FINAL
YEAR 5 (2018) MONITORING REPORT
UT TO MARTIN'S CREEK (CONTRERAS) MITIGATION PROJECT

Cherokee County, North Carolina
DMS Project No. 92766 (Contract No. 005717)
USACE Action ID No. 2010-00961/DWR Project No. 2010-00448
SCO No. 08-07249-01

Data Collection – March-November 2018

Hiwasssee River Basin
Cataloging Unit 06020002170010

SUBMITTED TO/PREPARED FOR:
North Carolina Department of Environmental Quality
Division of Mitigation Services
217 West Jones Street, Suite 3000A
Raleigh, North Carolina 27603

December 2018

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217 West Jones Street, Suite 3000A
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SUBMITTED BY:

Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603

December 2018

Axiom Environmental, Inc.

Axiom Environmental, Inc.

218 Snow Avenue, Raleigh, NC 27603 919-215-1693

December 5, 2018

Mr. Matthew Reid
North Carolina Department of Environmental Quality
Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

RE: UT to Martin's Creek (Contreras) Monitoring (DMS Project # 92633, Contract # 005717)
Final MY5 (2018) Annual Monitoring Report **12-004.16**

Dear Matthew:

Axiom Environmental, Inc. (AXE) is pleased to provide you with three hard copies and a CD of digital files for the Final UT to Martin's Creek (Contreras) Annual Monitoring Report. We received your comments via email on December 3, 2018 and have addressed them as follows:

- 2.2 Vegetation: Please add sentence at the end of the invasive species discussion: DMS will continue invasive species treatment in 2019.
  This sentence was added at the end of the invasive species discussion.

- 2.2 Vegetation: Please add sentence to section discussing wetland delineation services: DMS is not seeking additional wetland credit for the site.
  This sentence was added to the section discussing wetland delineation services.

- Table 2: Please add two additional lines under Year 5 Monitoring for Vegetation Monitoring and Stream Monitoring with corresponding dates.
  These rows have been added to Table 2.

- Cross Sections and Table 11: Please double check XS7 and XS8. According to Table 11a, these two sections did not hold the Abkf constant in the dimension calculations. Please update graphs and table as necessary.
  The data for cross sections 7 and 8 were revised to assure that the bankfull area remained fixed from last year's data. The graph and table were updated to reflect this change.

- As Axiom has done in the past, please include a response to the comment letter and how/where the comments were addressed. Please insert this letter directly behind the cover page in the final deliverables.
  This comment letter has been included just behind the cover page in the final deliverable. A word document is also included in the digital submittal.

Please let me know if you have any questions or comments regarding any component of this submittal. Thank you for the opportunity to continue to assist the Division of Mitigation Services with this important project.

Sincerely,
AXIOM ENVIRONMENTAL, INC.

Kenan Jernigan
Project Scientist

Attachments: 3 hardcopies Final UT to Martin's Creek (Contreras) MY5 (2018) Annual Monitoring Report
1 CD containing digital support files

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Appendices

1.0 PROJECT SUMMARY

The North Carolina Division of Mitigation Services (DMS) has established the UT to Martin's Creek (Contreras) Mitigation Project (Site) located in Cherokee County, just south of the town of Murphy. The Site is encompassed within 14-digit Cataloging Unit 06020002170010 of the Hiwassee River Basin (Figure 1, Appendix B and Table 4, Appendix A). Land use at the Site, prior to mitigation activities, was composed of agricultural uses, logging, grass land, single-family residences, and forested areas. Martin's Creek and its tributaries had been impaired by historical and current land management practices, which include timber harvesting, pasture, channelization, and livestock grazing. Completed project activities, reporting history, completion dates, project contacts, and project attributes are summarized in Tables 1-4 (Appendix A).

The Site is located on tributaries to Martin's Creek, which have been assigned Stream Index Number 1-49 and a Best Usage Classification of C. Site streams are listed on the NCDWQ draft 2014 and final 2012 Section 303(d) list of impaired streams due to a fair bioclassification for ecological/biological integrity and fish communities, and elevated levels of fecal coliform bacteria. The Site is located within a Targeted Local Watershed that has been identified for stream and buffer restoration opportunities (NCDMS 2008).

The Site lies within the focus area of the *Peachtree-Martins Creek Local Watershed Plan* (LWP). Goals of the LWP include working with local landowners, resource agencies, and nongovernmental groups to implement wetland and stream restoration projects that reduce sources of sediment and nutrients by restoring riparian buffers, stabilizing stream banks, and restoring natural channel geomorphology, particularly in headwater streams. The NCDMS is also placing an emphasis on projects that contribute to the restoration and protection of habitat for priority fish, mussel, snail, and crayfish species in the basin (NCDMS 2008).

The project goals will directly address stressors identified in the Peachtree-Martins Creek LWP, namely lack of riparian vegetation, channel modification, excess sediment inputs, excess nutrient inputs, and bacterial contamination as follows.

- Restore geomorphically stable stream channels within the Site;
- Restore or enhance wetlands;
- Exclude livestock from accessing project streams, wetlands, and riparian zones;
- Improve and restore hydrologic connections and achieve uplift of ecosystem functions;
- Improve water quality within the Site by reducing bank erosion, improving nutrient and sediment removal, and stabilizing stream banks;
- Restore and preserve headwater tributaries in the Peachtree-Martins Creek Watershed and the Hiwassee River; and
- Improve aquatic and terrestrial habitat by improving substrate and in-stream cover, adding woody debris, reducing water temperatures, and restoring riparian habitat.

In order to accomplish the goals of the project and contribute to the overall success of goals set forth for the greater Peachtree-Martin Creek local watershed planning area, a number of general project objectives and design objectives were identified for this project as follows.

General Project Objectives

- Utilize natural channel design concepts to restore or enhance channel profile, pattern, and dimension to reduce bank and channel profile degradation and to allow greater floodplain connectivity to aid in the dissipation of bankfull flows.
- Reduce stream bank degradation and sediment and nutrient inputs by limiting livestock access of project tributaries to crossings agreed upon between the NCDMS and the landowner.
- Further reduce sediment and nutrient inputs and stream bank instability by restoring or enhancing native riparian vegetation along a 30-foot buffer along the project reach.
- Improve channel bedform function and diversity by installing toe wood structures and grade control structures that also function to improve riffle and scour pool habitat.

Design Objectives

- Make important design decisions based on a geomorphic analyses of the Site, reference conditions, and hydraulic modeling.
- Consider field constraints and construction tolerances in order to produce a realistic design.
- Minimize disturbance to ecologically functional and physically stable areas and mimic the character of these areas to create a more natural design.
- Use native materials and minimize materials brought onsite to produce more favorable habitat for native flora and fauna, reduce compaction and onsite disturbance from material transport, and produce an aesthetically pleasing result.

The Site mitigation plan was completed in March 2010 with the final design and construction plans completed in November 2010 (Table 2, Appendix A). Project construction was completed between October 2012 and July 2013. The implemented mitigation is as follows (Figure 2, Appendix B and Table 1, Appendix A).

- 4952 Stream Mitigation Units
    - Restoring approximately 3330 linear feet of stream channel through construction of stable channel at the historic floodplain elevation.
    - Enhancing (level I) approximately 1319 linear feet of stream channel through cessation of current land use practices, installing grade control structures, repairing bank erosion, restoring proper channel dimension and profile, and planting with native forest vegetation.
    - Enhancing (level II) approximately 1953 linear feet of stream channel through cessation of current land use practices, removing invasive species, and planting with native forest vegetation.
- 0.15 Riparian Wetland Mitigation Units
    - Enhancing approximately 0.3 acres of riparian wetland by filling ditches/abandoned channels and supplemental planting.
- Planting a native woody riparian buffer (at least 30 feet in width) adjacent to restored/enhanced streams and wetlands within the Site.
- Protecting the Site in perpetuity with a conservation easement.

Stream Success Criteria

Stream restoration success criteria for the Site are based on the *Stream Mitigation Guidelines* issued in April 2003 by the USACE and NCDWQ. Success criteria for stream restoration will include 1) documentation of two bankfull events, 2) little change in the channel cross-section from as-built conditions, 3) stable longitudinal profile, 4) substrate consistency, and 5) photographic evidence of stability.

Bankfull Events
Two bankfull flow events in separate years must be documented within the 5-year monitoring period. Otherwise, stream monitoring will continue until two bankfull events have been documented in separate years.

Cross-sections
Riffle cross-sections on the restoration and enhancement reaches should be stable and should show little change in bankfull area, maximum depth ratio, and width-to-depth ratio. Riffle cross-sections should generally fall within the parameters defined for channels of the appropriate Rosgen stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a vertically incising thalweg or eroding channel banks. Changes in the channel that indicate a movement toward stability or enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth.

Longitudinal Profile
Longitudinal profile data for the stream reach should show that bedform features are remaining stable. The riffles should be steeper and shallower than the pools, while the pools should be deep with flat water surface slopes. The relative percentage of riffles and pools should not change significantly from the design parameters.

Bed Material Analysis
Substrate materials in the restoration reaches should indicate a progression towards or the maintenance of coarser materials in the riffle features and smaller particles in the pool features.

Photo Reference Sites
Photographs will be used to evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of erosion control measures subjectively. Lateral photos should not indicate excessive erosion or continuing degradation of the banks. A series of photos over time should indicate successive maturation of riparian vegetation.

Vegetation Success Criteria
Success criteria have been established to verify that the vegetation component supports community elements necessary for forest development. Success criteria for this project includes an average density of 320 planted stems per acre must be surviving in the first three monitoring years. Subsequently, 290 planted stems per acre must be surviving in year 4, and 260 planted stems per acre in year 5.

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in tables and figures within this report's appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on the NC Division of Mitigation Services (NCDMS) website. All raw data supporting the tables and figures in the appendices are available from NCDMS upon request.

2.0 METHODOLOGY
Monitoring of the Site's restoration efforts will be performed until agreed upon success criteria are fulfilled. Monitoring is proposed for the stream channel, riparian vegetation, and hydrology for a period of five years (Figure 2, Appendix B). Monitoring reports of collected data will be submitted no later than December of each monitoring year.

2.1 Streams

Post-restoration monitoring will be conducted for five years following the completion of construction to evaluate the effectiveness of the restoration practices. Measurements were taken using a Topcon GTS 303 total station and Recon data collector. The raw total station file was processed using Carlson Survey Software into a Computer Aided Design (CAD) file. Coordinates were exported as a text/ASCII file to Microsoft Excel for processing and presentation of data, and are not georeferenced. Pebble counts were completed using the modified Wolman method (Rosgen 1993). Monitored stream parameters include stream dimension (cross-sections), pattern (longitudinal survey), profile (profile survey), and photographic documentation. Baseline stream data can be found in Appendix D.

Two areas of concern were noted along UT-1 during Year 3 (2016), and both remained relatively unchanged during Year 5 (2018). One area consists of a section of log sills constructed within a riffle near station 25+00. The riffle bed material surrounding the log structures has scoured resulting in pools through this section of stream. This issue was first identified during Year 3 (2016), and it continues to appear unstable; however, it has not worsened significantly in the past year which may indicate more stability than originally assumed. An additional area of concern includes a log vane structure along the right bank of UT-1, just downstream from cross-section 7. The footer log of the structure has failed and become partially dislodged, and the downstream end of the log appears to move freely with the flow of the stream. However, it has continued to maintain grade along the upstream riffle, and it appears to be in a similar state as it was originally observed. Thus, the structure may be more stable than was reported during Years 3 (2016) and 4 (2017). Stream areas of concern are depicted on Figure 2 and quantified in Table 5A (Appendix B).

Due to the observation of several beaver dams during Year 3 (2016) monitoring, NCDMS contracted APHIS to monitor and eliminate beaver activity on the Site. In September 2016, all dams were removed and several beaver were trapped. APHIS will continue to monitor the Site and eliminate any beaver activity as necessary. No beaver activity was observed during Year 5 (2018) monitoring.

Bankfull Events

The occurrence of bankfull events within the monitoring period will be documented by the use of a crest gauge and photographs. One crest gauge was installed to record the highest watermark between site visits, and the gauge will be checked each Site visit to determine if a bankfull event has occurred (Figure 2, Appendix B). Photographs will be used to document the occurrence of debris lines and sediment deposition on the floodplain during monitoring site visits.

Three bankfull events were documented during monitoring year 5 (2018) for a total of 16 bankfull events during the five year monitoring period.

Cross-sections

A total of 14 permanent cross-sections, 10 riffle and 4 pool, were established and will be used to evaluate stream dimension; locations are depicted on Figure 2 (Appendix B) Because riffle cross-sections are critical in determining bankfull design parameters, the number of riffle cross-sections established will generally outnumber pool cross-sections. Each cross-section will be marked on both banks with permanent pins to establish the exact transect used. A common benchmark will be used for cross-sections and consistently used to facilitate easy comparison of year-to-year data. The annual cross-section survey will include points measured at all breaks in slope, including top of bank, bankfull, inner berm, edge of water, and thalweg, if the features are present. Riffle cross sections will be classified using the Rosgen Stream Classification System.

No additional indicators of instability were observed during year 5 (2018) monitoring; therefore, stream dimension measurements are currently meeting success criteria.

Longitudinal Profile

After Site construction, approximately 4640 linear feet of longitudinal profile was completed to document baseline conditions. Longitudinal profile will be resurveyed annually for the duration of the five-year monitoring period. Measurements include thalweg, water surface, bankfull, and top of low bank. Each of these measurements will be taken at the head of each channel unit (e.g., riffle, pool) and at the maximum pool depth. The survey will be tied to a permanent benchmark.

Minimal indicators of bedform instability were observed during year 5 (2018) monitoring; therefore, stream longitudinal profile measurements are currently meeting success criteria.

Bed Material Analysis

Pebble counts will be conducted annually on one permanent riffle cross-section (100-counts) at the time cross-section and longitudinal surveys are performed during the five year monitoring period. These samples will reveal changes in sediment gradation over time as the stream adjusts to upstream sediment loads.

Year 5 (2018) pebble counts indicate the maintenance of coarser materials in the measured riffle feature; therefore, bed material is currently meeting success criteria.

Photo Reference Sites

A total of 24 photographs will be used to visually document restoration success for at least five years following construction. Photographs will be taken from a height of approximately five to six feet. Photo locations will be recorded using sub-meter GPS to ensure that the same locations (and view directions) on the Site are monitored in each monitoring period.

Year 5 (2018) photo reference sites show no channel aggradation or degradation, or bank erosion. In addition, photo reference sites show successive maturation of riparian vegetation; therefore the photo reference sites show that Site meeting success criteria.

2.2 Vegetation

After planting was completed, an initial evaluation was performed to verify planting methods were successful and to determine initial species composition and density. Eleven sample vegetation plots (10-meter by 10-meter) were installed and measured within the Site as per guidelines established in *CVS-DMS Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). Vegetation plots are permanently monumented with 6-foot metal t-posts at each corner. In each sample plot, vegetation parameters to be monitored include species composition and species density. Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph. Vegetation plot information can be found in Appendix C.

Year 5 (2018) stem count measurements indicate an average of 349 planted stems per acre (excluding livestakes) across the Site; therefore, the Site is currently meeting vegetation success criteria. Eight of the eleven individual vegetation plots met success criteria based on planted stems alone; Plots 4 and 7 were one stem shy of success criteria. When including naturally recruited stems of northern red oak (*Quercus rubra*) both Plots 4 and 7 were above success criteria.

Stems from the 2015 supplemental planting remain vigorous during year 5 (2018). Two particularly dense patches of multiflora rose (*Rosa multiflora*) were first observed along the right bank of UT1-3 during Year 3 (2016) monitoring, and those remained during Year 5 (2018). The populations cover approximately 0.21 acres and are depicted on Figure 2 (Appendix B). Numerous additional populations of multiflora rose as well as several small patches of Chinese privet (*Ligustrum sinense*) and Japanese honeysuckle (*Lonicera*

japonica) were observed scattered throughout the site during year 5 (2018), but all were in quantities below mapping threshold. NCDMS will continue invasive species treatment in 2019.

The easement fencing at the downstream crossing of UT1 has been damaged by wrack and water during bankfull events, and the gate on the right bank of the crossing is damaged and is no longer able to prevent livestock access to the crossing. Additionally, easement fencing along the entire boundary, especially along the right bank of UT1-3, are becoming susceptible to damage from lack of maintenance. There was no evidence of livestock access to the easement observed during year 5 (2018).

On May 1-2, 2018, a wetland delineation was performed by Axiom as part of the wetland confirmation services in the monitoring contract with NCDMS. This delineation was performed in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (USACE, 2012) and has not been approved in the field by a USACE representative. The results of the delineation show a net increase in wetlands across the site from the wetlands originally proposed as mitigation assets (Table 1, Appendix A). NCDMS is not seeking additional wetland credit for the site. Appendix F contains a figure depicting the 2018 wetland delineation as well as the accompanying wetland data forms.

3.0 REFERENCES

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-DMS Protocol for Recording Vegetation. Version 4.2. North Carolina Department of Environmental Quality, Division of Mitigation Sevices. Raleigh, North Carolina.

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United States Geological Survey (USGS). 1974. Hydrologic Unit Map - 1974. State of North Carolina.

Weakley, Alan S. 2012. Flora of the Southern and Mid-Atlantic States. Available online at: http://www.herbarium.unc.edu/WeakleysFlora.pdf [September 28, 2012]. University of North Carolina Herbarium, North Carolina Botanical Garden, University of North Carolina, Chapel Hill, North Carolina.

APPENDIX A

PROJECT BACKGROUND DATA AND MAPS

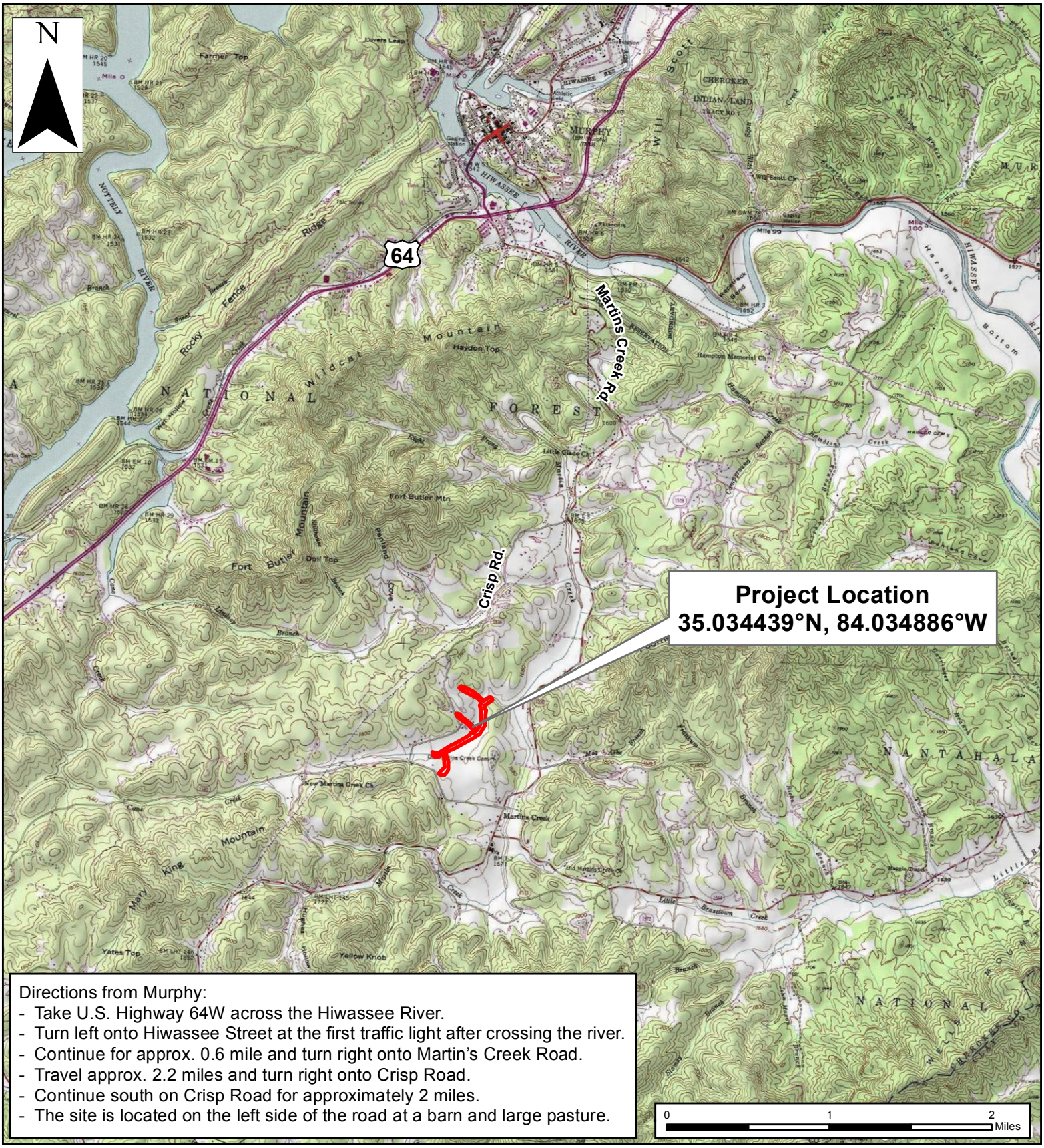
Figure 1. Vicinity Map

Table 1. Project Components and Mitigation Credits

Table 2. Project Activity and Reporting History

Table 3. Project Contacts Table

Table 4. Project Baseline Information and Attributes



Prepared by:	Prepared for:			
Axiom Environmental, Inc.	NC Department of Environmental Quality Division of Mitigation Services	VICINITY MAP UT TO MARTINS CREEK (CONTRERAS) DMS PROJECT NUMBER 92766 Cherokee County, North Carolina	Dwn. by. KRJ Date: Nov. 2015 Project: 12.004.16	FIGURE 1

Table 1. Project Components and Mitigation Credits
UT to Martin's Creek (Contreras) Mitigation Site

Mitigation Credit Summations		
Stream	**Riparian Wetland**	**Nonriparian Wetland**
4952	**0.15**	**--**

Project Components

Station Range	Existing Linear Footage/ Acreage	Priority Approach	Restoration/ Restoration Equivalent	Restoration Linear Footage/ Acreage	Mitigation Ratio	Mitigation Credits	Comment
UT1-1 Station 00+00 to 06+02	602	---	Enhance I	602-54 =548	1.5:1	365.3	Forded Crossing (54 linear feet) removed from credit
UT1-1	346	---	Enhance II	346	2.5:1	138.4	
UT1-1-1	106	---	Enhance II	106	2.5:1	42.4	
UT1-2 Station 00+00 to 02+07	141	PI	Restoration	207	1:1	207	
UT1-3 Station 00+00 to 08+33	767	---	Enhance I	767-62=705	1.5:1	470	Stream under power line easement (66 linear feet) will generate half credit and piped stream crossing (62 linear feet) removed from credit.
	66			66	3:1*	22.0	
UT1-4	1099	---	Enhance II	1014-53=961	2.5:1	384.4	Stream under two power line easements (40 and 45 linear feet) will generate half credit and forded crossing (53 linear feet) removed from credit.
	40			40	5:1**	8	
	45			45	5:1**	9	
UT 1 to Martin's Creek	455	---	Enhance II	455	2.5:1	182	
UT1 to Martin's Creek Station 00+00 to 32+74	2674	PI	Restoration	3274-53-47-51 =3123	1:1	3123	Three crossings (53, 47, and 51 linear feet) removed from credit.
Wetland Enhancement	0.3	---	Enhancement	0.3	2:1	0.15	Enhancement of existing riparian wetlands characterized by removal of invasive species and supplemental planting.

