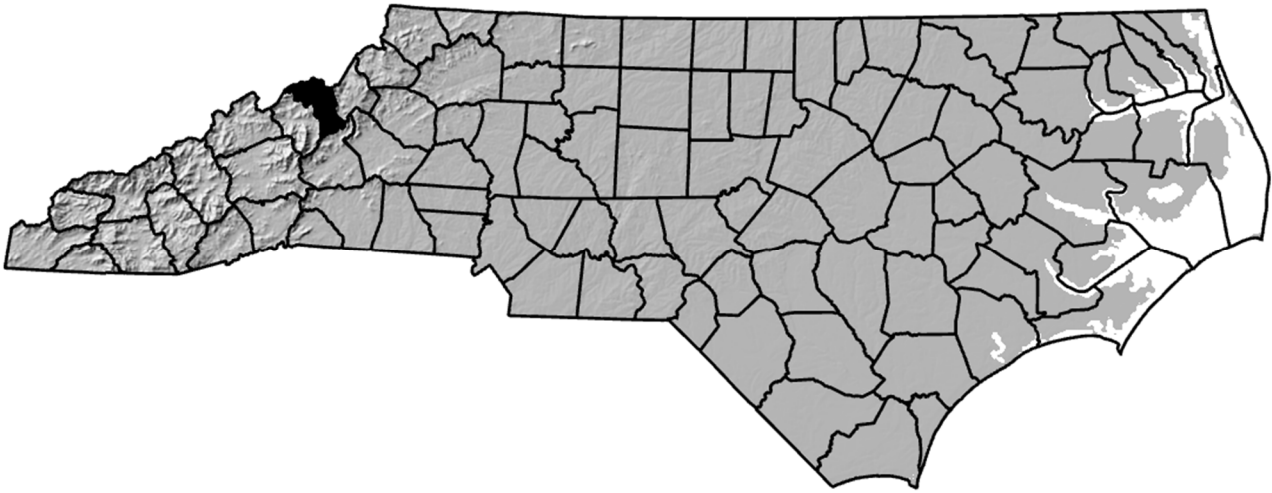


ANNUAL REPORT FOR 2023



UT to Brushy Creek Site #30 Mitigation Site

ONE ID #: 061-004

Mitchell County

TIP No. R-2519B

COE Action ID: SAW-2004-9987181 / 2004-30631

NCDWR Project #: 2013-0743v.2



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SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the year 2023 at the UT to Brushy Creek Site #30 mitigation site in Mitchell County. The North Carolina Department of Transportation (NCDOT) completed the streambank reforestation at this project in March 2020. This report provides the monitoring results for the fourth formal year of monitoring (Year 2023). The Year 2023 monitoring period is the fourth of five scheduled years of monitoring on the UT to Brushy Creek Site #30 mitigation site.

Based on the overall conclusions of monitoring at the UT to Brushy Creek Site #30, it has met the required monitoring protocols for the fourth formal year of monitoring on the stream. The channel throughout the stream site is stable. The 2023 vegetation monitoring of the site revealed an average tree density of 680 trees per acre. This average is well above the minimum success criteria of 290 trees per acre for Year 4. In September 2023, a herbicide treatment was applied to invasive species on the site.

Remediation work that was completed at the site upstream of the US 19 highway crossing in August of 2022 remains stable and streambank erosion in this area has abated. Photos of the remediation efforts can be found in Appendix B.

NCDOT proposes to continue stream and vegetation monitoring at the UT to Brushy Creek Site #30 mitigation site in 2024.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2023 at UT to Brushy Creek Site #30. Site #30 is located on US 19 at the intersection with Penland Road and Brushy Creek Road in Mitchell County from Sta. 319+92 to 323+03 -L- Lt. and from Sta. 324+10 to 325+10 -L- Rt. (Figure 1). The UT to Brushy Creek Site #30 was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2519B in Yancey and Mitchell Counties.

The mitigation site provided approximately 635 linear feet of stream relocation and restoration. Streambank reforestation was completed in March 2020 by NCDOT. The relocation and restoration of the UT to Brushy Creek Site #30 involved restoring the channel to its historic, relic location. The stream runs under US 19 through two new 8x8 reinforced concrete box culverts and flows into an adjacent field re-establishing the original flow path. A new floodplain and channel were excavated and several in- stream structures such as cross vanes were installed. The planted riparian buffer zone is greater than 50 feet on both sides of the stream. No utility easements affect this mitigation site.

