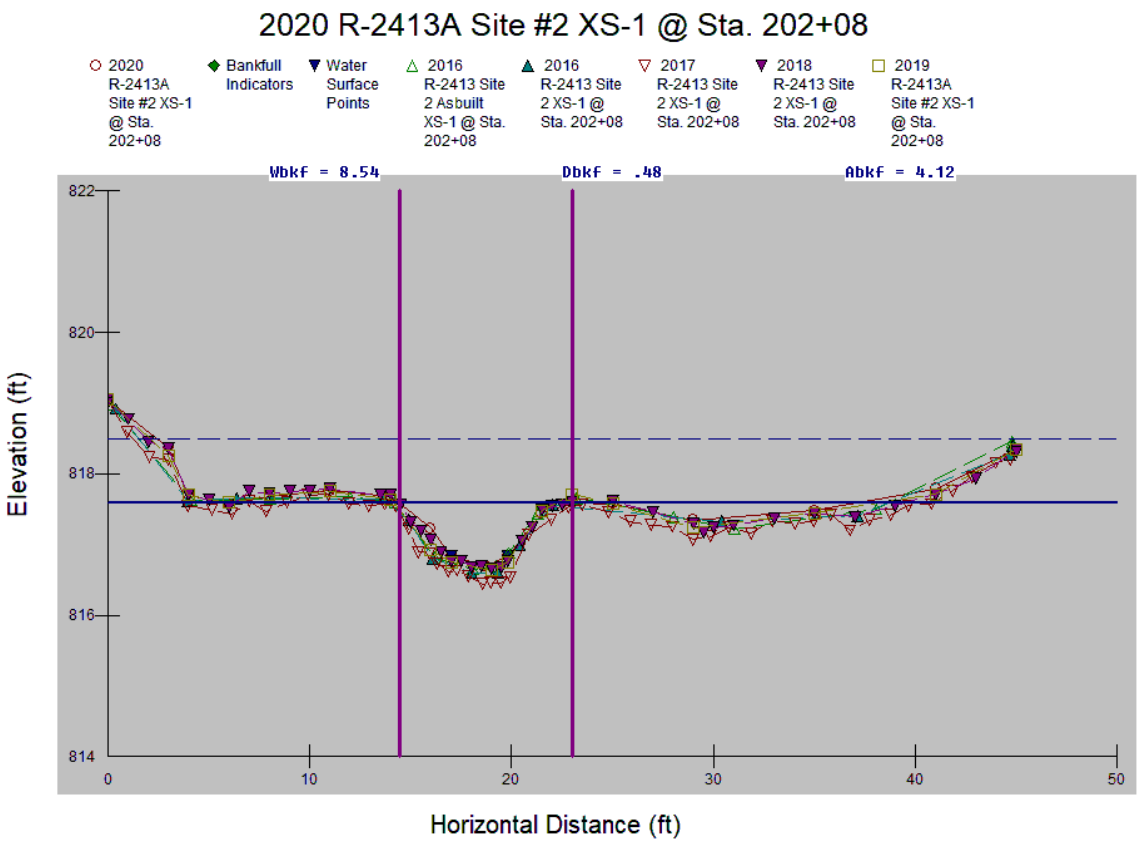
As-Built Report/Record Drawings for R-2413 Site #2 Mitigation Site, Guilford County, NC, September 28, 2016.

Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

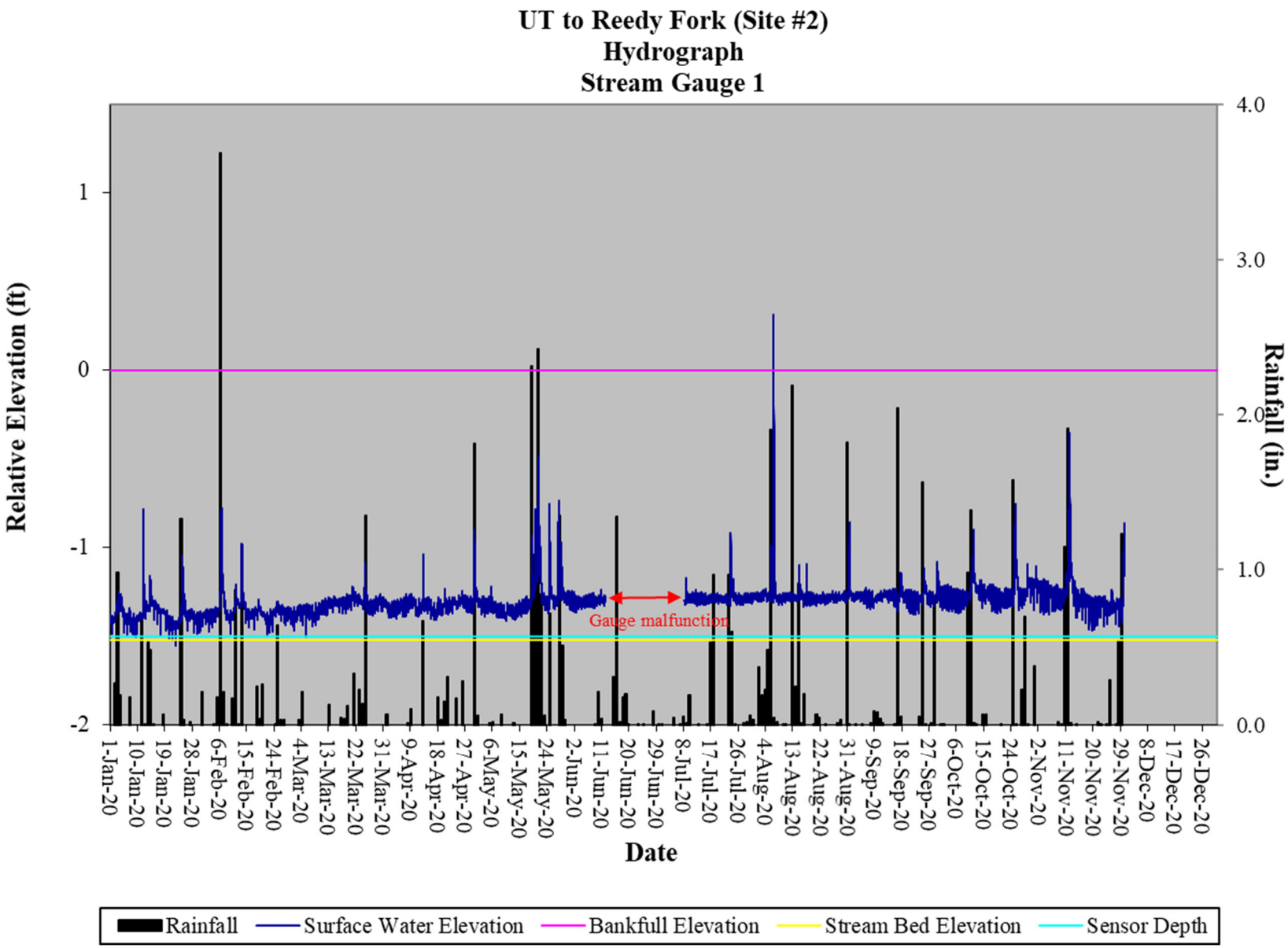
US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. Prepared with cooperation from the US Environmental Protection Agency, NC Wildlife Resources Commission, and the NC Division of Water Quality.