Component Summation

Restoration Level	Stream (linear footage)	Riparian Wetland (acreage)	Nonriparian Wetland (acreage)
Restoration	3330	--	--
Enhancement (Level 1)	1319	--	--
Enhancement (Level II)	1953	--	--
Enhancement	--	0.3	--
Totals	**6602**	**0.3**	**--**
Mitigation Units	**4952 SMUs**	**0.15 Riparian WMUs**	**0.00 Nonriparian WMUs**

*66 linear feet of stream under the power line easement is receiving a mitigation ratio of 3:1 (half credit for enhancement [level I]).
**85 linear feet of stream under two power line easements is receiving a mitigation ratio of 5:1 (half credit for enhancement [level II]).

Table 2. Project Activity and Reporting History
UT to Martin's Creek (Contreras) Mitigation Site

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Mitigation Plan	September 2009-March 2010	March 2010
Final Design – Construction Plans	March 2010-November 2010	November 2010
Construction	--	October 2012-July 2013
Temporary S&E Mix applied to Entire Project Site	--	October 2012-July 2013
Permanent Seed Mix applied to the Entire Project Site	--	October 2012-July 2013
Bare Root; Containerized; and B&B Plantings for the Entire Project Site	--	March 2014
Mitigation Plan/ As-Built (Year 0 Monitoring Baseline)	April 2014	April 2014
Invasive Species Treatment	--	July 2014
Year 1 Monitoring	October 2014	November 2014
Warranty Supplemental Planting	--	March 2015
Invasive Species Treatment	--	July 2015
Beaver/Dam Removal	--	September 2015
Year 2 Monitoring	November 2015	December 2015
Beaver/Dam Removal	--	September 2016
Year 3 Monitoring	November 2016	December 2016
Year 4 Monitoring	November 2017	December 2017
Year 5 Monitoring	November 2018	November 2018
Year 5 Vegetation Monitoring	September 25, 2018	--
Year 5 Stream Monitoring	April 1, 2018	--

Table 3. Project Contacts Table
Martin's Creek II Mitigation Site

Designer	Michael Baker Engineering, Inc. 797 Haywood Road, Suite 201 Asheville, NC 28806 Micky Clemmons 828-350-1408
Construction Plans and Sediment and Erosion Control Plans	Michael Baker Engineering, Inc. 797 Haywood Road, Suite 201 Asheville, NC 28806 Micky Clemmons 828-350-1408
Construction Contractor	River Works, Inc. 6105 Chapel Hill Rd. Raleigh, NC 27607 919-582-3574
Planting Contractor	Carolina Silvics, Inc. 908 Indian Trail Road Edenton, NC 27932 (252) 482-8491
As-built Surveyor	Turner Land Surveying. PLLC 3201 Glenridge Drive Raleigh, NC 27604 919-875-1378
Baseline Data Collection	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis 919-215-1693

Table 4. Project Attribute Table
UT to Martin's Creek (Contreras) Mitigation Site

Project County	Cherokee County, North Carolina									
Physiographic Region	Blue Ridge									
Ecoregion	Broad Basins									
Project River Basin	Hiwassee									
USGS HUC for Project (14 digit)	06020002170010									
NCDWQ Sub-basin for Project	04-05-02									
Planning Area	Yes – Peachtree-Martins Creek LWP									
WRC Class (Warm, Cool, Cold)	Cold									
% of easement fenced/demarcated	100% fenced to exclude livestock									
Beaver activity observed during design phase?	Yes, on UT1 below lower limits of project area									
	Restoration Component Attribute Table									
	UT 1-1		UT 1-1-1	UT 1-2	UT 1-3		UT 1-4		UT1 to Martin Cr	
Drainage Area	.018	.028	.004	.005	.074	.082	.023		.79	.82
Stream Order (USGS topo)	1st	2nd	1st	1st	1st	1st	2nd		3rd	3rd
Restored Length (feet)	346	548	106	207	----	738	----	1099	3123	----
Perennial or Intermittent	I	P	I	I	I	P	I	P	P	P
Watershed Type	Rural									
Watershed impervious cover	<10%									
NCDWQ AU/Index number	1-49									
NCDWQ Classification	C		C	C	C		C		C	
303d listed?	No									
Upstream of a 303d listed	No									
Reasons for 303d listed segment	NA									
Total acreage of easement	15.63									
Total existing vegetated acreage of easement	---									
Total planted restoration acreage	~15.63									
Rosgen Classification of preexisting	B/E/Eb		E	F	G/C/B		B		G/Eb/Cb	
Rosgen Classification of As-built	B		---	C	B		B		C	
Valley type	II		II	II	II		II		II	
Valley slope	.034		---	.010	.029		---		.009	
Cowardin classification of proposed	N/A		N/A	N/A	N/A		N/A		N/A	
Trout waters designation	No									
Species of concern, endangered etc.	No									
Dominant Soil Series	Junaluska Brasstown Complex/ Thurmont-Dillard Complex/Arc aqua loam		Junaluska Brasstown Complex	Arc qua loam	Thurmont-Dillard Complex		Junaluska Tsali Complex		Arc qua loam	

APPENDIX B

VISUAL ASSESSMENT DATA

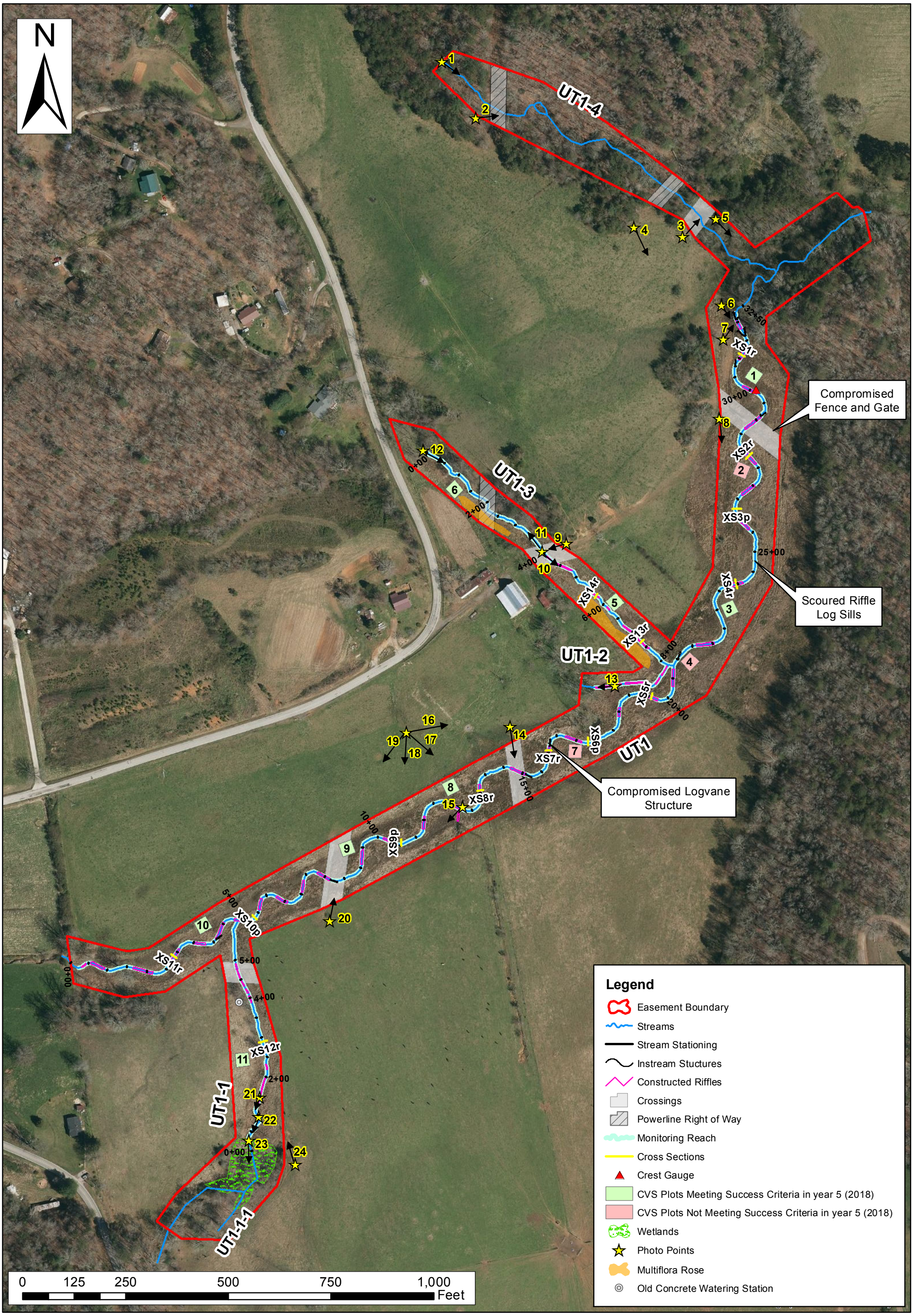
Figure 2. Current Conditions Plan View (CCPV)

Tables 5A-5D. Visual Stream Morphology Stability Assessment

Table 6. Vegetation Condition Assessment

Stream Station Photographs

Vegetation Plot Photographs



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Axiom Environmental, Inc.

CURRENT CONDITIONS PLAN VIEW
UT TO MARTINS CREEK (CONTRERAS)
DMS PROJECT # 92766
Cherokee County, North Carolina

Dwn. by.	KRJ
Date:	Nov 2018
Project:	12-004.16

FIGURE
2

Table 5A **Visual Stream Morphology Stability Assessment**
Reach ID **UT1**
Assessed Length **3123**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			1	100	97%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	38	39			97%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	40	40			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	40	40			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	40	40			100%			
		2. Thalweg centering at downstream of meander (Glide)	40	40			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	11	12			92%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	12	12			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	11	12			92%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	11	12			92%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	12	12			100%			

Table 5B **Visual Stream Morphology Stability Assessment**
Reach ID **UT1-1**
Assessed Length **602**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	14	14			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	17	17			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	17	17			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	17	17			100%			
		2. Thalweg centering at downstream of meander (Glide)	17	17			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	13	13			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	13	13			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	13	13			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	13	13			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	13	13			100%			

Table 5C **Visual Stream Morphology Stability Assessment**
Reach ID **UT1-2**
Assessed Length **207**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	6	6			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	5	5			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	5	5			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	5	5			100%			
		2. Thalweg centering at downstream of meander (Glide)	5	5			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	4	4			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	4	4			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	4	4			100%			

Table 5D **Visual Stream Morphology Stability Assessment**
Reach ID **UT1-3**
Assessed Length **803**

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	1. **Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	23	23			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	24	24			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	24	24			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	24	24			100%			
		2. Thalweg centering at downstream of meander (Glide)	24	24			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	9	9			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	9	9			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	9	9			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	9	9			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	9	9			100%			

Table 6 Vegetation Condition Assessment

UT to Martins Creek (Contreras) Mitigation Project

Planted Acreage[1] **15.63**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	None	0.1 acres	none	0	0.00	0.0%
2. Low Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
2B. Low Planted Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	None	0.25 acres	N/A	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%

Easement Acreage[2] **15.63**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Multiflora rose	1000 SF	Orange polygon	2	0.21	1.3%
5. Easement Encroachment Areas[3]	None	none	none	0	0.00	0.0%

1 = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

2 = The acreage within the easement boundaries.

3 = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.

4 = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern spcies are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by DMS such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of Microstegium in the herb layer will not likley trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly ealry in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolzing invasives polygons, particulalry for situations where the conditon for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.

UT to Martin's Creek (Contreras)
Fixed Station Photographs
Taken April/May/September/November 2018

Photo Point 1

Photo Point 2

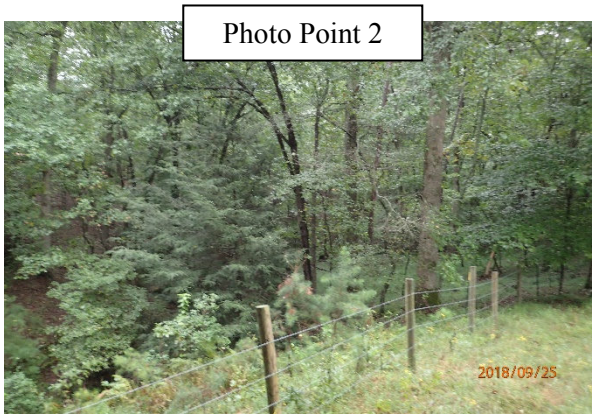


Photo Point 3

Photo Point 4

Photo Point 5

Photo Point 6

UT to Martin's Creek (Contreras)
Fixed Station Photographs (continued)
Taken April/May/September/November 2018

Photo Point 7

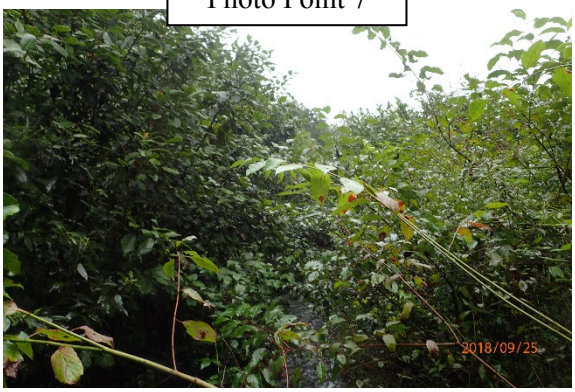


Photo Point 8

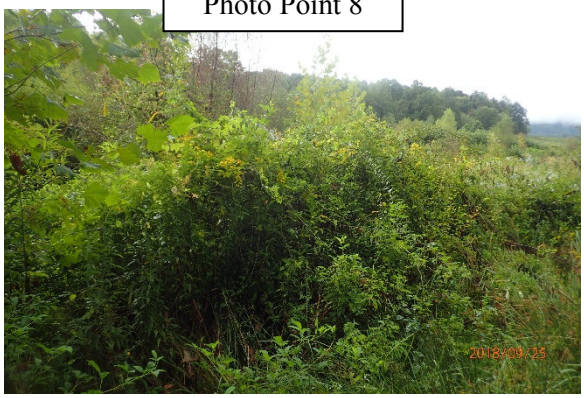


Photo Point 9

Photo Point 10

Photo Point 11

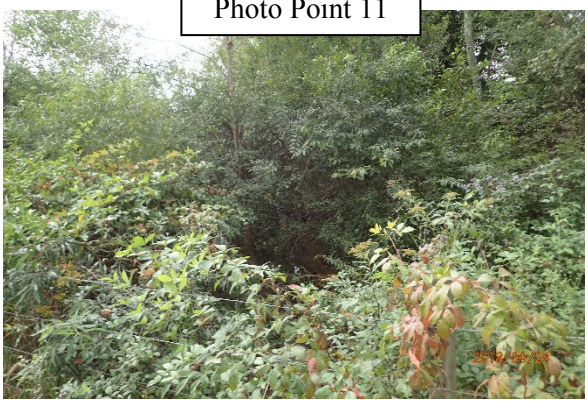
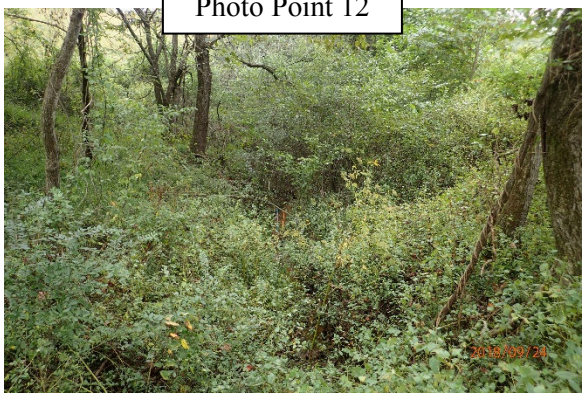


Photo Point 12



UT to Martin's Creek (Contreras)
Fixed Station Photographs (continued)
Taken April/May/September/November 2018

Photo Point 13

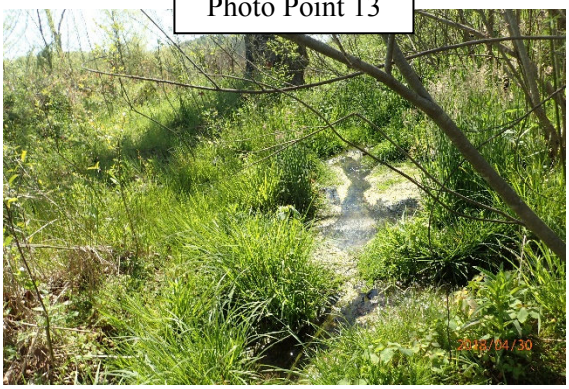


Photo Point 14

Photo Point 15

Photo Point 16

Photo Point 17

Photo Point 18

UT to Martin's Creek (Contreras)
Fixed Station Photographs (continued)
Taken April/May/September/November 2018

Photo Point 19

Photo Point 20

Photo Point 21

Photo Point 22

Photo Point 23

Photo Point 24

UT to Martin's Creek (Contreras)
Vegetation Monitoring Photographs
Taken September 2018

Plot 1

Plot 2

Plot 3

Plot 4

Plot 5

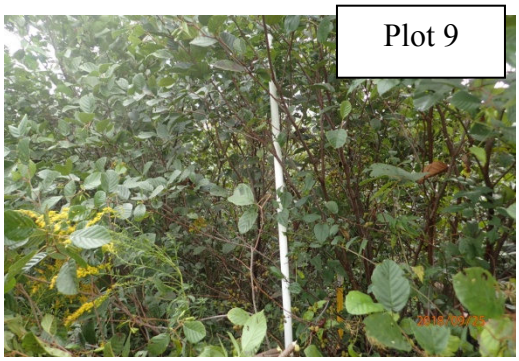
Plot 6

UT to Martin's Creek (Contreras)
Vegetation Monitoring Photographs
Taken September 2018
(continued)

Plot 7

Plot 8

Plot 9



Plot 10

Plot 11

APPENDIX C

VEGETATION PLOT DATA

Table 7. Vegetation Plot Criteria Attainment

Table 8. CVS Vegetation Plot Metadata

Table 9. Total and Planted Stems by Plot and Species

Table 7. Vegetation Plot Criteria Attainment Based on Planted Stems
UT to Martin's Creek (Contreras) Mitigation Site (DMS Project Number 92766)

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	73%
2	No	
3	Yes	
4	No	
5	Yes	
6	Yes	
7	No	
8	Yes	
9	Yes	
10	Yes	
11	Yes	

Table 8. CVS Vegetation Plot Metadata
UT to Martin's Creek (Contreras) Mitigation Site (DMS Project Number 92766)

Report Prepared By	Corri Faquin
Date Prepared	9/1/2018 13:23
database name	Axiom-UTMartinsContreras-2018-A-v2.3.1.mdb
database location	S:\Business\Projects\12\12-004 EEP Monitoring\12-004.16 UT to Martins and Martins\UT to Martins (Contreras)\2018\CVS
computer name	PHILLIP-PC
file size	50331648
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.
Proj, total stems	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.
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	92766
project Name	UT to Martin's Creek (Contreras)
Description	Stream Restoration
River Basin	Hiwassee
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	11

Table 9. Total and Planted Stems by Plot and Species
DMS Project Code 92766. Project Name: UT to Martin's Creek (Contreras)