1.2 Purpose

In order for a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2023 at the UT to Brushy Creek Site #30. Hydrologic monitoring was not required for this site.

1.3 Project History

March 2020	Streambank Reforestation Completed
September 2020	Stream Channel and Vegetation Monitoring (Year 1)
February 2021	Supplement Buffer Planting Completed
April 2021	NCDOT and Regulatory Agency Onsite Review
July 2021	Vegetation Monitoring (Year 2)
August 2021	Herbicide Application on Invasive Species
September 2021	Stream Channel Monitoring (Year 2)
August 2022	Vegetation Monitoring (Year 3)
August 2022	Stream Channel Monitoring (Year 3)
August 2022	Stream Remediation on Upstream Section Completed
September 2022	Herbicide Application on Invasive Species
July 2023	Vegetation Monitoring (Year 4)
September 2023	Herbicide Application on Invasive Species
November 2023	Stream Channel Monitoring (Year 4)

1.4 Debit Ledger

The entire UT to Brushy Creek Site #30 stream mitigation site was used for the R-2519B project to compensate for unavoidable stream impacts.



Figure 1. Site #30 Vicinity Map

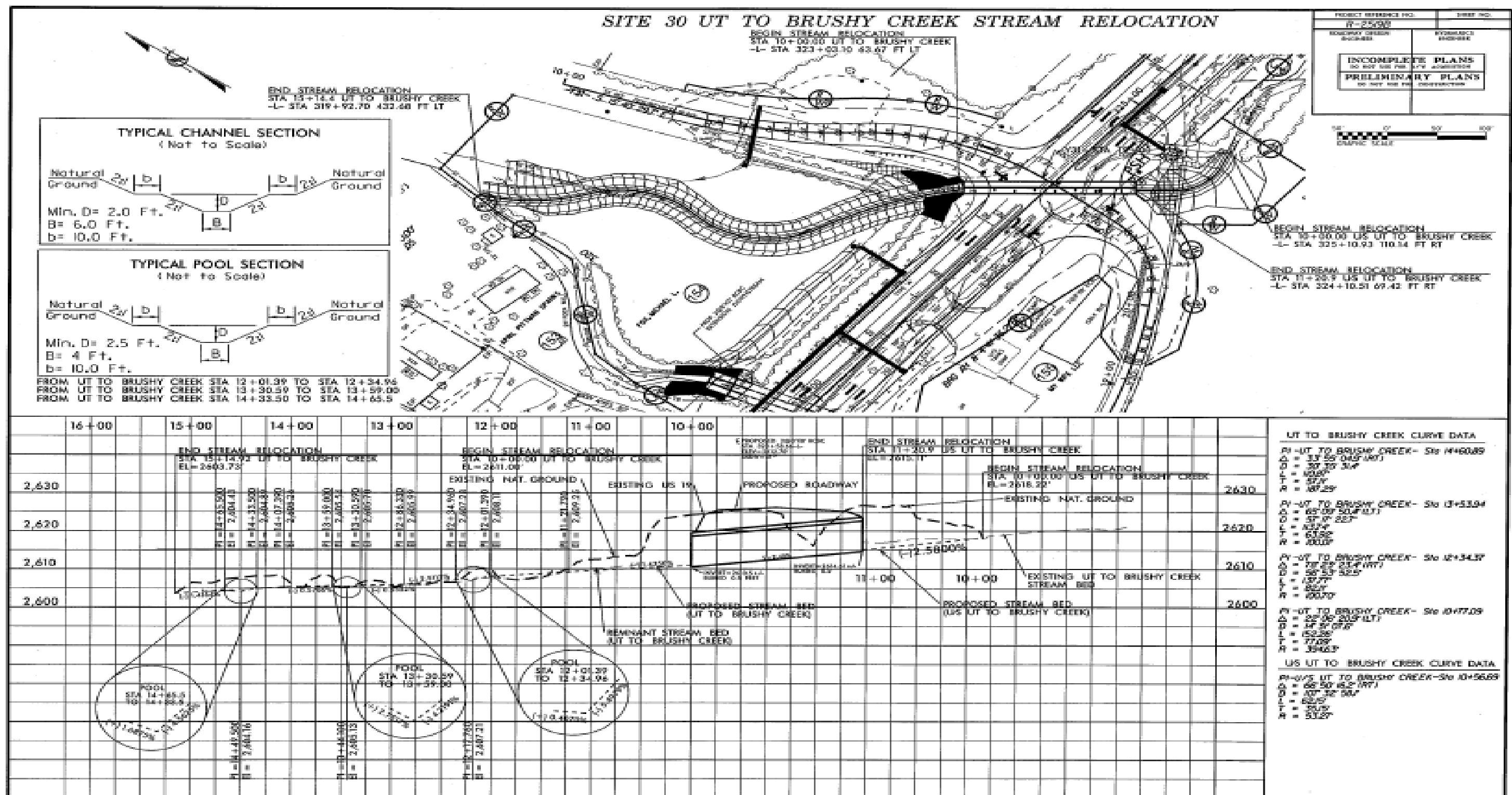


Figure 2. Site #30 Permit Drawing

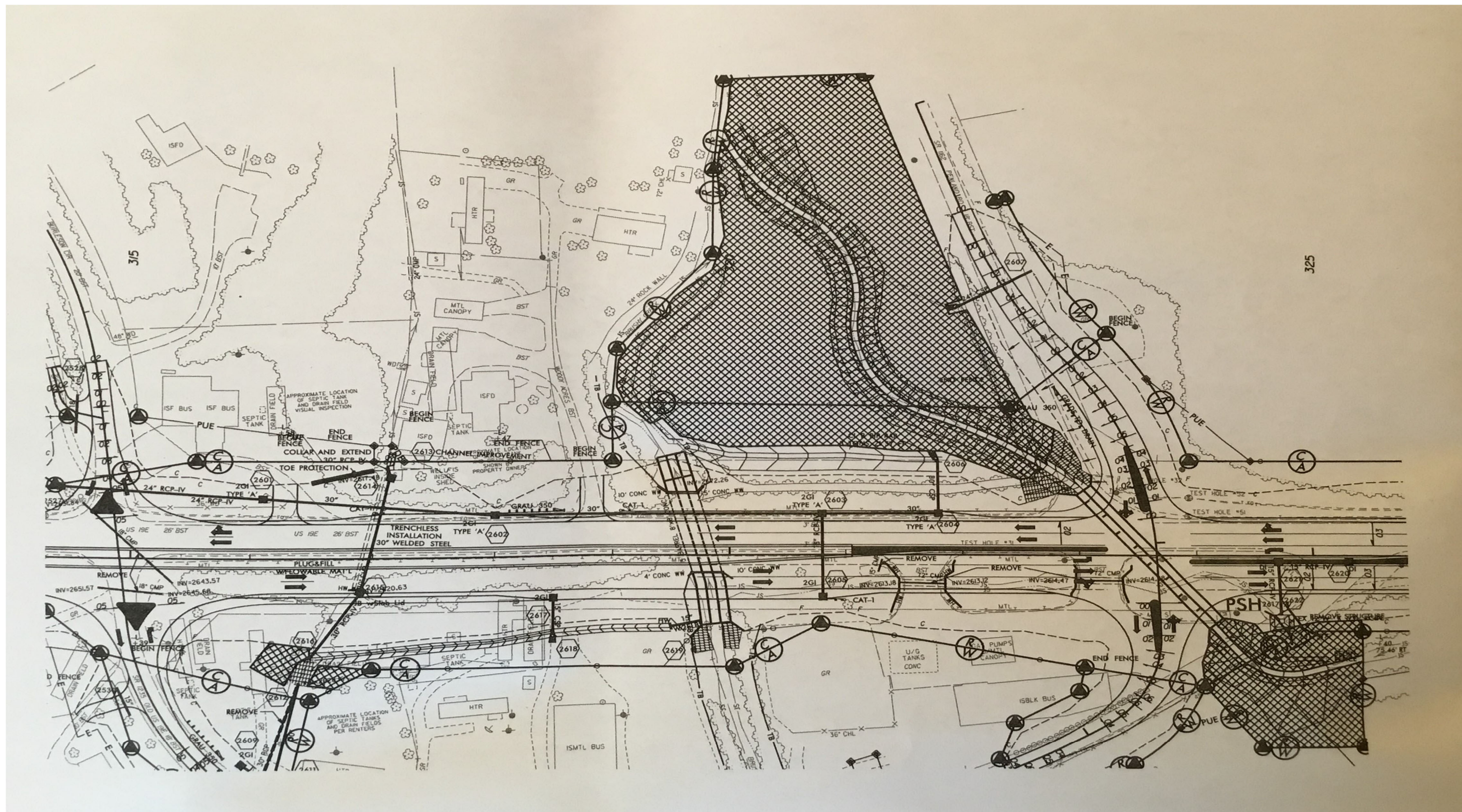


Figure 3. Site #30 Reforestation Plan

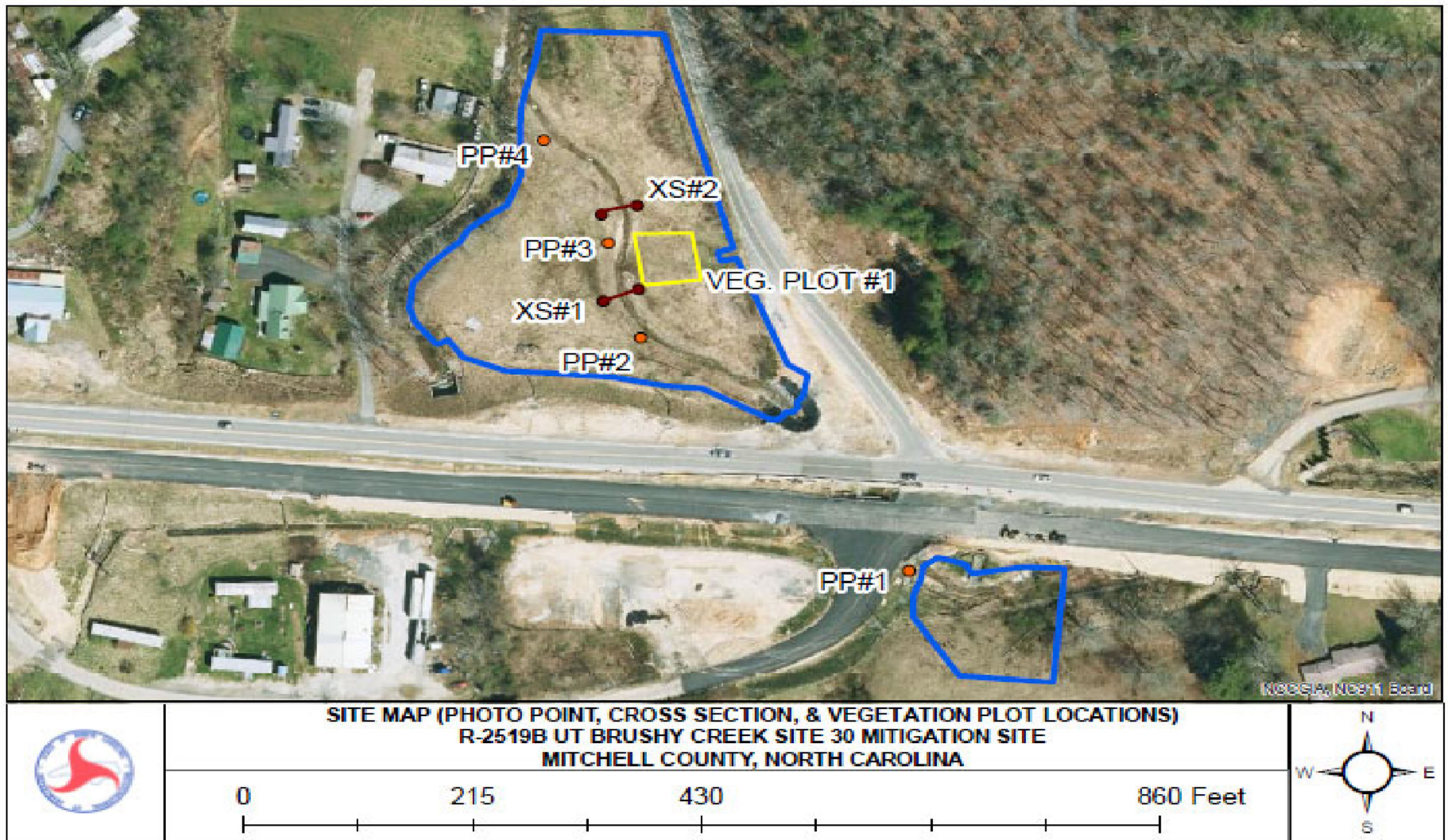


Figure 4. Site #30 Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

Based on email correspondence with the Regulatory Agencies (July 1, 2020) it was agreed to follow the mitigation plan language as it relates to the vegetation monitoring.