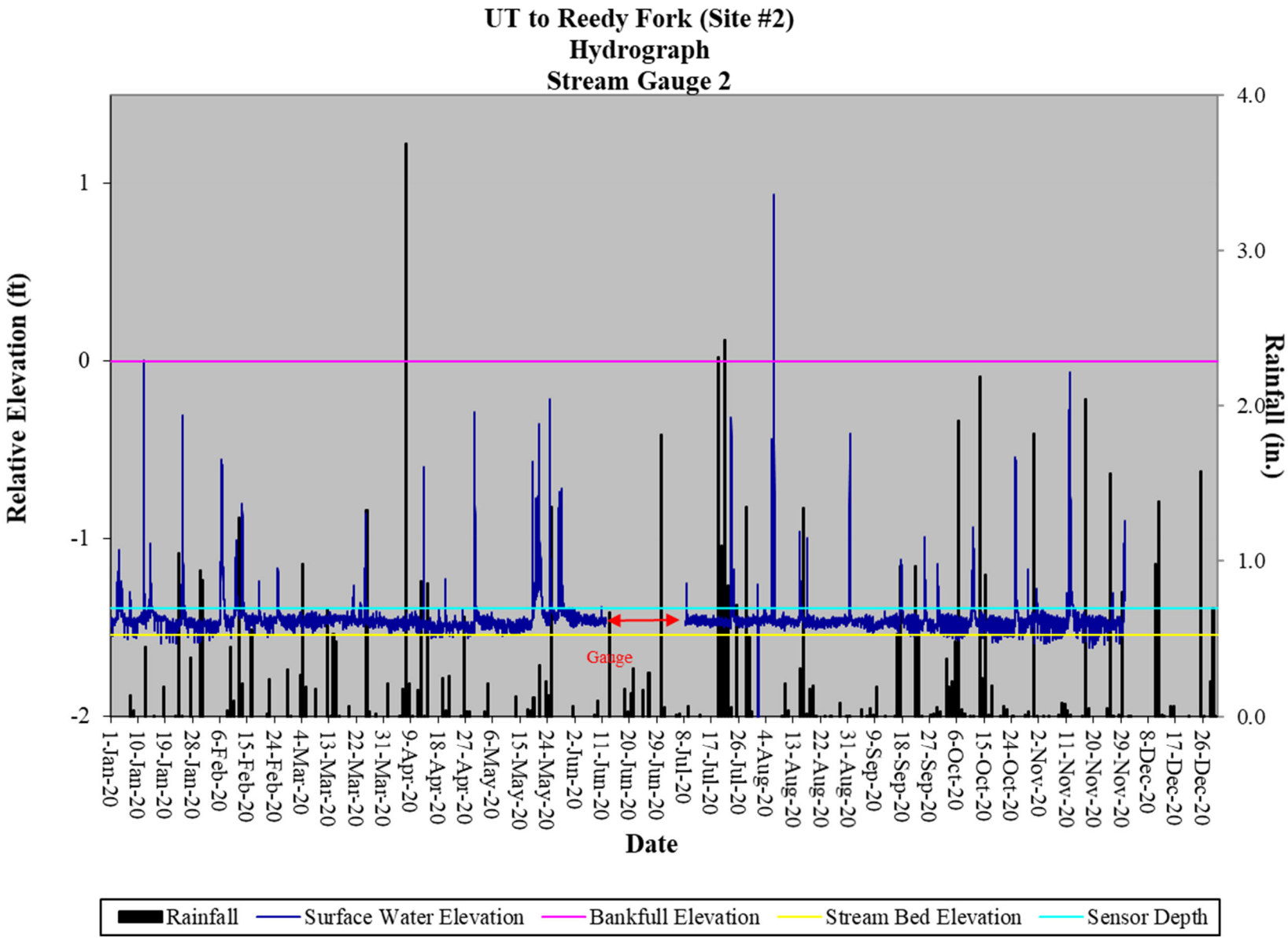
APPENDIX A

CROSS SECTION COMPARISONS
&
LONGITUDINAL PROFILE



Site 2: Cross-Section #1 (Riffle) Abbreviated Morphological Summary						
	As-built	2016	2017	2018	2019	2020
Bankfull Width (ft)	8.40	8.23	8.54	8.56	10.91	8.54
Bankfull Mean Depth (ft)	0.48	0.64	0.50	0.53	0.53	0.48
Width/Depth Ratio	17.50	12.86	17.08	16.15	20.58	17.79
Bankfull Cross Sectional Area (ft^2)	4.02	5.25	4.23	4.56	5.83	4.12
Maximum Bankfull Depth (ft)	0.86	1.01	0.91	0.94	1.07	0.90
Width of the Floodprone Area (ft)	43	44	43	43	43.97	42.57
Entrenchment Ratio	5.12	5.30	5.01	5.05	4.03	4.99


UT to Reedy Fork (Site #2)
Hydrograph
Stream Gauge 1
Relative Elevation (ft)
Rainfall (in.)
Gauge malfunction
Date
Rainfall
Surface Water Elevation
Bankfull Elevation
Stream Bed Elevation
Sensor Depth