			Current Plot Data (MY5 2018)																								
			92766-01-0001			92766-01-0002			92766-01-0003			92766-01-0004			92766-01-0005			92766-01-0006			92766-01-0007			92766-01-0008			92766-01-0009		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree																										
Acer rubrum	red maple	Tree									3																	3
Alnus serrulata	hazel alder	Shrub			9			5			5												51			13			8
Amelanchier arborea	common serviceberry	Tree																									2	2	2
Betula nigra	river birch	Tree	1	1	1													1	1	1			1						
Carpinus caroliniana	American hornbeam	Tree													4	4	4										1	1	1
Carya	hickory	Tree																											
Carya alba	mockernut hickory	Tree	1	1	1				1	1	1																		
Carya glabra	pignut hickory	Tree																											
Cornus amomum	silky dogwood	Shrub				1	1	1				1	1	1		1	1												
Cornus florida	flowering dogwood	Tree																											
Diospyros virginiana	common persimmon	Tree																											
Juglans nigra	black walnut	Tree																		3									
Liquidambar styraciflua	sweetgum	Tree																											
Liriodendron tulipifera	tuliptree	Tree													7	7	7	2	2	2	1	1	1	1	1	1			
Nyssa	tupelo	Tree																											
Nyssa sylvatica	blackgum	Tree																			1	1	1	2	2	2			
Platanus occidentalis	American sycamore	Tree	3	3	4	2	2	2	4	4	4	2	2	2	1	1	1	1	1	1	2	2	2				1	1	1
Prunus serotina	black cherry	Tree																											
Prunus serrulata	Japanese flowering cherry																												
Pyrus calleryana	Callery pear	Exotic																											
Quercus	oak	Tree																						1	1	1			
Quercus coccinea	scarlet oak	Tree	1	1	1				1	1	1																1	1	1
Quercus nigra	water oak	Tree																											
Quercus pagoda	cherrybark oak	Tree										2	2	2							1	1	1	1	1	1			
Quercus rubra	northern red oak	Tree	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	4	4	4	1	1	2	3	3	3	2	2	2
Quercus shumardii	Shumard's oak	Tree							1	1	1							1	1	1				1	1	1			
Salix nigra	black willow	Tree																								1			
Unknown		Shrub or Tree																											
		Stem count	8	8	18	5	5	10	9	9	17	6	6	7	13	14	14	9	9	12	6	6	59	9	9	23	7	7	18
		size (ares)	1			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			0.02		
		Species count	5	5	6	3	3	4	5	5	7	4	4	4	4	5	5	5	5	6	5	5	7	6	6	8	5	5	7
		Stems per ACRE	323.7	323.7	728.4	202.3	202.3	404.7	364.2	364.2	688	242.8	242.8	283.3	526.1	566.6	566.6	364.2	364.2	485.6	242.8	242.8	2388	364.2	364.2	930.8	283.3	283.3	728.4

Color for Density
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%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

Table 9. Total and Planted Stems by Plot and Species (Continued)
DMS Project Code 92766. Project Name: UT to Martin's Creek (Contreras)

			Current Plot Data (MY5 2018)						Annual Means															
			92766-01-0010			92766-01-0011			MY5 (2018)			MY4 (2017)			MY3 (2016)			MY2 (2015)			MY1 (2014)			MY0 (2014)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer negundo	boxelder	Tree						1			1			1			1			1			1			
Acer rubrum	red maple	Tree						5			11			1			7									
Alnus serrulata	hazel alder	Shrub			14						105			158			119			112			81			1
Amelanchier arborea	common serviceberry	Tree							2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
Betula nigra	river birch	Tree	2	2	2				4	4	5	5	5	5	6	6	7	13	13	13	12	12	12	19	19	19
Carpinus caroliniana	American hornbeam	Tree							5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Carya	hickory	Tree													2	2	3	2	2	2	3	3	3	2	2	2
Carya alba	mockernut hickory	Tree							2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	5	5	5
Carya glabra	pignut hickory	Tree				3	3	3	3	3	3	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5
Cornus amomum	silky dogwood	Shrub							2	3	3	2	3	3	1	2	2	1	2	2	1	2	4		1	2
Cornus florida	flowering dogwood	Tree						4			4			4			2			4						
Diospyros virginiana	common persimmon	Tree																		1				1	1	1
Juglans nigra	black walnut	Tree									3						2			6			3			
Liquidambar styraciflua	sweetgum	Tree												2												
Liriodendron tulipifera	tuliptree	Tree	1	1	1	1	1	3	13	13	15	14	14	15	15	15	19	17	17	18	9	9	9	7	7	7
Nyssa	tupelo	Tree				1	1	1	1	1	1	1	1	1	1	1	1									
Nyssa sylvatica	blackgum	Tree							3	3	3	3	3	3	2	2	2	2	2	2						
Platanus occidentalis	American sycamore	Tree	3	3	3	1	1	1	20	20	21	22	22	22	21	21	23	20	20	20	8	8	8	10	10	10
Prunus serotina	black cherry	Tree			3						3			11			9			14			5			
Prunus serrulata	Japanese flowering cherry							3			3															
Pyrus calleryana	Callery pear	Exotic												3												
Quercus	oak	Tree							1	1	1	1	1	1	5	5	5	14	14	14	16	16	16	49	49	49
Quercus coccinea	scarlet oak	Tree	1	1	1				4	4	4	3	3	3	4	4	4	2	2	2	2	2	2			
Quercus nigra	water oak	Tree										1	1	1	1	1	1	2	2	2	1	1	1	1	1	1
Quercus pagoda	cherrybark oak	Tree	2	2	2	2	2	2	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	5	5	5
Quercus rubra	northern red oak	Tree	2	2	2	4	4	4	24	24	26	27	27	27	28	28	28	30	30	30	23	23	23	1	1	1
Quercus shumardii	Shumard's oak	Tree							3	3	3	3	3	3	5	5	5	3	3	3						
Salix nigra	black willow	Tree									1						1									1
Unknown		Shrub or Tree																1	1	1	1	1	1			6
		Stem count	11	11	28	12	12	27	95	96	233	103	104	285	113	114	263	130	131	270	99	100	192	113	114	123
		size (ares)	1			1			11			11			11			11			11			11		
		size (ACRES)	0.02			0.02			0.27			0.27			0.27			0.27			0.27			0.27		
		Species count	6	6	8	6	6	10	15	15	23	16	16	23	17	17	24	17	17	23	15	15	19	13	14	17
		Stems per ACRE	445.2	445.2	1133	485.6	485.6	1093	349.5	353.2	857.2	378.9	382.6	1049	415.7	419.4	967.6	478.3	481.9	993.3	364.2	367.9	706.4	415.7	419.4	452.5

Color for Density
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%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

APPENDIX D

STREAM SURVEY DATA

Cross-section Plots

Longitudinal Profile Plots

Substrate Plots

Tables 10a-f. Baseline Stream Data Summary

Tables 11a-f. Monitoring Data

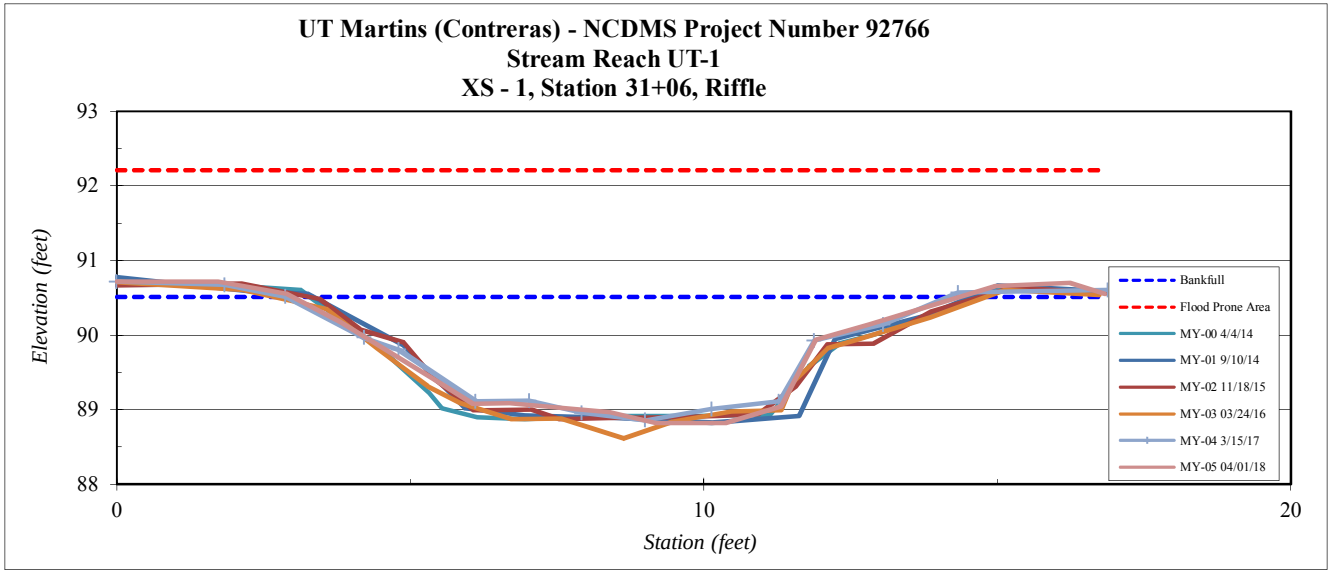
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 1, Riffle
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	90.72
1.72	90.72
2.89	90.56
3.80	90.18
5.41	89.40
6.07	89.08
6.68	89.08
7.54	89.03
8.39	88.97
9.18	88.82
10.37	88.82
11.32	89.04
11.91	89.94
12.82	90.14
14.96	90.66
16.2	90.70
16.8	90.55

SUMMARY DATA	
Bankfull Elevation:	90.5
Bankfull Cross-Sectional Area:	11.6
Bankfull Width:	11.4
Flood Prone Area Elevation:	92.2
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.7
Mean Depth at Bankfull:	1.0
W / D Ratio:	11.2
Entrenchment Ratio:	8.8
Bank Height Ratio:	1.0


XS 1 Looking Upstream

Stream Type	E



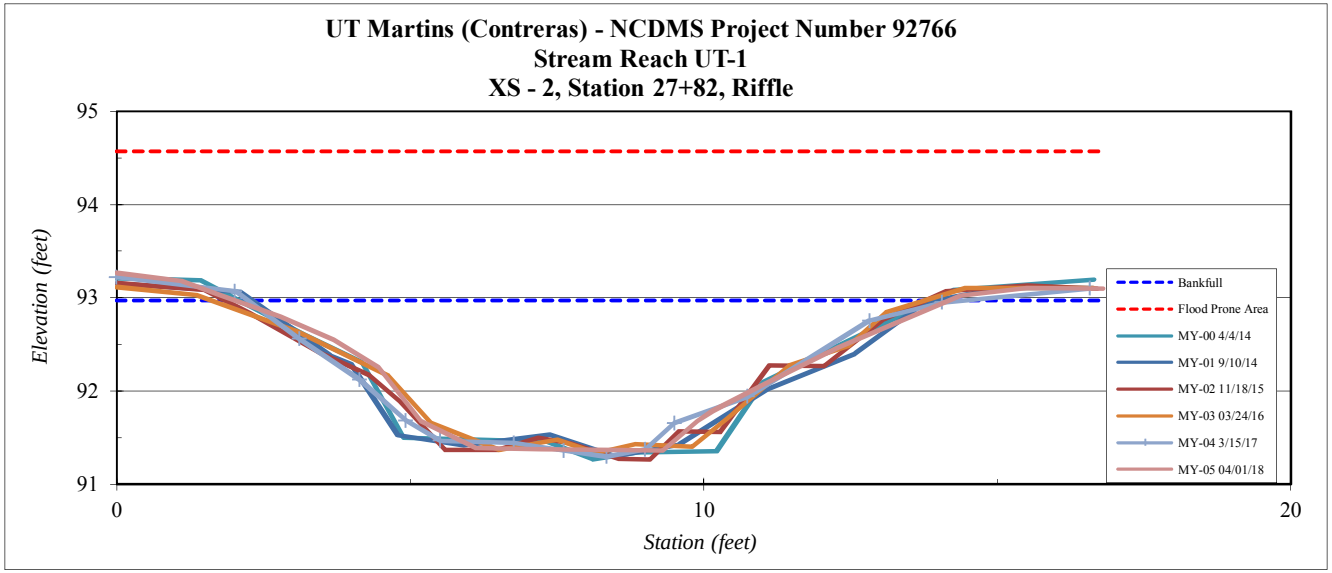
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 2, Riffle
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	93.27
1.10	93.18
1.75	93.03
2.79	92.80
3.70	92.55
4.46	92.25
5.18	91.68
6.11	91.39
7.24	91.38
8.46	91.37
9.30	91.36
9.89	91.67
10.15	91.79
11.03	92.07
12.29	92.47
14.4	93.02
15.5	93.10
16.8	93.10

SUMMARY DATA	
Bankfull Elevation:	93.0
Bankfull Cross-Sectional Area:	11.4
Bankfull Width:	12.2
Flood Prone Area Elevation:	94.6
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.6
Mean Depth at Bankfull:	0.9
W / D Ratio:	13.1
Entrenchment Ratio:	8.2
Bank Height Ratio:	1.0

XS 2 Looking Upstream

Stream Type	E

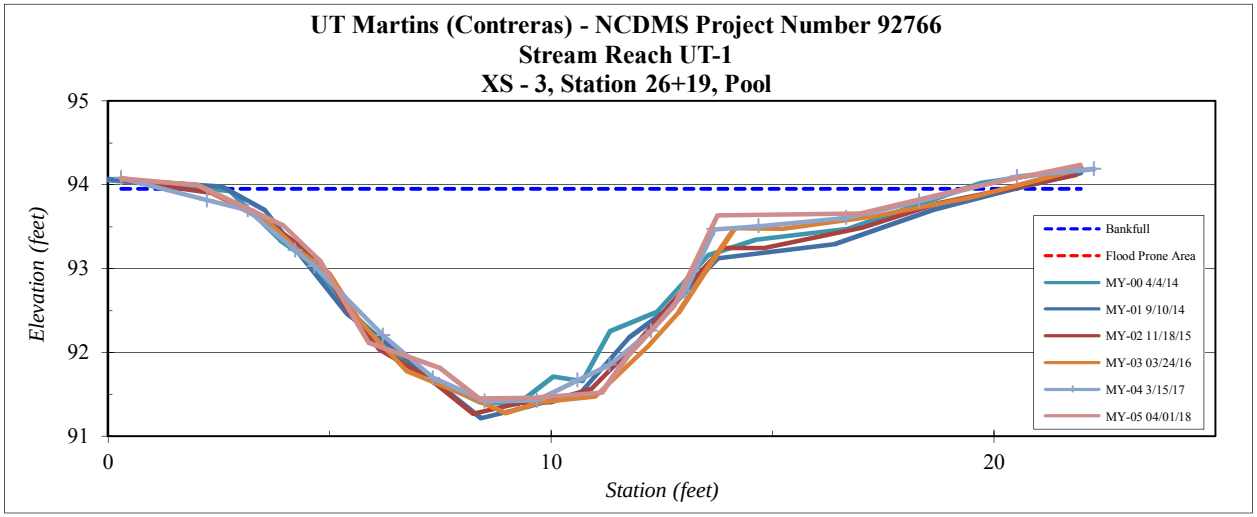


Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 3, Pool
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.3	94.1
2.0	94.0
4.0	93.5
4.8	93.1
5.9	92.1
7.5	91.8
8.4	91.4
9.6	91.5
11.1	91.5
11.7	92.0
12.8	92.6
13.8	93.6
17.0	93.7
19.1	93.9
22.0	94.2

SUMMARY DATA	
Bankfull Elevation:	94.0
Bankfull Cross-Sectional Area:	19.7
Bankfull Width:	17.1
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.5
Mean Depth at Bankfull:	1.2
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

Stream Type	E



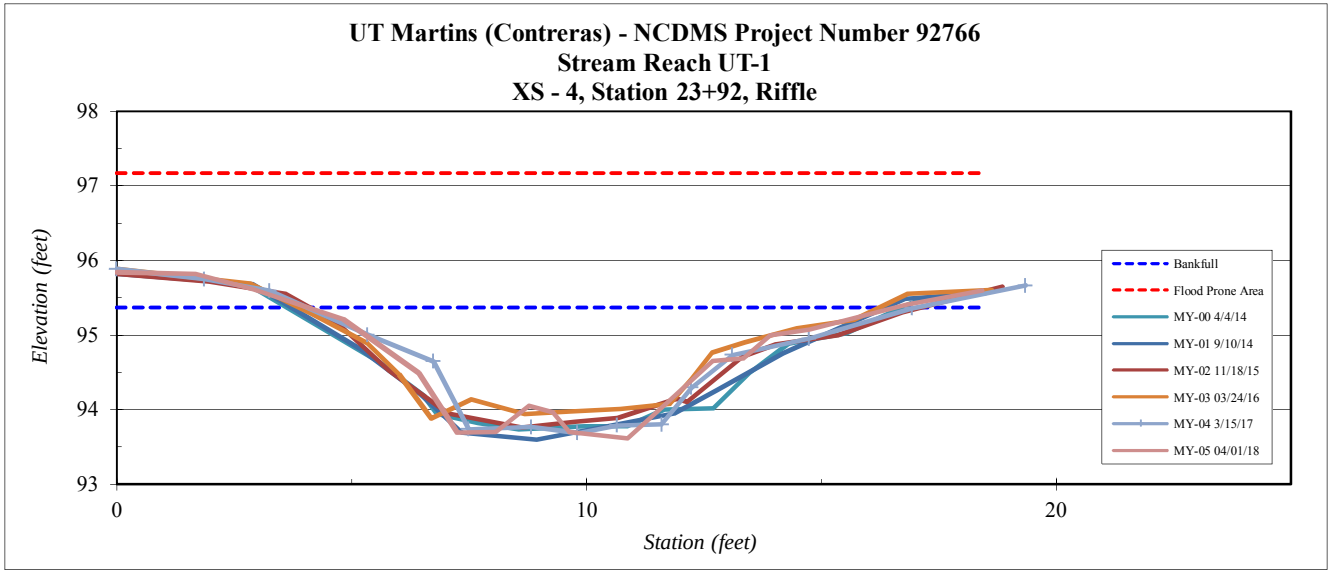
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 4, Riffle
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	95.84
1.68	95.82
2.91	95.61
4.83	95.21
6.44	94.49
7.25	93.69
8.07	93.70
8.78	94.06
9.28	93.97
9.63	93.70
10.88	93.62
11.86	94.17
12.68	94.65
13.34	94.69
13.91	94.99
14.7	95.08
16.8	95.41
18.4	95.60

SUMMARY DATA	
Bankfull Elevation:	95.4
Bankfull Cross-Sectional Area:	11.3
Bankfull Width:	12.5
Flood Prone Area Elevation:	97.2
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.8
Mean Depth at Bankfull:	0.9
W / D Ratio:	13.8
Entrenchment Ratio:	8.0
Bank Height Ratio:	1.0

XS 4 Looking Upstream

Stream Type	E

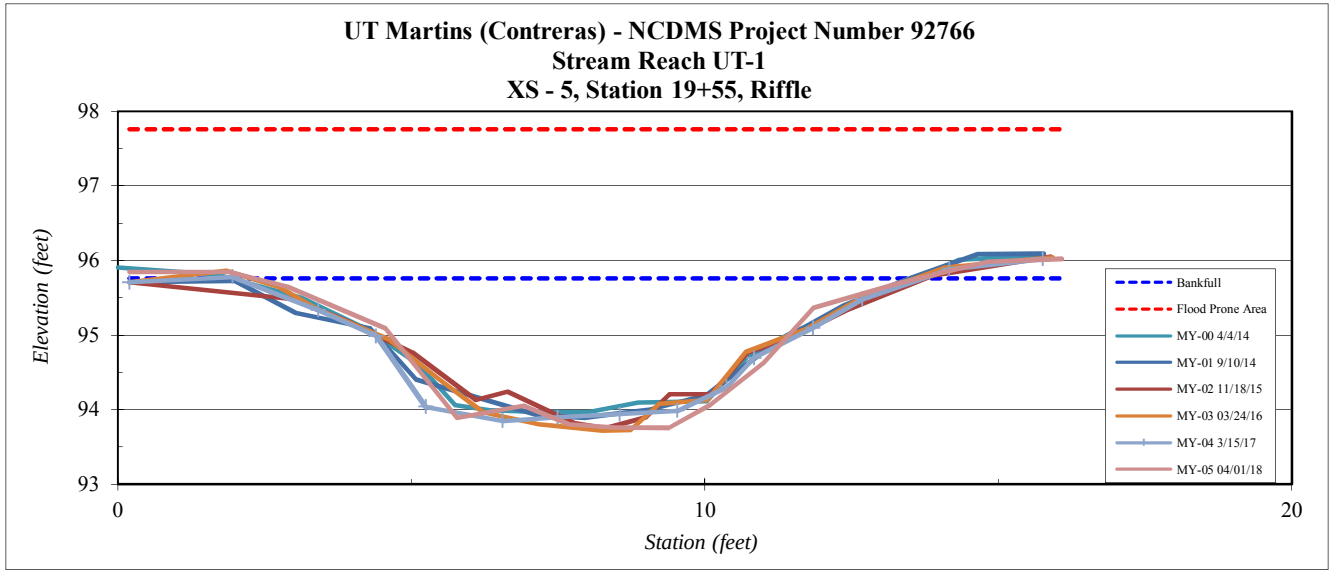


Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 5, Riffle
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.20	95.85
1.90	95.84
2.89	95.65
4.56	95.09
5.78	93.89
6.91	94.05
7.69	93.80
8.46	93.76
9.39	93.76
10.09	94.06
11.00	94.63
11.85	95.36
13.33	95.70
14.81	95.98
16.08	96.02