Mitigation Plan

Performance Standards

Performance standards are based on the April 2003 Stream Mitigation Guidelines. Success for vegetation monitoring within the riparian buffer areas will be based on the survival of at least 260 stems of five-year old trees at year five. Assessment of channel stability will be based on the survival of riparian vegetation and lack of significant bank erosion, channel widening or downcutting.

Monitoring Requirements

Each site will be monitored for five years with no less than two bankfull events, which must occur in separate monitoring years and be documented. If less than two bankfull events occur during the first five years, monitoring will continue until the second bankfull event is documented. The following components of Level 1 monitoring will be performed annually for the monitoring period: reference photos, plant survival monitoring (identification of specific problem areas and remedial action), and visual inspection of channel stability. Vegetation stem counts will be conducted on Sites 8, 21, and 30 only. Physical measurements of channel stability/morphology will only be performed on Site 30. An as-built will be submitted for each site and will include stream channel profile and cross-section surveys which will provide a baseline for comparison if it is determined at any time during the monitoring period that a problem has occurred. Annual monitoring reports will be made available on the NCDOT website.

NCDWR Condition #1

The permittee shall visually monitor the vegetative plantings to assess and ensure complete stabilization of the mitigation stream segments. Riparian area success shall be determined by conducting stem counts to ensure a tree survival rate of 320 stems/acre. The monitoring shall be conducted annually for a minimum of 3 years after final planting. Photo documentation shall be utilized to document the success of the riparian vegetation and submitted to NCDWR in a final report within sixty days after completing monitoring. After 3 years the NCDOT shall contact NCDWR to schedule a site visit to "close out" the mitigation site.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The relocation and restoration of the UT to Brushy Creek Site #30 involved restoring the channel to its historic, relic location. The stream will run under US 19 through two new 8x8 reinforced concrete box culverts and will flow into an adjacent field re-establishing the original flow path. A new floodplain and channel were excavated and several in-stream structures such as cross vanes installed. The planted riparian buffer zone will be greater than 50 feet on both sides of the stream. No utility easements will affect this mitigation site.

2.2.2 Monitoring Conditions

The objective of the UT to Brushy Creek Site #30 stream relocation and restoration was to restore a stream as identified in Rosgen's Applied River Morphology. A total of two cross sections (one in a riffle and one in a pool) were surveyed. For this report, only cross sections containing riffles were used in the comparison of channel morphology presented below in Table 1.

Table 1. Site #30 Morphological Summary

UT to Brushy Creek Site #30 XS-1					
Variable	2020	2021	2022	2023	2024
Width of the Floodprone Area (ft.)	35.0	35.0	35.0	35.0	
Bankfull Width (ft.)	12.8	12.5	12.8	12.6	
Entrenchment Ratio	2.7	2.8	2.7	2.8	
Bankfull Mean Depth (ft.)	1.0	1.0	1.1	1.1	
Maximum Bankfull Depth (ft.)	1.5	1.6	1.6	1.9	
Width/Depth Ratio	12.9	12.0	12.1	11.6	
Bankfull Cross Sectional Area (ft ²)	12.6	13.0	13.7	13.8	

*Riffle values are used for classification purposes, pool values are shown in Appendix A.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of two cross sections and the longitudinal profile of the UT to Brushy Creek Site #30 established by NCDOT after construction. The length of the profile along the site was approximately 525 linear feet. Two cross sections were established during the as-built monitoring year. Cross section locations were subsequently based on the stationing of the longitudinal profile and are presented below. The location of the cross sections are shown in Appendix A.