UT to Reedy Fork (Site #2)
Hydrograph
Stream Gauge 2
Relative Elevation (ft)
Rainfall (in.)
Date
Gauge
1
0
-1
-2
4.0
3.0
2.0
1.0
0.0
1-Jan-20
10-Jan-20
19-Jan-20
28-Jan-20
6-Feb-20
15-Feb-20
24-Feb-20
4-Mar-20
13-Mar-20
22-Mar-20
31-Mar-20
9-Apr-20
18-Apr-20
27-Apr-20
6-May-20
15-May-20
24-May-20
2-Jun-20
11-Jun-20
20-Jun-20
29-Jun-20
8-Jul-20
17-Jul-20
26-Jul-20
4-Aug-20
13-Aug-20
22-Aug-20
31-Aug-20
9-Sep-20
18-Sep-20
27-Sep-20
6-Oct-20
15-Oct-20
24-Oct-20
2-Nov-20
11-Nov-20
20-Nov-20
29-Nov-20
8-Dec-20
17-Dec-20
26-Dec-20
Rainfall
Surface Water Elevation
Bankfull Elevation
Stream Bed Elevation
Sensor Depth

APPENDIX B

SITE PHOTOGRAPHS

UT to Reedy Fork Creek Site #2

Photo Point #1 (Upstream)

Photo Point #1 (Downstream)

UT to Reedy Fork Creek Site #2

Vegetation Plot #1

Vegetation Plot #2

Overview Photo Looking Upstream from the NC 68 Connector.

Overview Photo Looking Downstream from the NC 68 Connector.

July 2020

APPENDIX C

CROSS SECTION, VEGETATION PLOT & PHOTO POINT LOCATIONS (AS-BUILT PLANS)

DESC.	STATION (AS-BUILT)	ELEV. (AS-BUILT)
RCV1	200+01.3	821.36
HR1	200+12.6	820.87
RCV2	200+42.0	820.21
HR2	200+60.3	819.86
RCV3	200+83.4	819.49
HR3	201+06.3	819.19
RCV4	201+36.7	818.47
HR4	201+53.2	818.00
RCV5	201+80.7	817.69
HR5	201+99.3	817.08
RCV6	202+24.4	816.46
HR6	202+36.8	816.21
RCV7	202+70.4	815.54
HR7	202+86.3	815.00
RCV8	203+15.8	814.40
HR8	203+39.3	813.78
RCV9	203+56.2	813.62
HR9	203+78.3	813.08
RAV1	204+01.5	812.71

PREPARED IN THE OFFICE OF:

Kimley»Horn ©2016

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PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-6

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT

APPROVED BY:

DATE:

SITE 2-UPPER PLAN RECORD DRAWINGS

30 15 0 30 60

NAD 83

DESIGN EL. = 819.81
AS-BUILT EL. = 820.21
ELEVATION ADJUSTED BY CONTRACTOR TO MATCH UPSTREAM ADJUSTMENTS.

DESIGN EL. = 819.00
AS-BUILT EL. = 819.49
ELEVATION ADJUSTED BY CONTRACTOR TO MATCH UPSTREAM ADJUSTMENTS.

DESIGN EL. = 817.90
AS-BUILT EL. = 818.47
ELEVATION ADJUSTED BY CONTRACTOR TO MATCH UPSTREAM ADJUSTMENTS.

DESIGN EL. = 816.04
AS-BUILT EL. = 816.46
ELEVATION ADJUSTED BY CONTRACTOR TO MATCH UPSTREAM ADJUSTMENTS.

DESIGN EL. = 813.95
AS-BUILT EL. = 814.40
ELEVATION ADJUSTED BY CONTRACTOR TO MATCH UPSTREAM ADJUSTMENTS.

DESIGN EL. = 813.14
AS-BUILT EL. = 813.62
ELEVATION ADJUSTED BY CONTRACTOR TO MATCH UPSTREAM ADJUSTMENTS.

DESIGN EL. = 812.24
AS-BUILT EL. = 812.71
ELEVATION ADJUSTED BY CONTRACTOR TO MATCH UPSTREAM ADJUSTMENTS.