SUMMARY DATA	
Bankfull Elevation:	95.8
Bankfull Cross-Sectional Area:	12.6
Bankfull Width:	11.3
Flood Prone Area Elevation:	97.8
Flood Prone Width:	50.0
Max Depth at Bankfull:	2.0
Mean Depth at Bankfull:	1.1
W / D Ratio:	10.1
Entrenchment Ratio:	4.4
Bank Height Ratio:	1.0

Stream Type	E



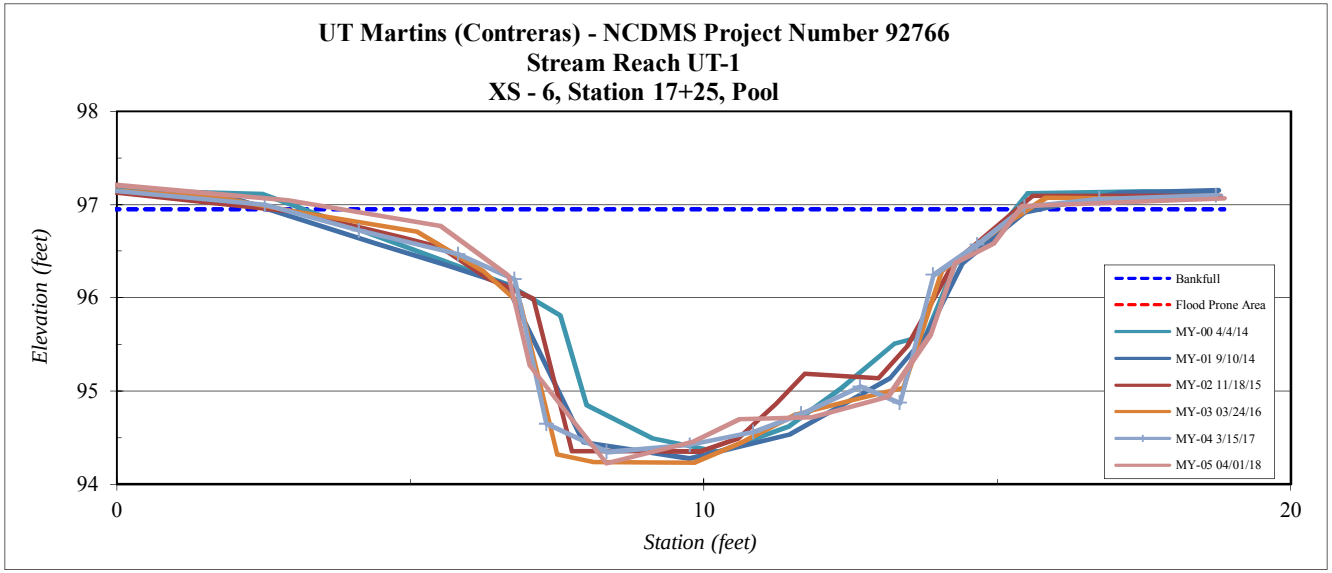
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 6, Pool
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
-0.10	97.21
2.92	97.05
5.51	96.77
6.65	96.24
6.68	96.23
7.04	95.27
8.34	94.23
9.82	94.46
10.61	94.70
11.85	94.72
13.14	94.94
13.86	95.61
14.28	96.37
14.95	96.58
15.42	96.98
18.87	97.07

SUMMARY DATA	
Bankfull Elevation:	97.0
Bankfull Cross-Sectional Area:	17.2
Bankfull Width:	11.5
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.7
Mean Depth at Bankfull:	1.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

XS 6 Looking Upstream

Stream Type	E



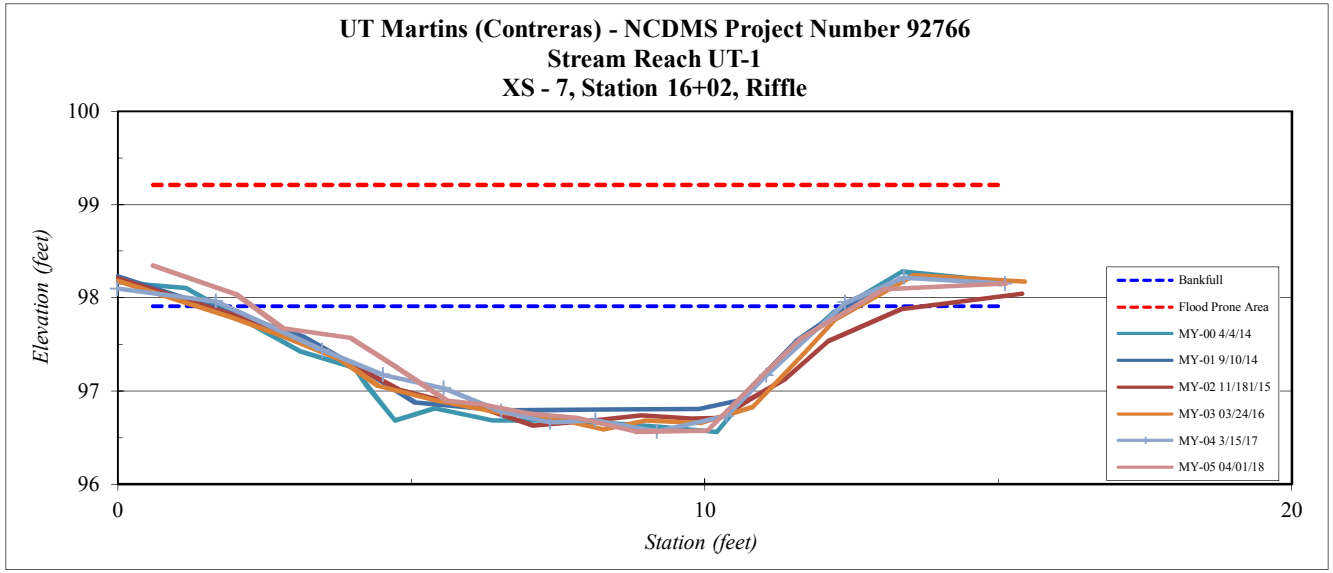
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 7, Riffle
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.60	98.34
2.02	98.04
2.82	97.67
3.97	97.57
4.69	97.28
5.61	96.89
6.21	96.86
7.00	96.76
7.83	96.71
8.81	96.57
10.05	96.58
11.05	97.21
11.63	97.56
13.05	98.09
15.13	98.15

SUMMARY DATA	
Bankfull Elevation:	97.9
Bankfull Cross-Sectional Area:	8.4
Bankfull Width:	10.3
Flood Prone Area Elevation:	99.2
Flood Prone Width:	50.0
Max Depth at Bankfull:	1.3
Mean Depth at Bankfull:	0.8
W / D Ratio:	12.6
Entrenchment Ratio:	4.9
Bank Height Ratio:	1.1

XS 7 Looking Upstream

Stream Type	E



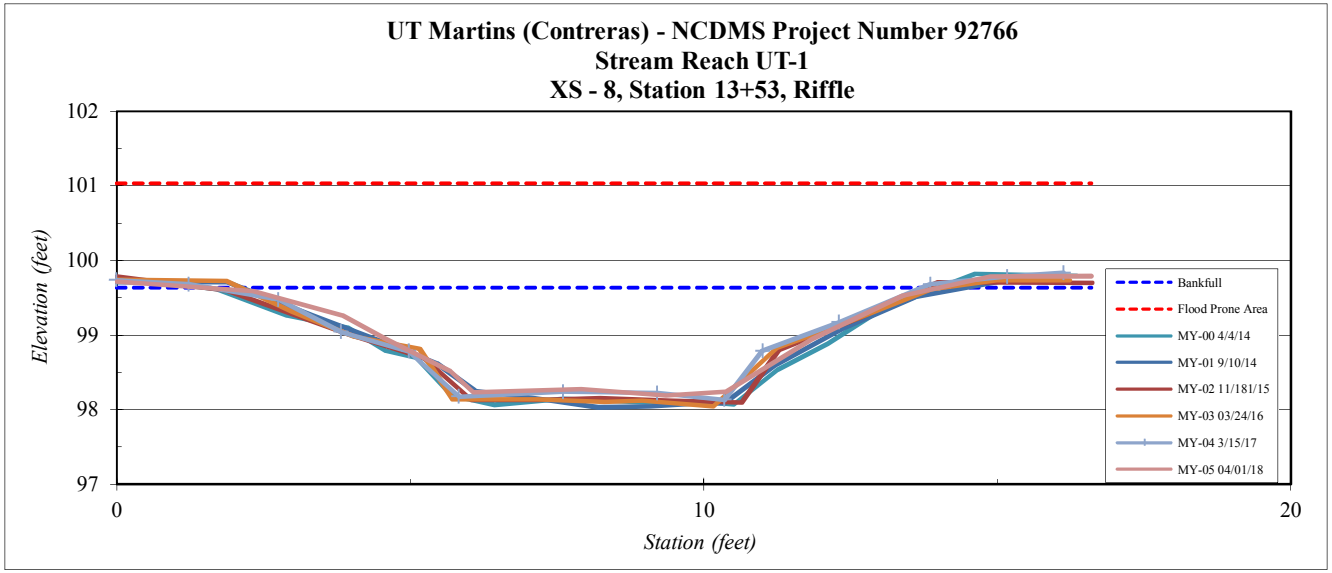
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 8, Riffle
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	99.72
2.33	99.59
3.85	99.26
4.57	98.96
5.68	98.51
6.07	98.23
7.91	98.28
9.36	98.19
10.38	98.24
11.84	98.95
13.39	99.53
14.89	99.79
16.60	99.79

SUMMARY DATA	
Bankfull Elevation:	99.6
Bankfull Cross-Sectional Area:	10.4
Bankfull Width:	12.5
Flood Prone Area Elevation:	101.0
Flood Prone Width:	50.0
Max Depth at Bankfull:	1.4
Mean Depth at Bankfull:	0.8
W / D Ratio:	15.0
Entrenchment Ratio:	4.0
Bank Height Ratio:	1.0

XS 8 Looking Upstream

Stream Type	E

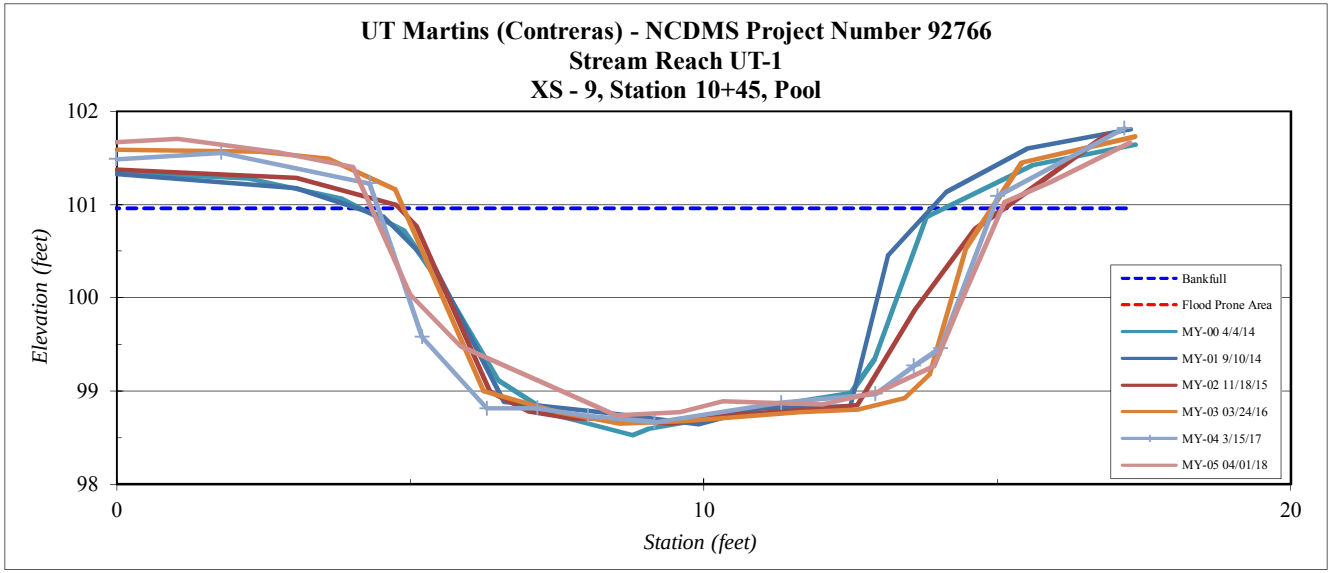


Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 9, Pool
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
-0.40	101.65
1.03	101.70
2.75	101.56
4.02	101.40
5.00	100.04
5.85	99.48
7.28	99.09
8.51	98.74
9.59	98.77
10.32	98.89
12.02	98.85
12.99	99.00
13.92	99.27
14.32	99.88
15.13	101.02
15.91	101.24
17.26	101.67

SUMMARY DATA	
Bankfull Elevation:	101.0
Bankfull Cross-Sectional Area:	18.4
Bankfull Width:	10.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.2
Mean Depth at Bankfull:	1.7
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.05

Stream Type	E



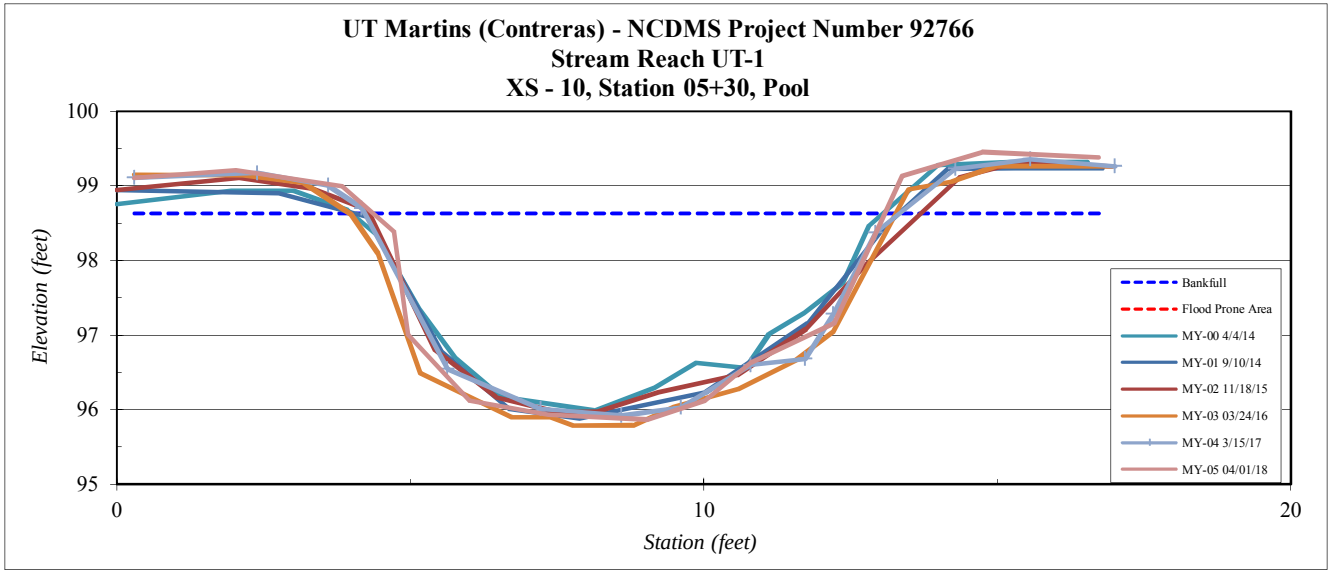
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 10, Pool
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.30	99.11
2.03	99.21
3.84	99.00
4.72	98.38
4.96	97.01
6.00	96.12
7.35	95.93
9.02	95.87
10.02	96.12
10.80	96.62
12.22	97.16
13.38	99.13
14.74	99.45
16.73	99.38

SUMMARY DATA	
Bankfull Elevation:	98.6
Bankfull Cross-Sectional Area:	18.0
Bankfull Width:	8.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	2.8
Mean Depth at Bankfull:	2.1
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0


XS 10 Looking Upstream

Stream Type	E



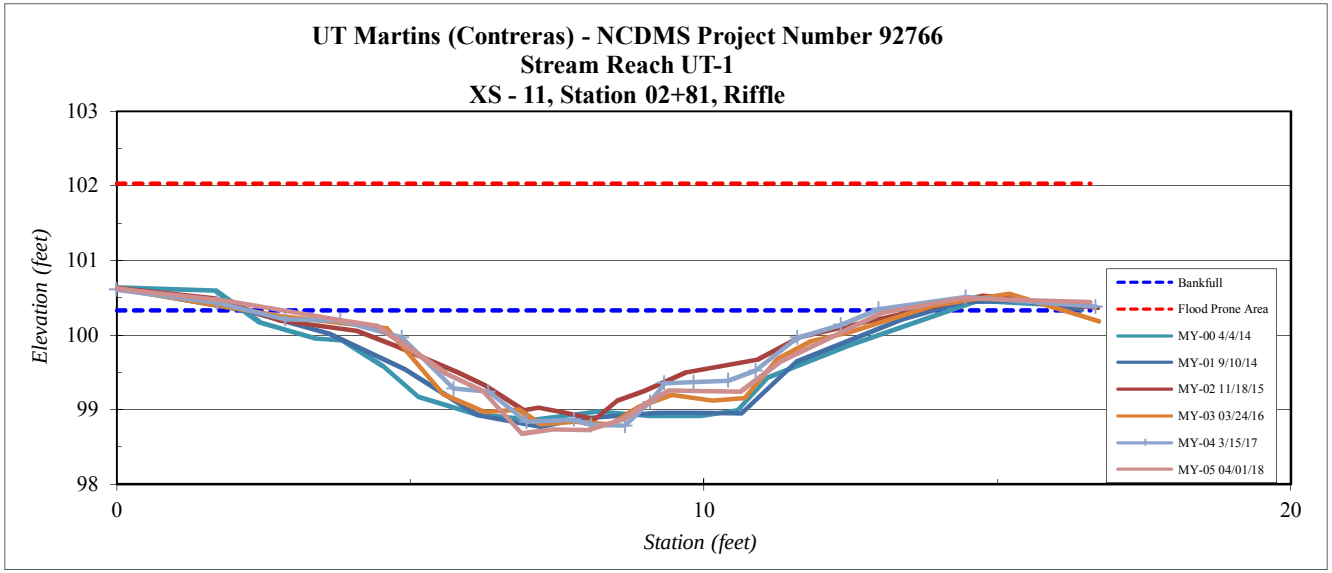
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 11, Riffle
Reach	UT 1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	100.62
1.87	100.46
3.80	100.20
4.42	100.13
5.62	99.48
6.23	99.25
6.90	98.68
7.44	98.73
8.02	98.73
8.63	98.87
9.03	99.08
9.41	99.26
9.90	99.25
10.63	99.24
11.33	99.65
12.4	100.05
13.0	100.30
14.4	100.49
16.6	100.44

SUMMARY DATA	
Bankfull Elevation:	100.3
Bankfull Cross-Sectional Area:	8.6
Bankfull Width:	10.4
Flood Prone Area Elevation:	102.0
Flood Prone Width:	50.0
Max Depth at Bankfull:	1.7
Mean Depth at Bankfull:	0.8
W / D Ratio:	12.6
Entrenchment Ratio:	4.8
Bank Height Ratio:	1.0

XS 11 Looking Upstream

Stream Type	E



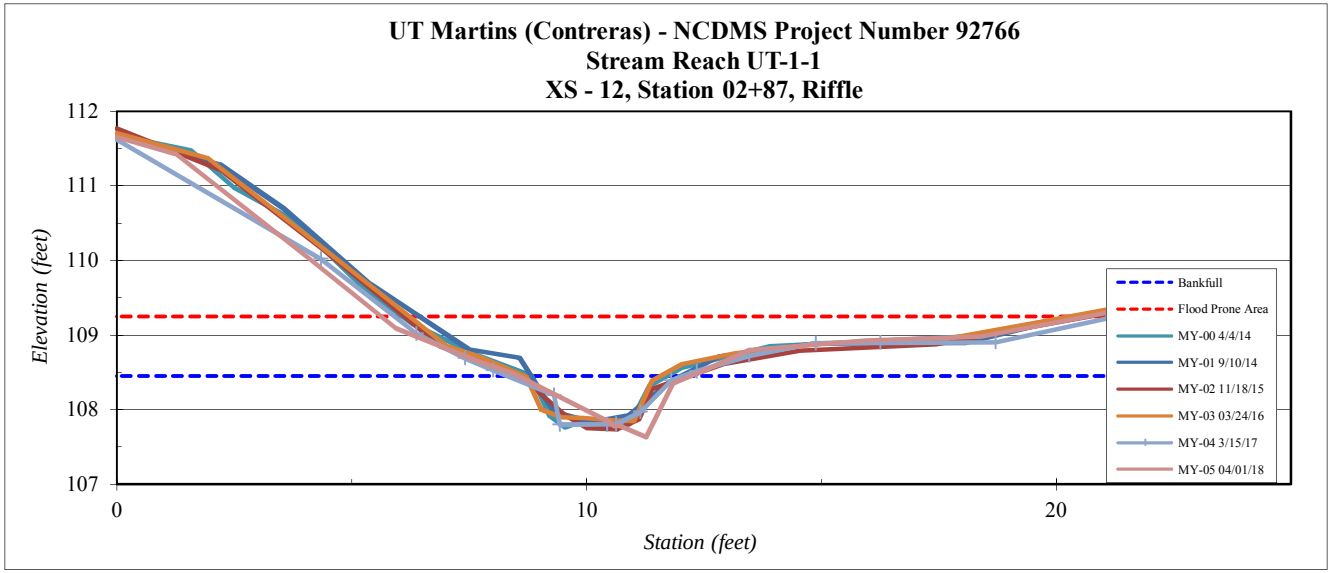
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 12, Riffle
Reach	UT 1-1
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
-0.25	111.70
1.27	111.42
4.13	110.01
5.94	109.09
7.73	108.63
8.46	108.48
10.42	107.86
10.59	107.78
10.70	107.78
11.27	107.63
11.85	108.35
12.57	108.54
13.46	108.80
15.95	108.93
18.40	108.98
21.9	109.39