UT to Brushy Creek Site #30 Cross-Sections:

- ◆ Cross-Section #1: UT to Brushy Creek Site #30, Sta. 12+33, head of riffle
- ◆ Cross Section #2: UT to Brushy Creek Site #30, Sta. 13+40, midpoint of pool

Based on comparisons of the as-built to the MY4 (2023) monitoring data, both cross sections appear stable with little or no active bank erosion. Graphs of the cross sections are presented in Appendix A. Future survey data will vary depending on the actual location of rod placement and alignment; however, this information should remain similar in appearance. Longitudinal profile survey was not conducted because the height of the vegetation along the stream reach limits the line of sight for survey equipment. A visual inspection of the site showed that there were no visible signs of erosion along the restored stream reach.

Remediation work was completed at the site upstream of the US 19 highway crossing in August of 2022. The remediation work comprised of grading the left bank back and installing boulder toe protection to repair bank erosion that had continued throughout the monitoring period. A visual inspection of this area in 2023 indicates the left bank is stable and erosion has subsided. Photos of the remediation area are shown in Appendix B.

3.0 VEGETATION: UT TO BRUSHY CREEK SITE #30

3.1 Description of Species

The following tree species were planted on the stream bank:

Salix nigra, Black Willow

Cephalanthus occidentalis, Buttonbush

The following tree species were planted in the buffer area:

Liriodendron tulipifera, Yellow Poplar

Platanus occidentalis, Sycamore

Fraxinus pennsylvanica, Green Ash

Quercus alba, White Oak

Quercus rubra, Northern Red Oak

Betula nigra, River Birch

Quercus phellos, Willow Oak

3.2 Results of Vegetation Monitoring

Plot #	Yellow Poplar	Sycamore	Green Ash	White Oak	Northern Red Oak	Willow Oak	Total (Year 4)	Total (at planting)	Density (Trees/Acre)
1	12	28					40	40	680
Year 4 Average Density (Trees/Acre)									680
Year 3 Average Density (Trees/Acre)									680
Year 2 Average Density (Trees/Acre)									680
Year 1 Average Density (Trees/Acre)									680

Site Notes: Live stakes were surviving along the streambanks. Volunteer Sycamore were noted. Some Japanese Knotweed and Multiflora Rose were noted onsite. Invasive species were sprayed by Division 13 Roadside in September 2023

3.3 Conclusions

There is one vegetation monitoring plot located within the stream buffer area. The 2023 vegetation monitoring of the site revealed an average tree density of 680 trees per acre. This average is well above the minimum success criteria of 290 trees per acre for Year 4. NCDOT proposes to continue monitoring planted vegetation in 2024.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The UT to Brushy Creek Site #30 has met the required monitoring protocols for the fourth formal year of monitoring. The channel throughout the stream site is stable. The streambank and buffer area planted vegetation are surviving. The remediation of the upper section, performed in August of 2022, remains stable and erosion has subsided. The Division 13 Roadside Environmental Unit completed spraying of the invasive species in September of 2023.

NCDOT proposes to continue stream and vegetation monitoring the UT to Brushy Creek Site #30 in 2024.

5.0 REFERENCES

Mitigation Plan, US 19E Widening, Yancey and Mitchell Counties, North Carolina TIP Number R-2519B, WBS No. 35609.1.1, May 6, 2013 (Revised November 4, 2013)

Department of the Army Permit, Permittee: North Carolina Department of Transportation, Permit No. 2004-9987181 / 2004-30631, TIP No. R-2519B, Issuing Office: CESA-W-RG-A