SITE 2-UPPER

200+00 201+00 202+00 203+00 204+00

VEG PLOT 1

XS-1

PHOTO POINT 1

DESIGN EL. = 820.7
AS-BUILT EL. = 821.36
CONTRACTOR ADJUSTED INVERT IN FIELD TO BETTER MATCH TIE-IN ELEVATION. THIS ADJUSTMENT CONTINUED THROUGH THE PROFILE TO MAINTAIN THE OVERALL CHANNEL SLOPES SHOWN IN THE DESIGN DRAWINGS.

DESIGN EL. = 817.34
AS-BUILT EL. = 817.69
ELEVATION ADJUSTED BY CONTRACTOR TO MATCH UPSTREAM ADJUSTMENTS.

DESIGN EL. = 815.12
AS-BUILT EL. = 815.54
ELEVATION ADJUSTED BY CONTRACTOR TO MATCH UPSTREAM ADJUSTMENTS.

-L- N 54° 40' 00.0" E

TIE PROPOSED WOVEN WIRE FENCE TO RIGHT-OF-WAY FENCING

BEGIN RELOCATION STA. 200+89

PROPOSED WOVEN WIRE FENCE

END RELOCATION STA. 204+23.77, TIE TO 36" RCP.

NORTH CAROLINA PROFESSIONAL SEAL L-2828 LAND SURVEYOR MICHAEL D. CASE

RECORD DRAWING

I, Michael D. Case, PLS, certify that the as-built information was from an actual field location under my direct supervision. The horizontal and vertical datum was referenced to the coordinate system supplied by NCDOT.

Michael D. Case, PLS — 9.23.2016 Date

09/26/11

PREPARED IN THE OFFICE OF:

Kimley»Horn ©2016

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PHONE: (919) 677-2000

PROJECT REFERENCE NO.	SHEET NO.
R-2413A&B	OSM-7

PROJECT ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT

APPROVED BY:

DATE:

SITE 2-LOWER PLAN RECORD DRAWINGS

30 15 0 30 60

NAD 83 NSRS 2011

MATCHLINE SEE SHEET OSM-6

MATCHLINE SEE SHEET OSM-5

SITE 2-LOWER

DESIGN EL. = 804.71
AS-BUILT EL. = 805.17
ELEVATION ADJUSTED IN THE FIELD TO BETTER MATCH ADJACENT FLOODPLAIN CONDITIONS.

DESIGN EL. = 803.46
AS-BUILT EL. = 803.15
ELEVATION ADJUSTED IN THE FIELD TO BETTER MATCH ADJACENT FLOODPLAIN CONDITIONS.

DESIGN EL. = 796.90
AS-BUILT EL. = 797.36
ELEVATION ADJUSTED IN THE FIELD TO BETTER MATCH ADJACENT FLOODPLAIN CONDITIONS.

DESIGN EL. = 794.96
AS-BUILT EL. = 795.20
ELEVATION ADJUSTED IN THE FIELD AND STRUCTURE CONVERTED TO ROCK CROSS VANE IN ORDER TO TIE-IN TO EXISTING BEDROCK.

VEG PLOT 2

PHOTO POINT 2

PHOTO POINT 3

XS-2

XS-3

250+00 251+00 252+00 253+00 254+00 255+00

DESC.	STATION (AS-BUILT)	ELEV. (AS-BUILT)
RAV1	250+34.6	808.70
HR1	250+47.4	807.66
RAV2	250+74.6	807.40
HR2	251+00.0	806.72
RAV3	251+25.6	805.17
HR3	251+48.5	805.69
RAV4	251+65.1	805.18
HR4	251+92.8	804.31
RAV5	252+11.0	803.15
HR5	252+39.8	802.07
RAV6	252+57.9	801.79
HR6	252+86.2	800.52
RAV7	253+05.9	800.34
HR7	253+27.8	799.16
RAV8	253+48.7	798.88
HR8	253+75.8	797.45
RAV9	253+99.4	797.36
HR9	254+29.9	795.21
RAV10	254+49.9	795.20
HR10	254+68.9	794.86

RECORD DRAWING

I, Michael D. Case, PLS, certify that the as-built information was from an actual field location under my direct supervision. The horizontal and vertical datum was referenced to the coordinate system supplied by NCDOT.

Michael D. Case, PLS — Date: 9.23.2016

NORTH CAROLINA PROFESSIONAL SEAL L-2828 LAND SURVEYOR MICHAEL D. CASE