SUMMARY DATA	
Bankfull Elevation:	108.5
Bankfull Cross-Sectional Area:	1.4
Bankfull Width:	3.7
Flood Prone Area Elevation:	109.3
Flood Prone Width:	15.0
Max Depth at Bankfull:	0.8
Mean Depth at Bankfull:	0.4
W / D Ratio:	9.8
Entrenchment Ratio:	4.1
Bank Height Ratio:	1.0

XS 12 Looking Upstream

Stream Type	E



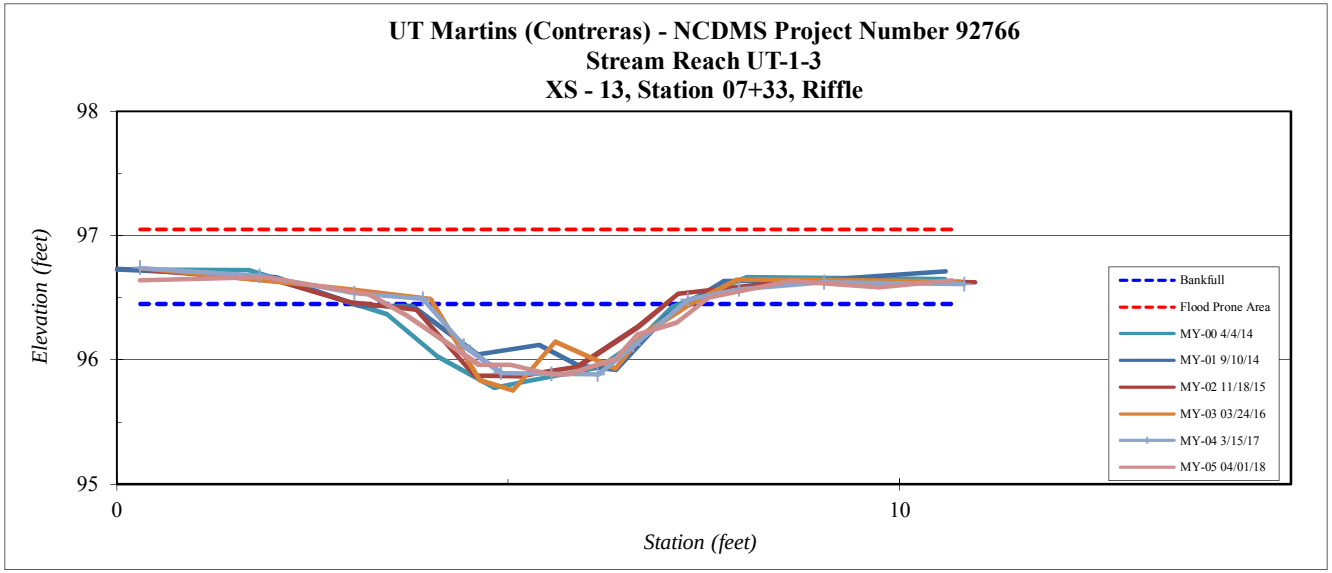
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 13, Riffle
Reach	UT 1-3
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.30	96.64
1.89	96.67
3.22	96.53
3.70	96.36
4.63	95.96
5.03	95.96
5.55	95.88
5.76	95.88
6.37	96.01
6.64	96.20
7.15	96.30
7.56	96.50
8.59	96.64
9.74	96.58
10.67	96.64

SUMMARY DATA	
Bankfull Elevation:	96.5
Bankfull Cross-Sectional Area:	1.4
Bankfull Width:	4.0
Flood Prone Area Elevation:	97.1
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	11.4
Entrenchment Ratio:	6.3
Bank Height Ratio:	1.0

XS 13 Looking Upstream

Stream Type	C/E



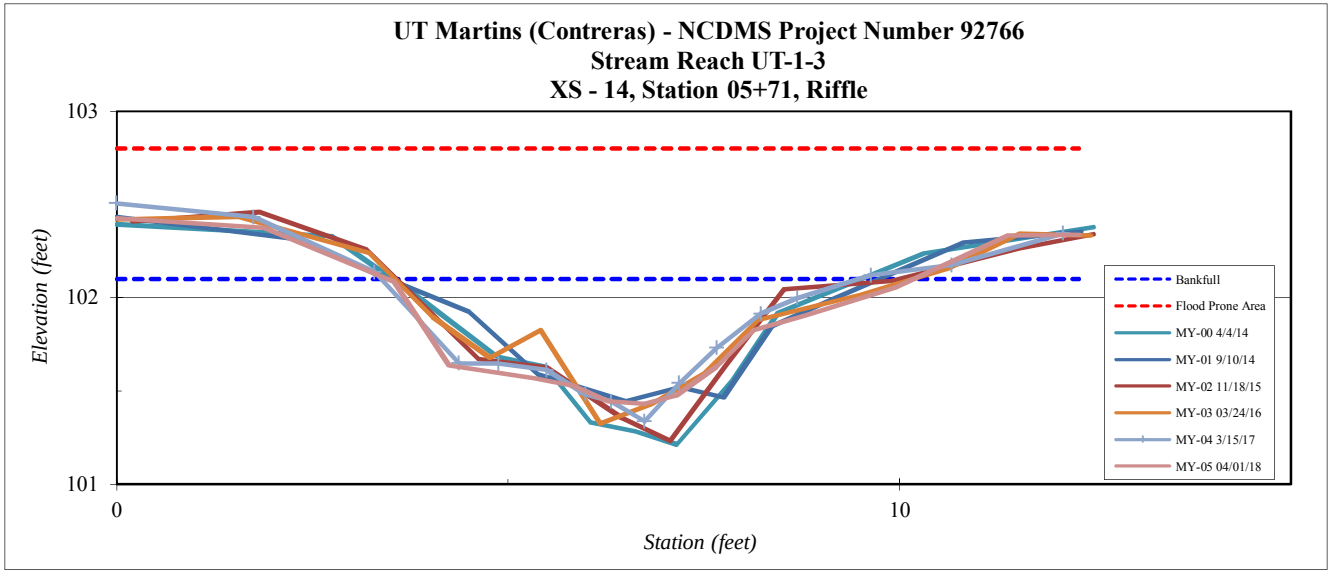
Site	UT to Martins (Contreras)
Project Number:	92766
XS ID	XS - 14, Riffle
Reach	UT 1-3
Date:	4/1/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	102.43
1.88	102.38
3.54	102.09
4.25	101.64
5.33	101.57
5.84	101.53
6.28	101.45
6.74	101.43
7.15	101.48
7.66	101.63
8.13	101.83
8.80	101.91
9.95	102.06
11.38	102.34
12.29	102.34

SUMMARY DATA	
Bankfull Elevation:	102.1
Bankfull Cross-Sectional Area:	2.6
Bankfull Width:	6.7
Flood Prone Area Elevation:	102.8
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.4
W / D Ratio:	17.3
Entrenchment Ratio:	3.7
Bank Height Ratio:	1.0

XS 14 Looking Upstream

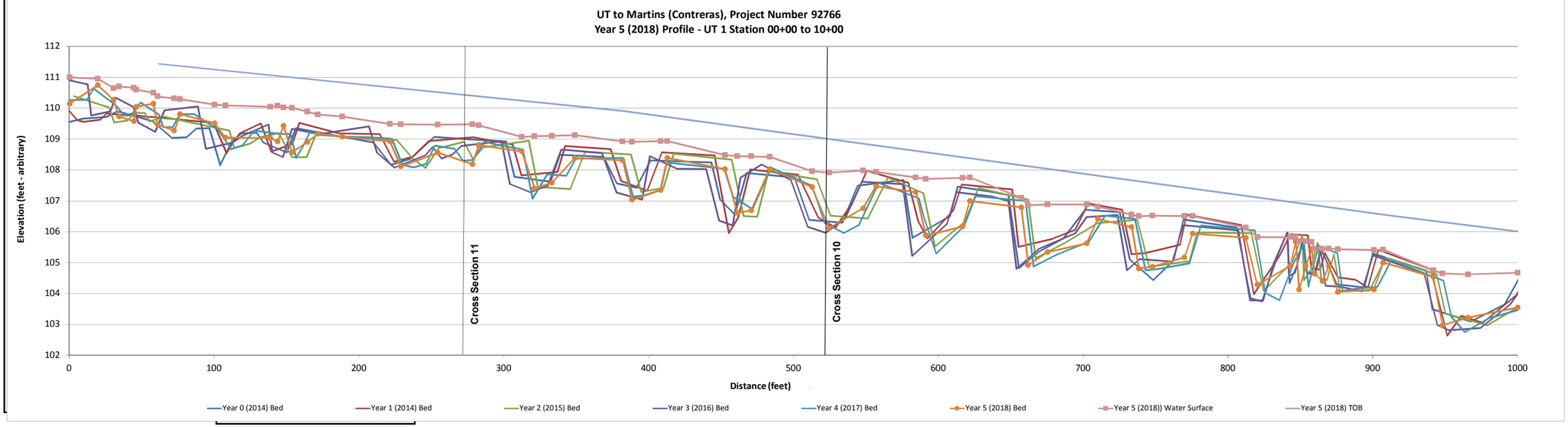
Stream Type	C/E



Project Name	UT to Martins (Contreras), NC DMS Project Number 92766
Reach	UT 1 Station 00+00 - 10+00
Project Number	92766
Date	4/1/18
Crew	Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
1001.1	104.5	105.0	1008.1	104.6	105.1	1000.3	103.6	104.9	1003.6	104.2	105.0	1013.1	104.2	104.6	1005.8	104.0	104.7
991.0	103.6	105.0	999.2	104.0	105.1	979.1	103.0	104.9	994.8	103.7	105.0	1000.5	103.5	104.7	999.9	103.6	104.7
967.6	103.1	105.0	975.8	103.0	105.2	950.3	103.3	105.0	974.1	102.9	104.9	980.8	103.2	104.6	965.7	103.2	104.6
941.1	103.5	105.0	961.0	103.3	105.2	944.1	104.6	105.0	952.2	102.8	105.1	963.4	102.8	104.6	948.1	103.0	104.7
936.9	104.7	105.2	951.3	102.6	105.2	908.9	105.2	105.6	944.7	103.0	105.0	954.3	103.2	104.6	941.8	104.5	104.8
899.9	105.3	105.7	940.2	104.8	105.2	897.8	104.1	105.6	935.5	104.6	105.1	948.8	104.4	104.7	907.2	105.0	105.4
894.1	104.2	105.7	903.9	105.4	105.8	877.5	104.1	105.6	900.3	105.2	105.7	912.9	105.1	105.5	900.7	104.1	105.4
875.1	104.3	105.7	896.7	104.2	105.8	873.1	105.3	105.7	892.6	104.1	105.7	903.3	104.2	105.4	876.0	104.0	105.4
863.9	105.5	105.7	887.8	104.4	105.8	868.4	104.4	105.7	877.5	104.2	105.6	887.1	104.2	105.5	869.7	104.9	105.5
860.2	104.7	105.7	875.7	104.5	105.8	864.1	104.5	105.7	867.4	104.3	105.7	879.2	104.1	105.4	865.2	104.4	105.4
854.4	104.7	105.8	866.9	105.3	105.8	861.8	105.6	105.8	864.2	105.4	105.7	875.6	105.3	105.5	859.9	104.6	105.4
851.1	105.7	105.9	863.7	104.8	105.8	857.0	104.8	105.8	860.0	104.6	105.8	862.5	105.5	105.7	857.8	105.4	105.7
847.6	104.9	105.9	857.5	104.8	105.8	852.4	104.4	105.8	854.7	104.7	105.8	855.5	104.2	105.7	853.8	104.9	105.7
842.6	104.3	105.9	855.1	105.9	106.0	851.1	105.9	106.0	851.7	105.7	106.0	852.4	105.6	105.9	849.0	104.1	105.7
840.9	106.0	106.2	843.3	105.9	106.3	844.7	105.1	106.1	846.5	104.7	106.0	845.6	105.0	105.9	846.7	105.7	105.8
835.0	105.3	106.2	835.5	105.2	106.2	824.5	104.1	106.1	842.1	104.6	106.0	835.5	103.8	105.9	843.0	104.9	105.8
823.4	103.7	106.2	817.9	104.0	106.3	816.2	106.0	106.3	841.1	106.0	106.1	825.9	104.0	105.9	820.4	104.3	105.8
815.6	103.8	106.2	809.3	106.2	106.4	778.7	106.0	106.6	831.7	105.0	106.1	818.7	106.0	106.1	812.4	105.8	106.1
806.1	106.1	106.5	771.6	106.6	106.9	773.5	105.0	106.7	824.4	103.8	106.2	781.3	106.2	106.5	775.6	105.9	106.5
769.4	106.4	106.8	766.9	105.6	106.9	745.6	104.9	106.7	815.1	103.8	106.1	773.4	105.0	106.5	769.9	105.2	106.5
762.6	105.1	106.8	742.5	105.3	106.9	737.4	106.4	106.9	807.1	106.0	106.4	751.9	104.8	106.5	747.8	104.9	106.5
748.3	104.4	106.8	733.3	105.3	106.9	710.4	106.3	107.1	769.0	106.2	106.8	743.0	104.7	106.5	738.5	104.8	106.5
732.1	105.1	106.8	726.8	106.7	106.9	688.0	105.6	107.0	761.6	105.0	106.9	735.8	106.4	106.7	733.5	106.2	106.5
725.1	106.6	107.0	703.6	106.9	107.3	667.1	105.1	107.1	738.9	105.1	106.8	715.2	106.5	106.9	710.2	106.4	106.8
701.4	106.7	107.2	694.4	106.1	107.4	661.9	107.0	107.1	730.2	104.8	106.8	703.9	105.7	106.9	702.4	105.6	106.9
686.2	105.8	107.2	679.0	105.8	107.4	627.8	107.4	108.1	723.8	106.5	106.9	681.5	105.3	106.9	675.3	105.3	106.9
669.2	105.3	107.2	655.4	105.5	107.4	618.4	106.3	108.1	702.4	106.5	107.1	665.7	104.9	106.9	662.0	104.9	106.9
655.7	104.8	107.2	651.1	107.4	107.4	597.7	105.5	108.2	694.5	105.9	107.2	660.2	107.0	107.1	657.3	106.8	107.1

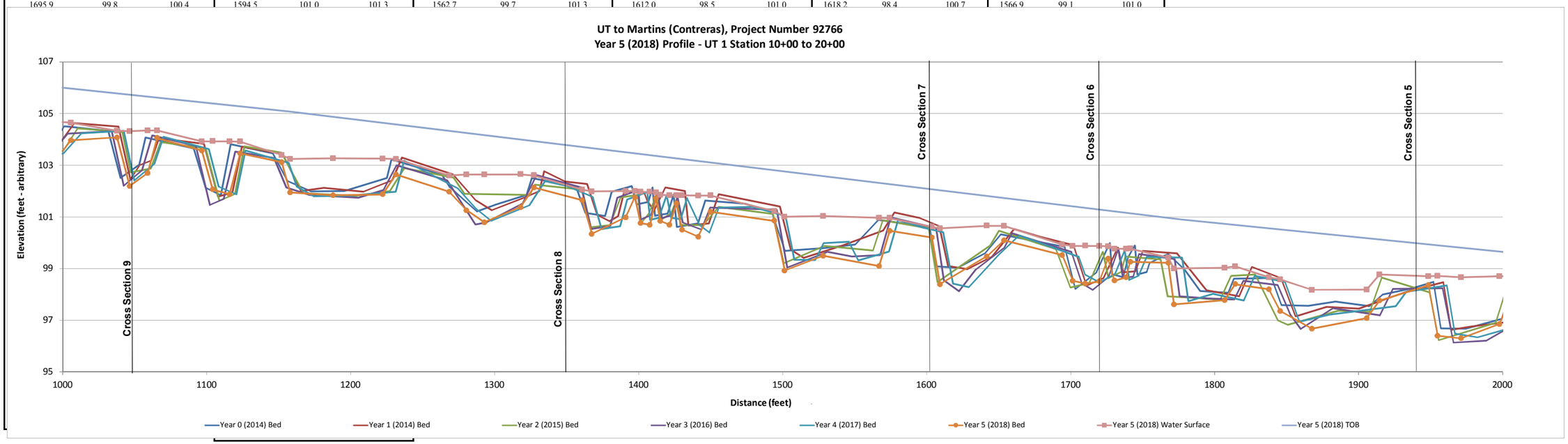
	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0069	0.0066	0.0069	0.0068	0.0068	0.0068
Riffle Length	33	32	31	30	30	31
Avg. Riffle Slope	0.0107	0.0118	0.0117	0.0132	0.0131	0.0129
Pool Length	40	42	39	40	39	41
Pool to Pool Spacing	66	71	64	63	66	64



Project Name UT to Martins (Contreras), NC DMS Project Number 92766
Reach UT 1 Station 10+00 - 20+00
Project Number 92766
Date 4/1/18
Crew Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
2006.3	98.1	98.7	2005.5	97.0	98.7	2001.8	98.1	98.8	2008.5	96.8	98.7	2009.8	96.8	98.9	2006.0	98.1	98.7
1999.4	97.1	98.7	1977.9	96.8	98.8	1995.2	96.9	98.8	1988.9	96.2	98.7	1982.5	96.3	98.9	1997.8	96.9	98.7
1974.3	96.7	98.7	1964.2	96.6	98.7	1955.6	96.2	98.8	1965.9	96.1	98.8	1967.0	96.5	98.9	1971.1	96.3	98.7
1957.1	96.7	98.7	1958.9	98.5	98.8	1949.4	98.1	98.8	1958.3	98.2	98.7	1961.2	98.3	98.9	1954.8	96.4	98.7
1952.0	98.5	98.8	1934.5	98.1	99.0	1916.1	98.7	99.4	1924.0	98.2	99.1	1944.7	98.2	98.9	1948.4	98.4	98.7
1937.4	98.2	98.9	1924.6	97.9	99.0	1907.8	97.3	99.3	1915.0	97.2	99.1	1933.3	98.1	98.9	1914.5	97.8	98.8
1916.5	98.0	99.0	1900.2	97.5	99.0	1885.8	97.4	99.3	1882.3	97.5	99.1	1925.9	97.5	98.9	1905.6	97.1	98.2
1907.4	97.5	99.0	1877.8	97.5	99.0	1850.7	96.8	99.2	1859.9	96.7	99.0	1905.0	97.4	98.9	1867.5	96.7	98.2
1883.9	97.7	99.0	1856.1	97.2	99.0	1844.0	97.0	99.3	1852.6	97.2	99.1	1879.7	97.2	99.0	1845.6	97.4	98.6
1865.1	97.6	99.0	1846.2	98.6	99.0	1828.1	98.8	99.2	1843.8	98.4	99.1	1859.0	97.0	99.0	1837.6	98.2	98.7
1846.5	97.6	99.0	1825.9	99.1	99.4	1811.5	98.7	99.3	1820.1	98.5	99.3	1848.9	98.5	98.9	1814.2	98.4	99.1
1839.6	98.6	99.0	1817.1	97.9	99.3	1804.0	97.8	99.3	1813.8	97.8	99.3	1827.7	98.7	99.1	1807.0	97.8	99.0
1813.6	98.6	99.4	1794.3	98.2	99.4	1788.1	97.9	99.3	1795.5	97.8	99.4	1820.4	97.8	99.2	1771.8	97.6	99.0
1809.5	98.1	99.4	1773.9	99.6	99.7	1767.3	97.9	99.3	1775.6	97.9	99.4	1798.8	98.0	99.2	1767.8	99.2	99.4
1790.1	98.1	99.4	1750.2	99.7	100.1	1762.4	99.4	99.5	1772.3	99.4	99.6	1781.6	97.7	99.2	1741.4	99.3	99.8
1779.6	98.9	99.5	1745.0	98.9	100.1	1737.9	99.5	99.9	1747.5	99.6	100.0	1777.3	99.4	99.5	1738.6	98.7	99.8
1767.8	99.6	99.7	1736.6	98.9	100.1	1735.2	98.9	99.9	1743.5	98.7	100.0	1752.8	99.5	99.8	1730.5	98.5	99.8
1754.8	99.2	99.7	1732.9	99.8	100.1	1726.3	98.6	99.9	1736.3	98.6	100.0	1747.3	98.7	99.8	1726.0	99.4	99.9
1752.9	98.9	99.7	1722.8	98.6	100.1	1722.3	99.6	100.0	1733.0	99.8	100.1	1740.7	98.6	99.8	1720.0	98.5	99.9
1746.3	98.8	99.7	1711.1	98.3	100.1	1713.0	98.4	100.0	1726.5	98.7	100.1	1737.5	99.7	99.9	1710.3	98.4	99.9
1744.5	99.9	100.0	1702.1	99.9	100.3	1699.9	98.3	100.0	1715.2	98.2	100.1	1730.9	98.8	99.9	1701.5	98.5	99.9
1739.8	99.4	100.0	1678.8	100.2	100.7	1689.8	99.8	100.2	1707.9	98.4	100.1	1720.1	98.5	99.9	1694.1	99.5	99.9
1736.5	98.7	100.0	1660.8	100.5	100.9	1650.2	100.5	100.9	1700.6	99.7	100.1	1710.1	98.8	99.9	1653.6	100.1	100.7
1728.7	98.8	100.1	1645.4	99.4	100.9	1644.2	99.9	100.9	1659.2	100.4	100.9	1705.6	99.5	99.9	1641.8	99.5	100.7
1727.2	100.0	100.2	1628.5	99.0	100.9	1607.6	98.5	100.8	1654.1	99.8	100.9	1664.3	100.3	100.7	1609.2	98.4	100.6
1717.9	98.9	100.2	1614.7	99.1	100.9	1601.4	100.6	100.9	1634.2	99.0	100.9	1649.7	99.5	100.7	1603.6	100.2	100.6
1703.3	98.2	100.2	1608.8	100.6	101.0	1569.7	100.9	101.2	1622.4	98.1	101.0	1629.2	98.3	100.7	1574.2	100.5	101.0
1695.9	99.8	100.4	1594.5	101.0	101.3	1562.7	99.7	101.3	1612.0	98.5	101.0	1618.2	98.4	100.7	1566.9	99.1	101.0