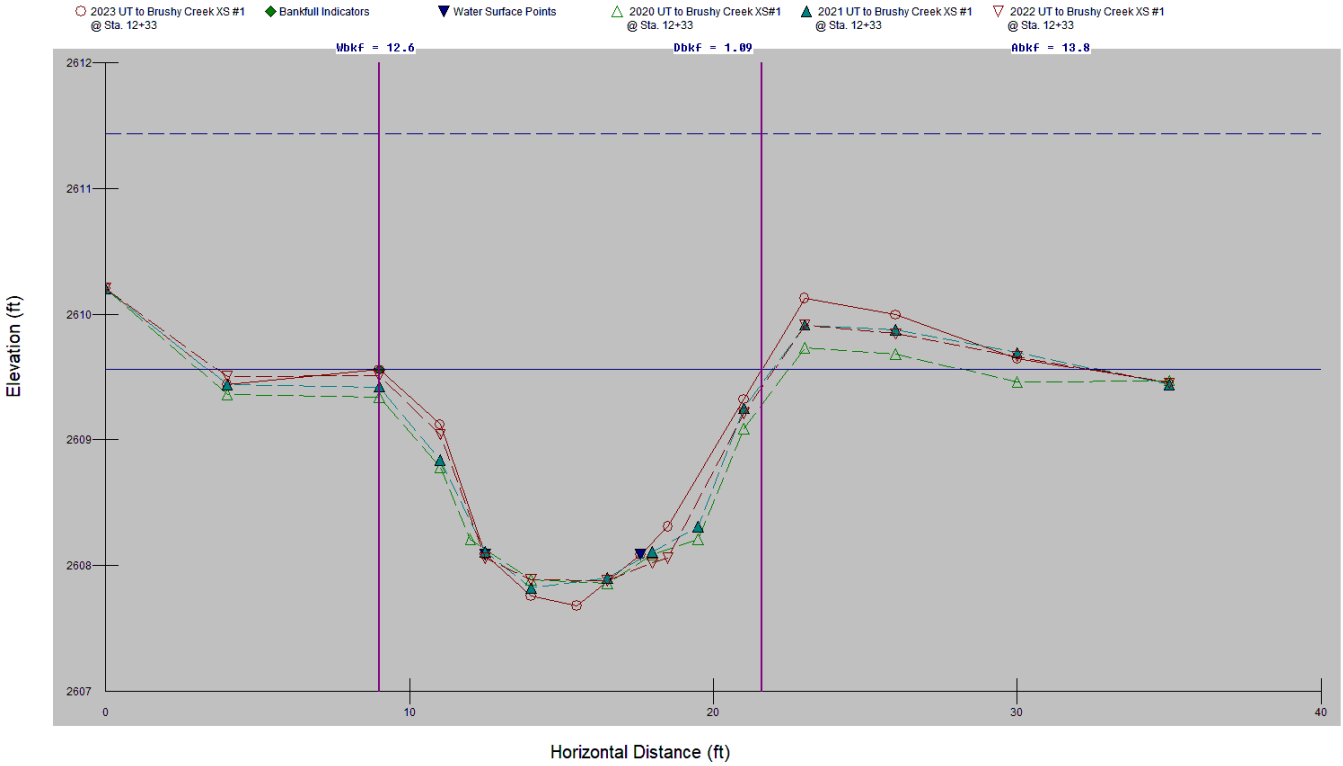
North Carolina Department of Environment and Natural Resources, Division of Water Resources, December 2, 2013, Proposed improvements to US 19E from SR 1186 in Yancey County to multilane section west of Spruce Pine in Mitchell County, State Project No. 6.909001T, WBS Element No. 35609.1.1, TIP R-2519B, NCDWR Project No. 2013-0743v.2