	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0069	0.0066	0.0069	0.0068	0.0068	0.0068
Riffle Length	33	32	31	30	30	31
Avg. Riffle Slope	0.0107	0.0118	0.0117	0.0132	0.0131	0.0129
Pool Length	40	42	39	40	39	41
Pool to Pool Spacing	66	71	64	63	66	64



Project Name UT to Martins (Contreras), NC DMS Project Number 92766
Reach UT 1 Station 20+00 - 32+00
Project Number 92766
Date 4/1/18
Crew Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
3170.0	89.1	89.4	3174.7	89.2	89.4	3158.6	89.1	89.3	3184.6	89.0	89.1	3181.7	88.8	89.2	3165.7	89.0	89.3
3145.0	89.5	89.8	3149.4	89.4	89.8	3132.7	89.5	89.7	3158.5	89.3	89.7	3157.8	89.1	89.5	3142.1	89.2	89.6
3138.3	88.8	89.8	3146.4	88.9	89.8	3129.4	88.8	89.7	3153.6	88.7	89.7	3151.8	88.6	89.4	3135.6	88.8	89.7
3124.6	88.8	89.8	3137.7	88.9	89.8	3112.3	89.0	89.7	3148.0	88.7	89.8	3145.6	88.7	89.5	3121.8	89.0	89.7
3121.6	90.2	90.3	3128.9	89.0	89.9	3109.9	90.1	90.4	3138.3	89.3	89.8	3137.2	89.1	89.6	3117.7	90.0	90.1
3113.2	88.7	90.4	3127.0	90.2	90.3	3103.3	88.7	90.2	3136.1	90.0	90.2	3133.7	90.0	90.0	3109.4	88.5	90.2
3101.4	88.3	90.3	3119.8	88.8	90.4	3078.4	88.2	90.2	3129.8	88.9	90.2	3126.2	88.5	90.0	3085.8	88.1	90.1
3088.0	89.2	90.4	3108.6	88.5	90.2	3074.6	90.5	90.6	3116.8	88.1	90.2	3116.3	88.0	90.1	3081.8	90.4	90.7
3085.4	90.7	90.8	3094.5	88.2	90.2	3057.4	90.3	90.9	3103.6	88.2	90.2	3100.9	88.0	90.0	3063.8	90.4	90.9
3066.9	90.5	91.0	3090.0	90.7	90.9	3048.9	89.6	90.9	3099.5	90.1	90.8	3097.0	90.2	90.5	3056.1	89.7	90.9
3060.6	89.8	91.0	3070.6	90.5	91.0	3030.5	90.3	90.9	3081.2	90.6	90.9	3076.2	90.1	90.8	3038.3	89.9	90.8
3053.7	89.7	91.1	3064.8	89.7	91.0	3028.8	91.3	91.6	3075.4	89.7	91.0	3064.3	89.7	90.7	3036.3	91.1	91.5
3043.5	89.8	91.0	3055.2	89.7	91.0	3022.2	90.4	91.6	3065.6	89.5	91.0	3052.5	90.0	90.8	3024.4	89.7	91.5
3040.2	91.3	91.6	3048.0	90.1	90.9	3001.7	89.9	91.6	3055.5	89.8	91.0	3049.9	91.1	91.3	3005.6	90.0	91.5
3034.9	90.5	91.6	3044.2	91.0	91.6	2978.5	90.1	91.6	3053.4	91.2	91.6	3039.5	89.8	91.3	2988.1	89.8	91.5
3007.6	89.9	91.6	3037.6	90.3	91.6	2969.7	91.4	91.7	3043.3	90.0	91.6	3018.4	89.6	91.4	2980.9	91.1	91.5
2989.7	90.3	91.7	3014.9	89.8	91.5	2951.6	91.5	92.0	3027.9	89.7	91.6	2999.2	90.1	91.4	2958.4	91.3	91.9
2983.2	91.4	91.7	2992.8	90.3	91.5	2944.0	90.9	92.0	3006.5	89.8	91.6	2994.2	91.1	91.4	2954.6	90.9	92.0
2962.1	91.7	92.2	2986.1	91.1	91.8	2921.2	91.0	92.0	2998.0	91.1	91.6	2974.8	91.3	91.9	2932.7	90.8	91.9
2928.5	91.6	92.1	2971.2	91.6	92.0	2916.0	91.6	92.1	2979.5	91.6	92.0	2941.4	91.2	91.9	2928.5	91.2	92.0
2914.1	90.6	92.1	2932.5	91.7	92.0	2904.9	91.0	92.0	2973.0	90.9	92.1	2925.2	90.9	91.9	2914.9	91.0	92.0
2902.0	89.2	92.1	2913.6	90.4	92.1	2894.5	89.9	92.1	2952.3	91.0	92.1	2915.7	89.6	91.8	2904.2	90.0	92.0
2884.4	90.8	92.2	2902.2	89.0	92.1	2873.9	90.0	92.0	2943.6	91.3	92.1	2894.9	90.0	91.9	2881.3	90.4	91.8
2880.3	92.1	92.6	2889.2	90.2	92.0	2868.3	92.0	92.5	2936.5	91.3	92.1	2889.0	92.0	92.3	2877.6	92.1	92.3
2845.7	92.6	93.0	2883.3	92.0	92.5	2820.4	92.6	93.2	2924.4	90.3	92.1	2842.3	92.4	93.1	2830.1	92.5	93.1
2833.9	92.6	93.1	2850.4	92.6	92.9	2816.1	91.8	93.2	2911.8	88.8	92.1	2837.4	91.7	93.0	2823.9	91.6	93.1
2825.9	92.0	93.1	2823.5	92.2	93.1	2773.1	91.3	93.2	2897.2	90.0	92.1	2805.0	91.4	93.0	2794.5	91.5	93.1
2802.7	91.7	93.2	2814.4	91.7	93.0	2764.6	92.7	93.2	2891.7	91.9	92.5	2791.9	91.1	93.0	2778.2	91.1	93.1

	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0069	0.0066	0.0069	0.0068	0.0068	0.0068
Riffle Length	33	32	31	30	30	31
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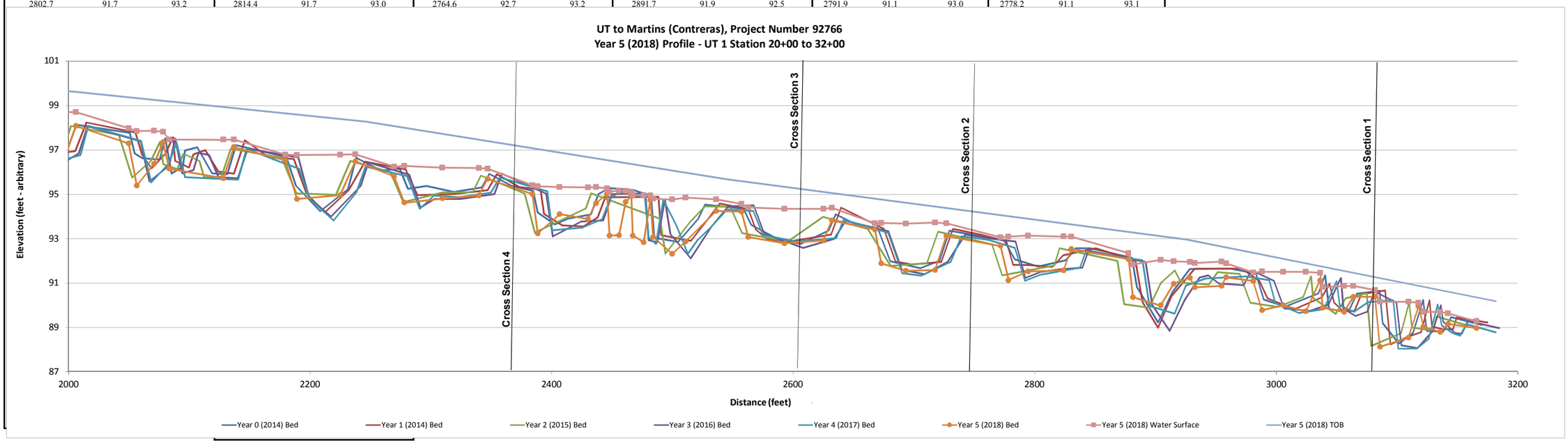
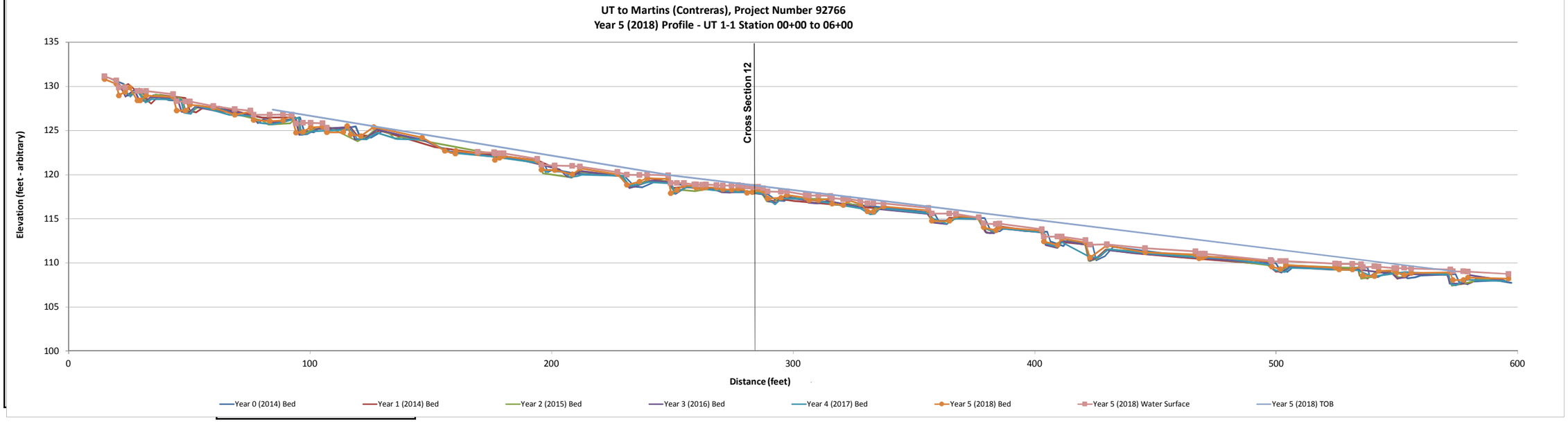


Project Name UT to Martins (Contreras), NC DMS Project Number 92766
Reach UT 1-1 Station 00+00 - 06+00
Project Number 92766
Date 4/1/18
Crew Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
597.4	107.7	108.5	593.9	108.1	108.7	594.7	108.0	108.8	594.7	108.0	108.6	595.3	107.9	108.3	596.3	108.2	108.7
591.3	108.0	108.6	584.1	108.4	108.8	583.7	108.2	109.0	580.3	108.6	108.9	578.3	108.1	108.7	579.4	108.3	109.0
581.8	107.9	108.5	580.9	107.8	108.8	581.6	107.9	109.0	577.4	107.7	108.9	574.4	107.4	108.7	577.5	108.0	109.0
579.4	107.6	108.6	572.9	107.4	108.9	572.7	107.4	109.1	571.9	107.6	108.9	572.4	107.6	108.7	573.2	108.0	109.0
575.8	107.8	108.7	570.5	108.8	109.1	571.2	108.7	109.1	571.0	108.6	109.0	571.5	108.6	109.0	572.1	108.9	109.2
574.4	108.7	108.9	558.2	108.9	109.2	556.2	108.8	109.6	555.4	108.7	109.6	553.4	109.0	109.4	555.9	108.8	109.4
559.8	108.6	109.3	554.2	108.5	109.2	553.4	108.4	109.7	553.9	108.4	109.5	539.8	108.4	109.4	553.1	108.6	109.4
557.6	108.3	109.3	550.1	108.2	109.2	550.5	108.4	109.7	550.2	108.2	109.6	533.5	109.1	109.6	549.8	108.9	109.4
554.3	108.3	109.3	547.4	109.0	109.2	548.0	108.8	109.7	548.3	108.8	109.6	515.7	109.3	109.9	549.0	109.2	109.4
550.5	108.9	109.3	540.9	108.9	109.3	541.3	109.0	109.7	533.9	109.3	109.6	505.6	109.4	110.1	542.5	109.1	109.6
544.9	108.7	109.5	537.8	108.2	109.4	539.4	108.4	109.7	522.6	109.2	110.0	503.6	109.0	110.1	540.7	108.5	109.6
542.5	108.4	109.5	534.6	108.5	109.3	535.2	108.2	109.8	505.5	109.5	110.2	499.4	109.2	110.2	535.9	108.6	109.5
538.7	108.4	109.5	533.9	109.4	109.5	534.0	109.4	109.8	502.0	108.9	110.2	497.4	109.8	110.1	535.1	109.6	109.8
538.0	109.5	109.5	504.2	109.6	110.0	505.1	109.7	110.2	499.0	109.2	110.2	479.3	110.5	110.9	531.5	109.2	109.9
518.3	109.4	110.0	502.4	109.1	109.9	501.5	108.9	110.2	496.9	109.9	110.2	467.5	110.6	110.9	526.1	109.2	109.9
507.5	109.6	109.9	499.8	109.0	109.9	498.6	109.3	110.3	466.8	110.6	111.1	447.3	111.1	111.8	524.4	109.5	109.9
504.5	109.0	110.0	496.3	109.8	110.0	496.3	109.7	110.3	444.6	111.0	111.6	430.6	111.5	111.9	504.1	109.7	110.2
501.3	109.3	109.9	458.8	110.7	111.1	459.2	110.9	111.5	429.9	111.4	111.8	426.2	110.6	111.8	501.8	109.3	110.2
499.9	110.0	110.1	440.7	111.1	111.5	429.9	111.5	112.1	427.2	110.7	111.8	423.0	110.6	111.8	498.3	109.5	110.1
482.1	110.6	110.9	429.3	111.5	111.8	426.1	110.5	112.0	423.2	110.2	111.8	411.2	112.3	112.7	497.7	110.2	110.3
467.0	110.7	111.1	425.8	110.6	111.8	422.6	110.2	112.1	421.3	112.1	112.3	409.5	111.8	112.7	470.5	110.7	111.0
451.7	111.1	111.4	422.3	110.2	111.8	420.9	112.1	112.4	411.2	112.5	112.8	404.5	112.2	112.8	469.4	110.6	111.0
432.5	111.8	111.9	420.9	112.1	112.2	410.9	112.5	112.9	409.5	111.7	112.8	403.9	113.4	113.6	468.1	110.5	111.0
428.9	110.7	111.9	410.4	112.4	112.8	408.6	111.8	112.9	404.6	112.0	112.8	385.5	113.9	114.3	466.6	110.9	111.3
425.5	110.3	111.9	408.3	111.8	112.8	404.1	112.2	112.9	403.3	113.4	113.6	383.6	113.4	114.3	445.7	111.2	111.6
423.9	112.1	112.2	404.0	112.3	112.8	402.8	113.5	113.6	385.2	113.9	114.3	379.6	114.0	114.4	429.9	112.0	112.1
413.5	112.5	112.8	402.7	113.5	113.6	384.5	114.0	114.4	383.3	113.4	114.3	377.6	115.0	115.1	423.0	110.6	112.1
412.0	111.9	112.8	384.8	114.1	114.3	383.1	113.5	114.4	380.0	113.4	114.3	365.7	115.0	115.3	421.1	112.3	112.6

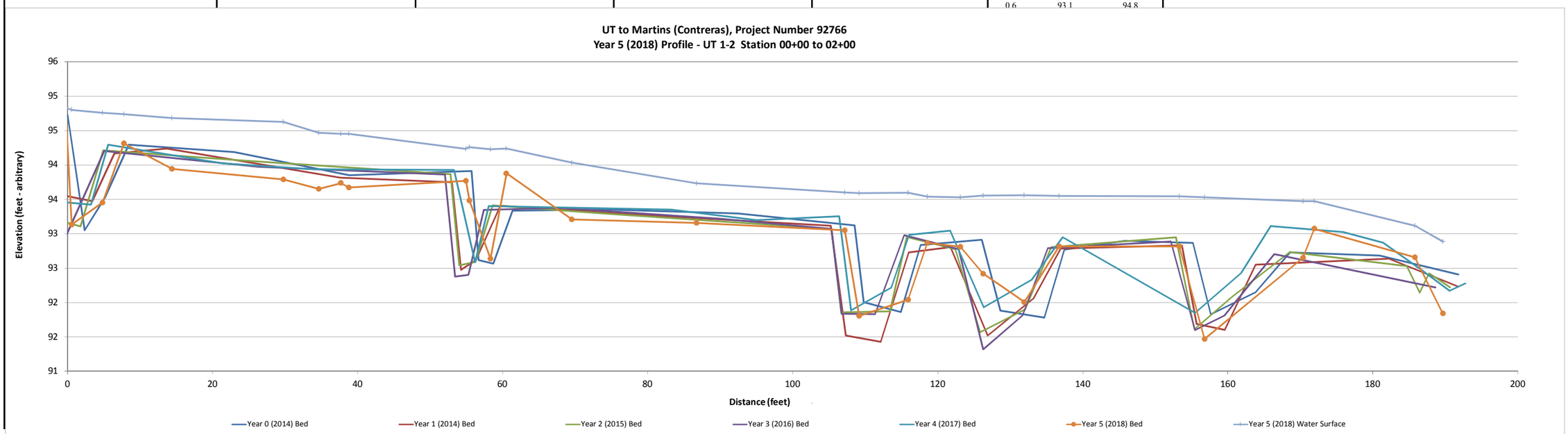
	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0383	0.0385	0.0381	0.0383	0.0388	0.0380
Riffle Length	24	26	19	20	26	13
Avg. Riffle Slope	0.0357	0.0306	0.0392	0.0309	0.0303	0.0330
Pool Length	8	9	10	8	8	9
Pool to Pool Spacing	32	34	27	26	33	20



Project Name UT to Martins (Contreras), NC DMS Project Number 92766
Reach UT 1-2 Station 00+00 - 02+00
Project Number 92766
Date 4/1/18
Crew Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
191.8	92.4	93.0	191.8	92.2	92.9	190.6	92.2	93.0	188.6	92.2	92.9	192.8	92.3	93.0	189.7	91.8	92.9
180.9	92.7	93.2	182.1	92.6	93.1	187.8	92.4	93.0	166.4	92.7	93.5	190.5	92.2	93.0	185.8	92.7	93.1
168.6	92.7	93.2	163.8	92.6	93.3	186.5	92.1	93.0	159.5	91.8	93.5	186.6	92.5	93.1	171.9	93.1	93.5
163.8	92.1	93.2	159.6	91.6	93.3	184.7	92.5	93.0	155.5	91.6	93.5	181.4	92.9	93.3	170.4	92.7	93.5
157.7	91.8	93.2	155.7	91.7	93.3	168.6	92.7	93.5	152.2	92.9	93.5	175.9	93.0	93.4	156.8	91.5	93.5
155.2	92.9	93.2	153.7	92.8	93.3	160.6	92.1	93.6	135.2	92.8	93.5	165.9	93.1	93.6	153.3	92.8	93.5
145.8	92.9	93.3	137.0	92.8	93.4	155.4	91.6	93.5	131.7	91.8	93.5	161.9	92.4	93.6	136.7	92.8	93.5
137.5	92.8	93.3	133.3	92.1	93.4	152.8	92.9	93.5	126.2	91.3	93.5	155.5	91.8	93.6	131.9	92.0	93.6
134.7	91.8	93.3	126.9	91.5	93.4	135.7	92.8	93.6	122.9	92.8	93.6	137.2	92.9	93.6	126.2	92.4	93.6
128.6	91.9	93.3	121.8	92.8	93.5	132.1	91.9	93.7	115.4	93.0	93.6	132.9	92.3	93.6	123.1	92.8	93.5
126.0	92.9	93.3	116.0	92.7	93.5	125.9	91.6	93.7	111.4	91.8	93.6	126.4	91.9	93.6	118.6	92.9	93.5
117.6	92.8	93.4	112.1	91.4	93.5	122.5	92.8	93.6	106.7	91.8	93.6	121.7	93.0	93.6	115.9	92.0	93.6
114.9	91.9	93.4	107.3	91.5	93.5	115.7	93.0	93.6	105.3	93.1	93.6	116.0	93.0	93.7	109.1	91.8	93.6
109.8	92.0	93.3	105.3	93.1	93.4	113.4	91.9	93.7	89.9	93.2	93.8	113.6	92.2	93.7	107.2	93.0	93.6
108.5	93.1	93.4	79.0	93.3	93.9	106.7	91.9	93.7	67.7	93.4	94.1	108.0	91.9	93.7	86.7	93.2	93.7
92.4	93.3	93.6	59.7	93.4	94.0	105.3	93.1	93.7	57.4	93.3	94.1	106.4	93.3	93.7	69.5	93.2	94.0
74.5	93.4	93.9	56.3	92.6	94.0	74.6	93.3	94.3	55.2	92.4	94.1	95.0	93.2	93.7	60.5	93.9	94.2
61.3	93.3	93.9	54.3	92.5	94.1	58.6	93.4	94.4	53.4	92.4	94.1	83.2	93.3	94.0	58.3	92.6	94.2
58.7	92.6	93.9	53.0	93.7	94.1	56.2	92.6	94.4	52.0	93.9	94.2	58.1	93.4	94.3	55.4	93.5	94.3
56.6	92.6	93.9	37.6	93.8	94.4	54.0	92.5	94.4	26.3	94.0	94.5	56.2	92.6	94.3	54.9	93.8	94.2
55.7	93.9	94.0	13.6	94.2	94.8	52.8	93.9	94.5	5.1	94.2	94.9	53.3	93.9	94.2	38.8	93.7	94.5
38.8	93.9	94.3	6.5	94.2	94.9	24.1	94.1	94.9	-0.2	93.0	94.8	33.9	93.9	94.5	37.7	93.7	94.5
23.0	94.2	94.6	3.4	93.5	94.9	4.9	94.2	95.1	-2.0	93.3	94.8	21.3	94.0	94.7	34.6	93.6	94.5
8.4	94.3	94.7	-1.4	93.6	94.8	1.8	93.1	95.1	-3.2	94.7	94.9	5.6	94.3	94.9	29.8	93.8	94.6
5.1	93.5	94.8	-2.2	94.6	94.9	-1.2	93.2	95.1	-50.5	94.8	95.1	3.2	93.4	94.9	14.4	93.9	94.7
2.3	93.1	94.7				-2.7	94.7	95.1				-0.9	93.5	94.8	7.8	94.3	94.7
0.0	94.7	95.0				-50.1	94.7	95.3				-3.2	94.8	95.0	4.8	93.5	94.8
															0.6	93.1	94.8

	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0105	0.0102	0.0096	0.0074	0.0090	0.0092
Riffle Length	29	27	30	32	30	20
Avg. Riffle Slope	0.0108	0.0112	0.0114	0.0093	0.0123	0.0101
Pool Length	10	10	9	10	10	11
Pool to Pool Spacing	38	37	38	38	38	31

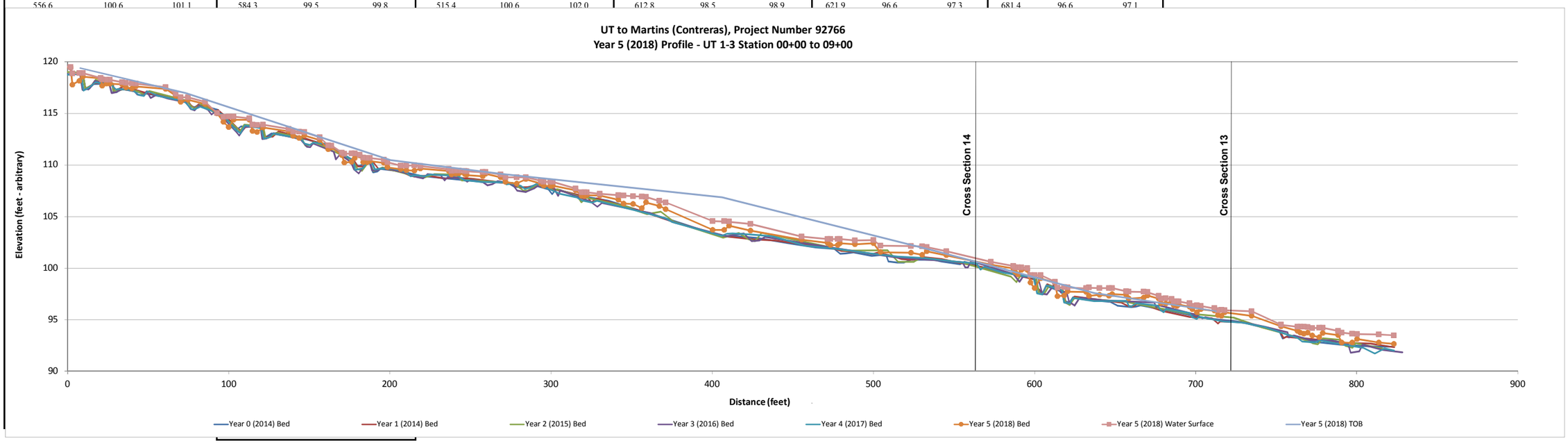


Project Name UT to Martins (Contreras), NC DMS Project Number 92766
Reach UT 1-3 Station 00+00 - 09+00
Project Number 92766
Date 4/1/18
Crew Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
822.4	92.4	92.9	823.2	92.3	92.8	822.3	92.0	92.9	828.3	91.8	92.9	823.1	92.0	92.8	823.1	92.6	93.5
807.4	92.4	93.0	808.3	92.7	93.0	799.3	92.7	93.3	816.1	92.1	92.9	817.2	92.2	92.8	813.6	92.8	93.6
789.7	92.6	93.3	793.4	92.7	93.1	797.3	92.3	93.4	803.6	92.6	93.1	815.7	92.1	92.8	800.2	93.1	93.6
775.6	92.8	93.5	781.8	93.0	93.4	792.8	92.5	93.4	801.6	91.9	93.1	811.2	91.7	92.8	797.2	92.8	93.6
757.6	93.4	93.8	769.7	93.1	93.5	789.1	93.0	93.6	796.3	91.8	93.3	803.8	92.3	92.8	790.7	92.8	93.7
754.1	93.2	93.8	756.4	93.3	93.7	779.1	93.2	93.8	794.6	92.6	93.4	788.0	92.7	93.2	788.4	93.5	93.9
752.0	93.8	93.9	754.8	93.2	93.7	775.7	92.6	93.9	784.6	93.0	93.7	777.2	93.0	93.4	778.8	93.7	94.2
727.9	94.8	95.0	752.6	93.8	93.9	772.5	92.7	94.0	771.3	93.0	93.8	774.3	92.8	93.4	776.7	93.3	94.2
707.0	95.1	95.4	738.3	94.4		763.1	93.3	94.0	761.0	93.5	94.0	766.0	92.9	93.5	772.4	93.5	94.2
681.7	95.9	96.2	729.5	94.7	95.1	741.2	94.3	94.9	758.0	93.3	94.1	763.2	93.2	93.6	769.5	93.7	94.3
665.8	96.4	97.0	715.1	94.8	95.2	723.6	95.2	95.6	757.0	93.8	94.0	742.7	94.3		767.2	93.6	94.3
662.5	96.3	97.0	713.7	94.6	95.2	694.6	95.6	96.1	742.7	94.3	94.9	728.9	94.7		765.1	93.7	94.3
660.1	96.2	97.0	710.2	95.1	95.3	656.6	96.7	97.5	732.3	94.6		717.5	94.8	95.2	763.2	93.9	94.3
651.4	96.4	97.1	696.1	95.2	95.6	624.8	97.1	97.9	722.1	94.8	95.6	702.2	95.3	95.6	753.1	94.3	94.5
646.9	96.7	97.2	679.2	95.9	96.2	621.7	96.4	97.9	712.6	95.0	95.7	700.5	95.1	95.6	734.7	95.4	95.8
630.3	97.0	97.4	665.1	96.6	97.0	619.0	96.7	97.9	706.1	95.2	95.8	698.1	95.2	95.6	717.9	95.7	95.9
624.0	97.2	97.5	661.4	96.3	97.0	617.6	97.8	98.1	704.0	95.1	95.8	696.2	95.7		716.0	95.4	96.0
621.8	96.7	97.5	657.9	96.3	97.0	609.3	98.3	98.9	700.2	95.5	95.8	681.7	96.0		713.9	95.4	95.9
618.3	96.8	97.5	653.5	96.7	97.0	605.9	97.5	98.9	677.3	96.4	96.9	680.1	95.7	96.2	711.7	95.9	96.1
617.1	97.7	97.8	624.8	97.2	97.4	602.7	97.5	98.9	675.6	96.2	96.9	678.1	95.9	96.2	703.2	96.0	96.3
607.2	98.2	98.7	622.0	96.4	97.4	600.9	99.1	99.3	674.3	96.7	97.1	676.7	96.4		700.9	95.7	96.4
605.0	97.4	98.7	619.6	96.6	97.4	591.2	99.2	99.7	643.7	96.9	97.5	663.3	96.6	96.9	697.9	96.0	96.3
600.9	98.1	98.6	617.6	97.8		588.7	98.6	99.7	628.1	97.1	97.6	660.3	96.3	97.0	696.2	96.2	96.6
600.2	98.9	99.1	607.9	98.4	98.7	585.3	99.2	99.8	624.9	96.3	97.5	658.5	96.3	97.0	689.6	96.5	96.8
591.1	99.3	99.5	605.0	97.6	98.8	553.9	100.6	101.4	621.5	96.7	97.6	657.0	96.8	97.1	688.3	96.3	96.8
582.1	99.5	99.9	601.6	98.1	98.7	530.1	101.0	101.8	619.9	97.7	98.0	637.1	96.8	97.3	686.4	96.4	96.7
573.3	99.8	100.1	599.8	98.9		525.3	100.6	101.8	616.7	97.6	98.2	624.1	97.1	97.4	685.1	96.7	97.0
556.6	100.6	101.1	584.3	99.5	99.8	515.4	100.6	102.0	612.8	98.5	98.9	621.9	96.6	97.3	681.4	96.6	97.1

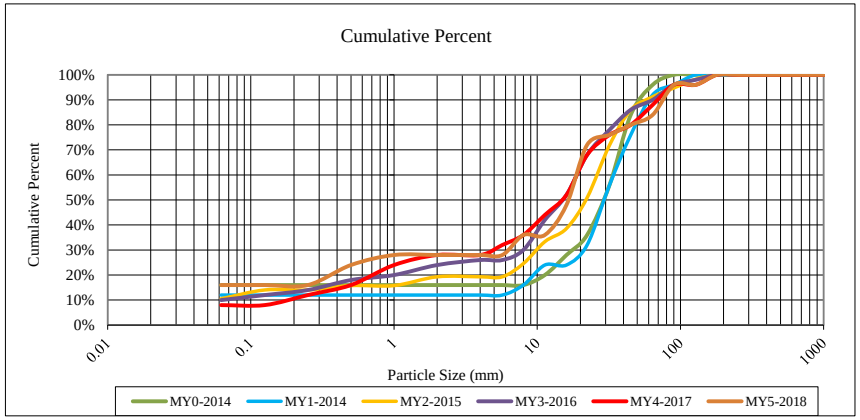
	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0321	0.0321	0.0321	0.0317	NA*	0.0317
Riffle Length	41	34	27	22	25	15
Avg. Riffle Slope	0.0318	0.0422	0.0413	0.0467	NA*	0.0346
Pool Length	12	11	11	8	10	11
Pool to Pool Spacing	51	45	40	29	35	26

* Insufficient water in channel to calculate slope.



Project Name: UT to Martins Creek (Contreras)					
Cross-Section: 5					
Feature: Riffle					
			2018		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	4	16%	16%
Sand	very fine sand	0.125	0	0%	16%
	fine sand	0.250	0	0%	16%
	medium sand	0.50	2	8%	24%
	coarse sand	1.00	1	4%	28%
	very coarse sand	2.0	0	0%	28%
Gravel	very fine gravel	4.0	0	0%	28%
	fine gravel	5.7	0	0%	28%
	fine gravel	8.0	2	8%	36%
	medium gravel	11.3	0	0%	36%
	medium gravel	16.0	3	12%	48%
	course gravel	22.3	6	24%	72%
	course gravel	32.0	1	4%	76%
	very coarse gravel	45	1	4%	80%
	very coarse gravel	64	1	4%	84%
Cobble	small cobble	90	3	12%	96%
	medium cobble	128	0	0%	96%
	large cobble	180	1	4%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			25	100%	100%

Summary Data	
D16	0.25
D35	7.72
D50	16.4
D84	64
D95	87



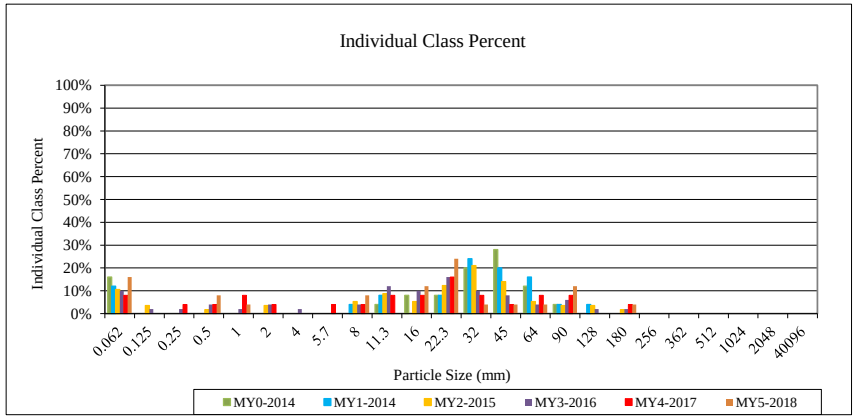


Table 10a. Baseline Stream Data Summary (UT -1 to Martin's Creek)
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Gauge	Regional Curve			Pre-Existing Condition (UT-1)					Reference Reach(es) Data					Design (UT-1)			Monitoring Baseline				
Dimension and Substrate - Riffle Only		**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Max**	**Med**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)					9.2			16.9		11.7			21.7		12.5	15.0		11.7	12.3	12.2	13.8	0.7
Floodprone Width (ft)					31.0			51.0		20			410		50	100		50	71	50	100	27
BF Mean Depth (ft)					1.0			1.6		0.6			1.0		1.0	1.2		0.9	1.0	1.1	1.1	0.1
BF Max Depth (ft)					2.1			2.6		0.9			2.5		1.2	1.7		1.5	1.7	1.7	1.8	0.2
BF Cross Sectional Area (ft^2)					12.8			18.8		10.2			13.1		12.5	18.0		11.5	12.7	12.8	14.7	1.2
Width/Depth Ratio					6.0			17.6		10.7			17.0		12.5	12.5		10.6	11.9	11.7	13.7	1.0
Entrenchment Ratio					>2.4			>5		1.7			32.0		3.5	7.7		4.1	5.8	5.8	8.5	2.1
Bank Height Ratio					1.1			1.7		1.0			1.0		1.0	1.0			1.0	1.0		
Profile																						
Riffle length (ft)																		5	33	35	55	12.2
Riffle slope (ft/ft)										0.2000			1.9000		0.0140	0.0140		0.0000	0.0107	0.0115	0.0230	0.0053
Pool length (ft)																		10.0	40.0	36.0	82.0	17.4
Pool Max depth (ft)										2.2			2.5		2.0	3.6		2.3	2.6	2.7	2.8	0.2
Pool spacing (ft)										48.0			231.0		50.0	105.0		10.0	66.0	70.0	118.0	31.0
Pattern																						
Channel Beltwidth (ft)										16			55		19	60		19			60	
Radius of Curvature (ft)										28			47		23	53		23			53	
Rc:Bankfull width (ft/ft)										2			3		1.8	3.5		1.8			3.5	
Meander Wavelength (ft)										70			260		87.5	180		87.5			180	
Meander Width ratio										4.4			17.6		7	12		7			12	
Transport parameters																						
Reach Shear Stress (competency) lbs/ft^2																						
Max part size (mm) mobilized at bankfull																						
Stream Power (transport capacity) W/m^2																						
Additional Reach Parameters																						
Rosgen Classification					Bc/Cc/E					Aa/Bc					C			E				
Bankfull Velocity (fps)					3.6 - 4.2										3.5 - 4.2							
Bankfull Discharge (cfs)					46 - 60																	
Valley Length (ft)																						
Channel Thalweg Length (ft)																		3180				
Sinuosity					1.17					1.19					1.5			1.5				
Water Surface Slope (ft/ft)					0.0075					0.0333					0.0058			0.0069				
BF slope (ft/ft)																						
Bankfull Floodplain Area (acres)																						
% of Reach with Eroding Banks					----					----												
Channel Stability or Habitat Metric					----					----												
Biological or Other					----					----												

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							Monitoring Baseline						
Ri%/RU%P%G%/S%																												
SC%/SA%/G%/C%/B%BE%																												
d16/d35/d50/d84/d95	3.0	12.6	17.9	72.3	84.0																							
Entrainment Class <1.5/1.5-1.99/2.0-4.9/5.0-																												
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0																												

Table 10c. Baseline Stream Data Summary (UT 1-1 and UT 1-2 to Martin's Creek)
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Gauge	Regional Curve			Pre-Existing Condition					Reference Reach(es) Data					Design			Monitoring Baseline				
Dimension and Substrate - Riffle Only		**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Max**	**Med**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)					4.5			6.7		11.7			21.7				4.5		2.9			
Floodprone Width (ft)					5.4			8.5		20			410				13.5		14			
BF Mean Depth (ft)					0.3			0.4		0.6			1.0				0.4		0.5			
BF Max Depth (ft)					0.5			1.0		0.9			2.5				0.5		0.7			
BF Cross Sectional Area (ft^2)					1.5			2.4		10.2			13.1				1.7		1.4			
Width/Depth Ratio					13.2			18.9		10.7			17.0				12.0		6.0			
Entrenchment Ratio					1.2			1.6		1.7			32.0				3.0		4.8			
Bank Height Ratio					1.0			4.4		1.0			1.0				1.0		1.0			
Profile																						
Riffle length (ft)																		5	24	15	67	21
Riffle slope (ft/ft)										0.2000			1.9000				0.0140	0.0000	0.0357	0.0332	0.1101	0.0245
Pool length (ft)																		4.0	8.0	8.0	14.0	2.3
Pool Max depth (ft)										2.2			2.5				0.8	----	----	----	----	----
Pool spacing (ft)										48.0			231.0				32.0	6.0	32.0	23.0	78.0	22.0
Pattern																						
Channel Beltwidth (ft)										16			55									
Radius of Curvature (ft)										28			47				34			34		
Rc:Bankfull width (ft/ft)										2			3				7.6			7.6		
Meander Wavelength (ft)										70			260									
Meander Width ratio										4.4			17.6									
Transport parameters																						
Reach Shear Stress (competency) lbs/ft^2																						
Max part size (mm) mobilized at bankfull																						
Stream Power (transport capacity) W/m^2																						
Additional Reach Parameters																						
Rosgen Classification					C					Aa/Bc					C			E				
Bankfull Velocity (fps)					3.5 - 4.1										3.5 - 4.1							
Bankfull Discharge (cfs)					6.0 - 7.0																	
Valley Length (ft)																						
Channel Thalweg Length (ft)																		580				
Sinuosity					1.02 - 1.08					1.19					1.03			1.03				
Water Surface Slope (ft/ft)					0.0096 - 0.0333					0.0333					0.0096 - 0.0333			0.0383				
BF slope (ft/ft)					----					----					----							
Bankfull Floodplain Area (acres)					----					----					----							
% of Reach with Eroding Banks					----					----												
Channel Stability or Habitat Metric					----					----												
Biological or Other					----					----												

Table 10d. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							Monitoring Baseline						
Ri%/RU%P%G%/S%																											
SC%/SA%/G%/C%/B%BE%																											
d16/d35/d50/d84/d95																											
Entrainment Class <1.5/1.5-1.99/2.0-4.9/5.0-																											
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0																											

Table 10e. Baseline Stream Data Summary (UT 1-3 to Martin's Creek)
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Gauge	Regional Curve			Pre-Existing Condition					Reference Reach(es) Data					Design			Monitoring Baseline				
Dimension and Substrate - Riffle Only		**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Max**	**Med**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)					6.3			14.3		11.7			21.7				6.5	5.9	6.6	6.6	7.3	1
Floodprone Width (ft)					10.2			32.6		20			410				14.0		25	25		
BF Mean Depth (ft)					0.2			0.5		0.6			1.0				0.5	0.4	0.5	0.5	0.5	0.1
BF Max Depth (ft)					0.8			1.0		0.9			2.5				0.7	0.9	1.0	1.0	1.0	0.1
BF Cross Sectional Area (ft^2)					3.2			3.5		10.2			13.1				3.5	2.7	3.2	3.2	3.6	0.6
Width/Depth Ratio					12.5			58.6		10.7			17.0				12.0	14.6	14.7	14.7	14.8	0.1
Entrenchment Ratio					>1.6			2.3		1.7			32.0				2.2	3.4	3.8	3.8	4.2	0.6
Bank Height Ratio					1.2			1.3		1.0			1.0				1.0		1.0	1.0		
Profile																						
Riffle length (ft)																		4	41	22	173	44
Riffle slope (ft/ft)										0.2000			1.9000				0.0140	0.0047	0.0318	0.0326	0.0913	0.0218
Pool length (ft)																		5.0	12.0	7.0	50.0	11.0
Pool Max depth (ft)										2.2			2.5				1.1					
Pool spacing (ft)										48.0			231.0				45.0	11.0	51.0	31.0	178.0	43.0
Pattern																						
Channel Beltwidth (ft)										16			55									
Radius of Curvature (ft)										28			47									
Rc:Bankfull width (ft/ft)										2			3									
Meander Wavelength (ft)										70			260									
Meander Width ratio										4.4			17.6									
Transport parameters																						
Reach Shear Stress (competency) lbs/ft^2																						
Max part size (mm) mobilized at bankfull																						
Stream Power (transport capacity) W/m^2																						
Additional Reach Parameters																						
Rosgen Classification					B					Aa/Bc					B			C/E				
Bankfull Velocity (fps)					2.5 - 2.9										2.3							
Bankfull Discharge (cfs)					8.0 - 10.0																	
Valley Length (ft)																						
Channel Thalweg Length (ft)																		813				
Sinuosity					1.08					1.19					1.08			1.08				
Water Surface Slope (ft/ft)					0.0275					0.0333					0.0275			0.0321				
BF slope (ft/ft)					----					----					----							
Bankfull Floodplain Area (acres)					----					----					----							
% of Reach with Eroding Banks					----					----												
Channel Stability or Habitat Metric					----					----												
Biological or Other					----					----												