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

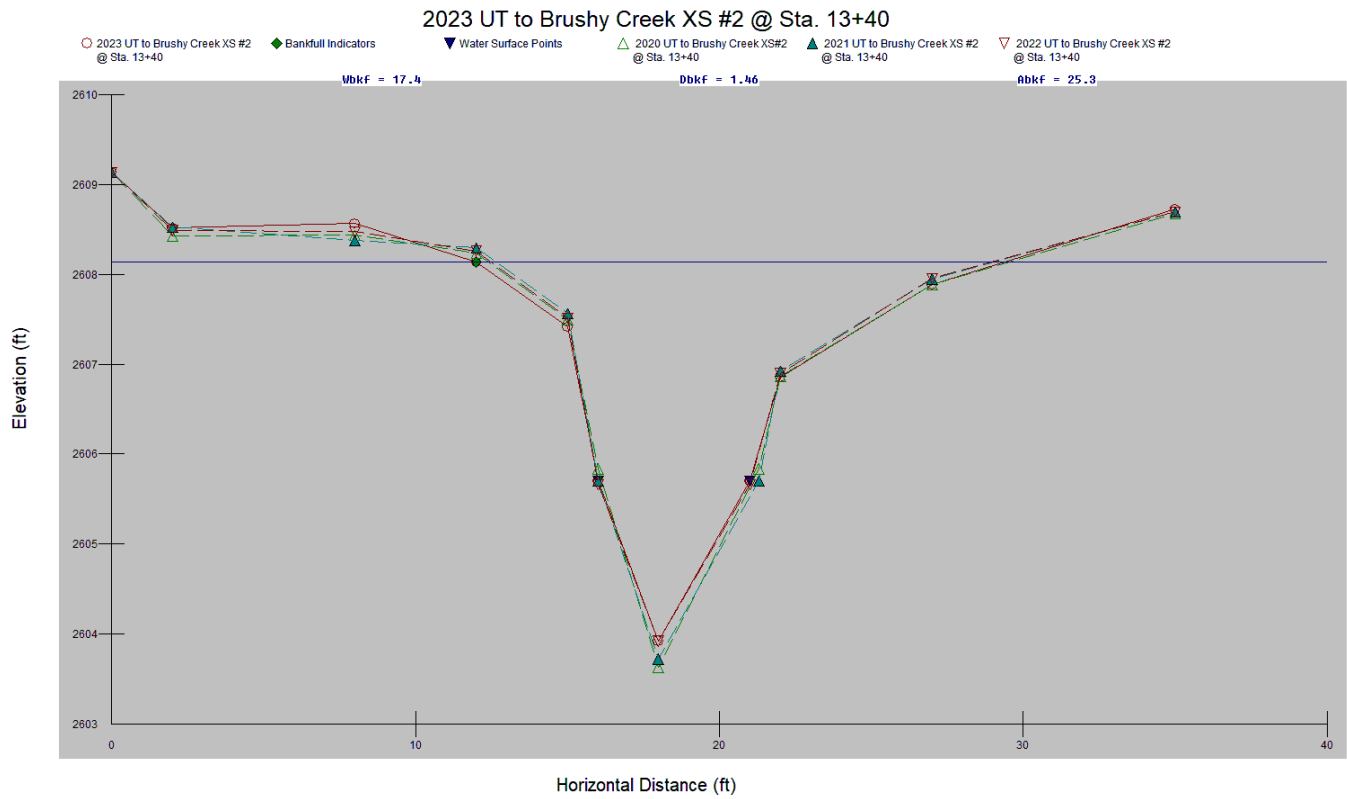
US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. Prepared with cooperation from the US Environmental Protection Agency, NC Wildlife Resources Commission, and the NC Division of Water Resources.

APPENDIX A
CROSS SECTIONS

2023 UT to Brushy Creek XS #1 @ Sta. 12+33



Site #30: Cross-Section #1 (Riffle) Abbreviated Morphological Summary					
Monitoring Year	2020	2021	2022	2023	2024
Width of the Floodprone Area (ft.)	35.0	35.0	35.0	35.0	
Bankfull Width (ft.)	12.8	12.5	12.8	12.6	
Entrenchment Ratio	2.7	2.8	2.7	2.8	
Bankfull Mean Depth (ft.)	1.0	1.0	1.1	1.1	
Maximum Bankfull Depth (ft.)	1.5	1.6	1.6	1.9	
Width/Depth Ratio	12.9	12.0	12.1	11.6	
Bankfull Cross Sectional Area (ft2)	12.6	13.0	13.7	13.8	



Site #30: Cross-Section #2 (Pool) Abbreviated Morphological Summary					
Monitoring Year	2020	2021	2022	2023	2024
Bankfull Width (ft.)	18.5	18.7	18.24	17.38	
Bankfull Mean Depth (ft.)	1.5	1.5	1.06	1.46	
Maximum Bankfull Depth (ft.)	4.6	4.6	4.34	4.22	
Bankfull Cross Sectional Area (ft2)	27.5	28.1	26.75	25.29	

*According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.

APPENDIX B
SITE PHOTOGRAPHS

UT to Brushy Creek Site #30



Photo Point #1 (Upstream)



Photo Point #1 (Downstream)



Photo Point #2 (Upstream)



Photo Point #2 (Downstream)

November 2023

UT to Brushy Creek Site #30



Photo Point #3 (Upstream)



Photo Point #3 (Downstream)



Photo Point #4 (Upstream)



Photo Point #4 (Downstream)

November 2023

UT to Brushy Creek Site #30



Upstream Section



Upstream Section Alternate View

November 2023

UT to Brushy Creek Site #30



Vegetation Plot #1

July 2023

UT to Brushy Creek Site #30



Aerial View of Lower Stream Segment



Aerial View of Upper Stream Segment

Site #30 Remediation Work



August 2022

Site #30 Remediation Work



August 2022

Site #30 Remediation Work



August 2022