Table 10f. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							Monitoring Baseline						
Ri%/RU%P%G%/S%																											
SC%/SA%/G%/C%/B%BE%																											
d16/d35/d50/d84/d95																											
Entrainment Class <1.5/1.5-1.99/2.0-4.9/5.0-																											
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0																											

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Cross Section 1 UT - 1 Riffle							Cross Section 2 UT - 1 Riffle							Cross Section 3 UT - 1 Pool							Cross Section 4 UT - 1 Riffle							Cross Section 5 UT - 1 Riffle							Cross Section 6 UT - 1 Pool						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	11.7	11.4	11.9	12.4	11.5	11.4		12.5	12.7	12.6	12.7	11.8	12.2		16.4	17.4	17.9	17.7	17.7	17.1		13.8	13.3	14.0	13.1	12.9	12.5		12.1	11.3	13.4	10.9	11.4	11.3		13.0	12.8	12.2	12.4	12.4	11.5	
Floodprone Width (ft) (approx)	100.0	100.0	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0	100.0		NA	NA	NA	NA	NA	NA		100.0	100.0	100.0	100.0	100.0	100.0		50.0	50.0	50.0	50.0	50.0	50.0		NA	NA	NA	NA	NA	NA	
BF Mean Depth (ft)	1.1	1.1	1.0	1.1	1.0	1.0		1.1	1.1	1.0	1.0	1.0	0.9		1.2	1.2	1.2	1.2	1.1	1.2		1.1	1.1	1.0	0.9	0.9	0.9		1.1	1.1	0.9	1.1	1.1	1.1		1.4	1.4	1.3	1.4	1.4	1.5	
BF Max Depth (ft)	1.7	1.7	1.7	1.9	1.7	1.7		1.8	1.8	1.8	1.7	1.7	1.6		2.5	2.7	2.7	2.6	2.5	2.5		1.8	1.9	1.7	1.6	1.7	1.8		1.8	1.8	2.0	2.0	1.9	2.0		2.8	2.6	2.6	2.7	2.6	2.7	
BF Cross Sectional Area (ft^2)	13.3	12.7	12.4	13.1	11.6	11.6		13.4	13.4	13.1	12.2	11.4	11.4		19.9	21.6	21.2	21.0	19.7	19.7		14.7	14.7	13.5	11.9	11.3	11.3		12.8	12.1	11.8	12.0	12.6	12.6		18.3	18.0	16.3	17.8	17.2	17.2	
Width/Depth Ratio	10.3	10.2	11.4	11.7	11.4	11.2		11.7	12.0	12.1	13.2	12.2	13.1		NA	NA	NA	NA	NA	NA		13.0	12.0	14.5	14.4	14.7	13.8		11.4	10.6	15.2	9.9	10.3	10.1		NA	NA	NA	NA	NA	NA	
Entrenchment Ratio	8.5	8.8	8.4	8.1	8.7	8.8		8.0	7.9	7.9	7.9	8.5	8.2		NA	NA	NA	NA	NA	NA		7.2	7.5	7.1	7.6	7.8	8.0		4.1	4.4	3.7	4.6	4.4	4.4		NA	NA	NA	NA	NA	NA	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	
d50 (mm)	----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		28.6	29.1	21.5	14.8	14.6	16.4		----	----	----	----	----	----	

Parameter	Cross Section 7 UT - 1 Riffle							Cross Section 8 UT - 1 Riffle							Cross Section 9 UT - 1 Pool							Cross Section 10 UT - 1 Pool							Cross Section 11 UT - 1 Riffle						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	11.7	12.8	11.7	11.0	10.3	10.3		12.2	12.1	11.9	11.7	11.9	12.5		9.4	9.2	10.0	9.9	10.4	10.7		9.6	10.1	9.5	9.4	9.2	8.7		12.3	12.3	11.9	12.0	11.3	10.4	
Floodprone Width (ft) (approx)	50.0	50.0	50.0	50.0	50.0	50.0		50.0	50.0	50.0	50.0	50.0	50.0		NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA		50.0	50.0	50.0	50.0	50.0	50.0	
BF Mean Depth (ft)	1.0	0.9	0.8	0.8	0.8	0.8		1.0	0.9	0.9	0.9	0.9	0.8		1.6	1.6	1.7	1.8	1.8	1.7		1.8	1.8	1.8	2.1	2.0	2.1		0.9	0.9	0.7	0.8	0.8	0.8	
BF Max Depth (ft)	1.5	1.4	1.3	1.3	1.3	1.3		1.5	1.6	1.5	1.6	1.5	1.4		2.3	2.2	2.2	2.2	2.2	2.2		2.8	2.9	2.7	2.9	2.8	2.8		1.5	1.6	1.5	1.6	1.6	1.7	
BF Cross Sectional Area (ft^2)	11.7	11.1	9.0	9.0	8.4	8.4		11.8	11.2	11.1	11.0	10.4	10.4		15.5	15.0	16.6	17.8	18.4	18.4		17.0	18.3	17.5	19.8	18.0	18.0		11.5	11.0	8.0	9.6	8.6	8.6	
Width/Depth Ratio	11.7	14.8	15.2	13.4	12.6	12.6		12.6	13.1	12.8	12.4	13.6	15.0		NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA		13.2	13.8	17.7	15.0	14.8	12.6	
Entrenchment Ratio	4.3	3.9	4.3	4.5	4.9	4.9		4.1	4.1	4.2	4.3	4.2	4.0		NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA		4.1	4.1	4.2	4.2	4.4	4.8	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.1		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.05		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	
d50 (mm)	----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----	

Table 11b. Monitoring Data - Stream Reach Data Summary
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Baseline (UT - 1)					MY-1 (UT - 1)					MY-2 (UT - 1)					MY-3 (UT - 1)					MY-4 (UT - 1)					MY-5 (UT - 1)				
Dimension and Substrate - Riffle Only	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)	11.7	12.3	12.2	13.8	0.7	11.3	12.3	12.3	13.3	0.7	11.7	12.5	11.9	14	0.9	10.9	12.0	12.0	13.1	0.8	10.3	11.6	11.5	12.9	0.8	10.4	11.4	11.4	12.5	0.8
Floodprone Width (ft)	50	71	50	100	27	50	71	50	100	27	50	71	50	100	27	50	71	50	100	27	50	71	50	100	27	50	71	50	100	27
BF Mean Depth (ft)	0.9	1.0	1.1	1.1	0.1	0.9	1.0	1.1	1.1	0.1	0.7	0.9	0.9	1.0	0.1	0.8	0.9	0.9	1.1	0.1	0.8	0.9	0.9	1.1	0.1	0.8	0.9	0.9	1.1	0.1
BF Max Depth (ft)	1.5	1.7	1.7	1.8	0.2	1.4	1.7	1.7	1.9	0.2	1.3	1.6	1.7	2.0	0.2	1.3	1.7	1.6	2.0	0.2	1.3	1.6	1.7	1.9	0.2	1.4	1.7	1.7	2.0	0.2
BF Cross Sectional Area (ft^2)	11.5	12.7	12.8	14.7	1.2	11.0	12.3	12.1	14.7	1.4	8.0	11.3	11.8	13.5	2.1	9.0	11.3	11.9	13.1	1.5	8.4	10.6	11.3	12.6	1.6	8.4	10.6	11.3	12.6	1.5
Width/Depth Ratio	10.6	11.9	11.7	13.7	1.0	10.3	12.2	12.1	14.2	1.6	11.9	14.0	14.0	17.0	1.7	9.9	12.9	13.0	15.0	1.8	10.4	12.6	12.9	14.3	1.5	10.3	12.4	12.7	13.9	1.3
Entrenchment Ratio	4.1	5.8	5.8	8.5	2.1	3.9	5.8	5.8	8.8	2.1	3.7	5.7	5.7	8.4	2.0	4.2	5.9	5.9	8.1	1.9	4.2	6.1	6.1	8.7	2.1	4.4	6.2	6.2	8.8	2.0
Bank Height Ratio		1.0	1.0				1.0	1.0				1.0	1.0				1.0	1.0				1.0	1.0				1.0	1.0		
Profile - UT -1																														
Riffle length (ft)	5	33	35	55	12.2	10	32	32	60	13	7	31	32	57	12	7	30	31	53	11	11	31	30	69	12	5	31	31	50	11
Riffle slope (ft/ft)	0.0000	0.0107	0.0115	0.0230	0.0053	0.0000	0.0118	0.0127	0.0250	0.0059	0.0000	0.0117	0.0116	0.0300	0.0060	0.0000	0.0132	0.0140	0.0252	0.01	0.0000	0.0131	0.0135	0.0301	0.0075	0.0021	0.0129	0.0134	0.0201	0.0049
Pool length (ft)	10	40	36	82	17	12	42	37	88	20	11	39	35	88	20	11	40	36	85	20	10	39	35	84	19	11	41	37	80	20
Pool Max depth (ft)	2.3	2.6	2.7	2.8	0.2	2.2	2.6	2.7	2.9	0.3	1.3	1.6	1.7	2.0	0.2	2.2	2.6	2.7	2.9	0.3	2.2	2.5	2.6	2.8	0.3	2.2	2.6	2.6	2.8	0.3
Pool spacing (ft)	10	66	70	118	31	12	71	72	118	28	11	64	59	121	30	11	63	64	120	31	13	66	67	118	29	11	64	68	116	31
Pattern																														
Channel Beltwidth (ft)	19			60																										
Radius of Curvature (ft)	23			53																										
Rc:Bankfull width (ft/ft)	1.8			3.5																										
Meander Wavelength (ft)	87.5			180																										
Meander Width ratio	7			12																										
Additional Reach Parameters																														
Rosgen Classification	E-Type					Ec-Type					Ec-Type					Ec-Type					Ec-Type					Ec-Type				
Channel Thalweg Length (ft)	3180					3184					3155					3199					3182					3166				
Sinuosity	1.5					1.5					1.5					1.5					1.5					1.5				
Water Surface Slope (Channel) (ft/ft)	0.0069					0.0066					0.0069					0.0068					0.0068					0.0068				
BF slope (ft/ft)	-----					-----					-----					-----					-----					-----				
Ri%/RU%P%G%/S%																														
SC%/SA%/G%/C%/B%BE%																														
d16/d35/d50/d84/d95																														
% of Reach with Eroding Banks	-----					-----					-----					-----					-----					-----				
Channel Stability or Habitat Metric	-----					-----					-----					-----					-----					-----				
Biological or Other	-----					-----					-----					-----					-----					-----				

Table 11c. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Cross Section 12 UT 1 -1 Riffle						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	2.9	3.2	3.6	2.9	3.8	3.7	
Floodprone Width (ft) (approx)	14.0	14.0	14.0	14.0	14.0	15.0	
BF Mean Depth (ft)	0.5	0.4	0.4	0.4	0.4	0.4	
BF Max Depth (ft)	0.7	0.6	0.7	0.6	0.7	0.8	
BF Cross Sectional Area (ft^2)	1.4	1.3	1.5	1.3	1.4	1.4	
Width/Depth Ratio	6.0	7.9	8.6	6.5	10.3	9.8	
Entrenchment Ratio	4.8	4.4	3.9	4.8	3.7	4.1	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0	
d50 (mm)	----	----	----	----	----	----	

Table 11d. Monitoring Data - Stream Reach Data Summary
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Baseline (UT 1 - 1)					MY-1 (UT 1 - 1)					MY-2 (UT 1 - 1)					MY-3 (UT 1 - 1)					MY-4 (UT 1 - 1)					MY-5 (UT 1 - 1)				
Dimension and Substrate - Riffle Only	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)		2.9					3.2					3.6					2.9					3.8					3.7			
Floodprone Width (ft)		14					14					14					14.0					14.0					15			
BF Mean Depth (ft)		0.5					0.4					0.4					0.4					0.4					0.4			
BF Max Depth (ft)		0.7					0.6					0.7					0.6					0.7					0.8			
BF Cross Sectional Area (ft^2)		1.4	1.4				1.3					1.5					1.3					1.4					1.4			
Width/Depth Ratio		6.0					8.0					8.9					6.5					10.3					9.8			
Entrenchment Ratio		4.8					4.4					3.9					4.8					3.7					4.1			
Bank Height Ratio		1.0					1.0					1.0					1.0					1.0					1.0			
Profile - UT 1 - 1																														
Riffle length (ft)	5	24	15	67	21	7	26	17	67	21	5	19	15	66	17	7	20	14	67	15	6	26	18	68	21	2	13	11	37	9
Riffle slope (ft/ft)	0.0000	0.0357	0.0332	0.1101	0.0245	0.0104	0.0306	0.0308	0.0555	0.0143	0.0017	0.0392	0.0364	0.0936	0.0218	0.0026	0.0309	0.0359	0.0508	0.01	0.0000	0.0303	0.0310	0.0529	0.0136	0.0061	0.0330	0.0303	0.0980	0.0211
Pool length (ft)	4	8	8	14	2	6	9	8	17	3	5	10	8	19	4	4	8	8	13	2	4	8	7	13	2	4	9	8	18	4
Pool Max depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool spacing (ft)	6	32	23	78	22	6	34	24	78	21	7	27	24	75	16	6	26	23	76	15	6	34	24	94	25	6	20	18	46	10
Pattern																														
Channel Beltwidth (ft)																														
Radius of Curvature (ft)			34																											
Rc:Bankfull width (ft/ft)			7.6																											
Meander Wavelength (ft)																														
Meander Width ratio																														
Additional Reach Parameters																														
Rosgen Classification	E-type					E-type					E-type					E-type					E-type					E-type				
Channel Thalweg Length (ft)	580					576					595					573					572					581				
Sinuosity	1.03					1.03					1.03					1.03					1.03					1.03				
Water Surface Slope (Channel) (ft/ft)	0.0383					0.0385					0.0381					0.0383					0.0388					0.038				
BF slope (ft/ft)	-----					-----					-----					-----					-----					-----				
Ri%/RU%P%G%/S%																														
SC%/SA%/G%/C%/B%BE%																														
d16/d35/d50/d84/d95																														
% of Reach with Eroding Banks	-----					-----					-----					-----					-----					-----				
Channel Stability or Habitat Metric	-----					-----					-----					-----					-----					-----				
Biological or Other	-----					-----					-----					-----					-----					-----				

Table 11e. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Cross Section 13 UT 1 - 3 Riffle							Cross Section 14 UT 1 - 3 Riffle						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	5.9	5.6	4.7	4.2	3.5	4.0		7.3	7.8	8.1	7.8	6.7	6.7	
Floodprone Width (ft) (approx)	25.0	25.0	25.0	25.0	25.0	25.0		25.0	25.0	25.0	25.0	25.0	25.0	
BF Mean Depth (ft)	0.5	0.4	0.4	0.4	0.4	0.4		0.5	0.4	0.4	0.4	0.4	0.4	
BF Max Depth (ft)	0.9	0.7	0.7	0.8	0.6	0.6		1.0	0.8	1.0	0.9	0.8	0.7	
BF Cross Sectional Area (ft^2)	2.7	2.1	1.7	1.6	1.4	1.4		3.6	3.2	3.4	3.3	2.6	2.6	
Width/Depth Ratio	12.9	14.9	13.0	11.0	8.8	11.4		14.8	19.0	19.3	18.4	17.3	17.3	
Entrenchment Ratio	4.2	4.5	5.3	6.0	7.1	6.3		3.4	3.2	3.1	3.2	3.7	3.7	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	
d50 (mm)	----	----	----	----	----	----		----	----	----	----	----	----	

Table 11f. Monitoring Data - Stream Reach Data Summary
UT to Martin's Creek Mitigation Project - DMS Project Number 92766

Parameter	Baseline (UT 1 - 3)					MY-1 (UT 1 - 3)					MY-2 (UT 1 - 3)					MY-3 (UT 1 - 3)					MY-4 (UT 1 - 3)					MY-5 (UT 1 - 3)				
Dimension and Substrate - Riffle Only	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)	5.9	6.6	6.6	7.3	1	5.6	6.7	6.7	7.8	1.6	4.7	6.4	6.4	8.1	2.4	4.2	6.0	6.0	7.8	2.5	3.5	5.1	5.1	6.7	2.3	4.0	5.4	5.4	6.7	1.9
Floodprone Width (ft)		25	25				25	25				25	25				25	25				25	25				25	25		
BF Mean Depth (ft)	0.4	0.5	0.5	0.5	0.1	0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4	0.0	0.4	0.4	0.4	0.4	0.0	0.4	0.4	0.4	0.4	0.0	0.3	0.4	0.4	0.4	0.1
BF Max Depth (ft)	0.9	1.0	1.0	1.0	0.1	0.7	0.8	0.8	0.8	0.1	0.7	0.9	0.9	1.0	0.2	0.8	0.9	0.9	0.9	0.1	0.6	0.7	0.7	0.8	0.1	0.6	0.7	0.7	0.7	0.1
BF Cross Sectional Area (ft^2)	2.7	3.2	3.2	3.6	0.6	2.1	2.7	2.7	3.2	0.8	1.7	2.6	2.6	3.4	1.2	1.6	2.5	2.5	3.3	1.2	1.4	2.0	2.0	2.6	0.8	1.4	2.0	2.0	2.6	0.8
Width/Depth Ratio	14.6	14.7	14.7	14.8	0.1	14.0	16.8	16.8	19.5	3.9	11.8	16.0	16.0	20.3	6.0	10.5	15.0	15.0	19.5	6.4	8.8	12.8	12.8	16.8	5.7	13.3	15.0	15.0	16.8	2.4
Entrenchment Ratio	3.4	3.8	3.8	4.2	0.6	3.2	3.8	3.8	4.5	0.9	3.1	4.2	4.2	5.3	1.6	3.2	4.6	4.6	6.0	1.9	3.7	5.4	5.4	7.1	2.4	3.7	5.0	5.0	6.3	1.8
Bank Height Ratio		1.0	1.0				1.0	1.0				1.0	1.0				1.0	1.0				1.0	1.0				1.0	1.0		
Profile - UT 1 - 3																														
Riffle length (ft)	4	41	22	173	44	4	34	30	147	35	8	27	18	138	30	2	22	12	122	27	4	25	17	151	31	3	15	10	61	14
Riffle slope (ft/ft)	0.0047	0.0318	0.0326	0.0913	0.0218	0.0139	0.0422	0.0324	0.1479	0.0353	0.0185	0.0413	0.0343	0.1077	0.0243	0.0091	0.0467	0.0337	0.1575	0.04	0.0047	0.0174	0.0159	0.0331	0.0130	0.0039	0.0346	0.0325	0.1023	0.0229
Pool length (ft)	5	12	7	50	11	4	11	8	31	8	5	11	8	21	5	3	8	8	16	3	4	10	8	38	7	5	11	8	43	8
Pool Max depth (ft)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Pool spacing (ft)	11	51	31	178	43	12	45	40	153	35	10	37	27	145	32	8	29	21	136	28	10	35	24	189	36	6	26	20	104	21
Pattern																														
Channel Beltwidth (ft)																														
Radius of Curvature (ft)																														
Rc:Bankfull width (ft/ft)																														
Meander Wavelength (ft)																														
Meander Width ratio																														
Additional Reach Parameters																														
Rosgen Classification	C/E type					C/E type					C/E type					C/E type					C/E type					C/E type				
Channel Thalweg Length (ft)	813					814					822					838					832					837				
Sinuosity	1.08					1.08					1.08					1.08					1.08					1.08				
Water Surface Slope (Channel) (ft/ft)	0.0321					0.0321					0.0321					0.0317					NA					0.0317				
BF slope (ft/ft)	-----					-----					-----					-----					-----					-----				
Ri%/RU%P%G%/S%																														
SC%/SA%/G%/C%/B%BE%																														
d16/d35/d50/d84/d95																														
% of Reach with Eroding Banks	-----					-----					-----					-----					-----					-----				
Channel Stability or Habitat Metric	-----					-----					-----					-----					-----					-----				
Biological or Other	-----					-----					-----					-----					-----					-----				

APPENDIX E

HYDROLOGY DATA

Table 12. Verification of Bankfull Events

Table 12. Verification of Bankfull Events
UT to Martin's Creek (Contreras) Mitigation Site (DMS Project Number 92766)

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
August 25, 2014	April 7, 2014	Crest gauge data indicates a bankfull event after approximately 2.4 inches of rain documented in one day at a nearby rain gauge.	---
August 25, 2014	July 1, 2014	Crest gauge data indicates a bankfull event after approximately 2.02 inches of rain was documented over two days at a nearby rain gauge.	---
August 25, 2014	August 24, 2014	Crest gauge data indicates a bankfull event after approximately 1.39 inches of rain documented over two days at a nearby rain gauge. Wrack and laid-back vegetation were also observed.	1
October 27, 2014	September 3, 2014	Crest gauge data indicates a bankfull event after approximately 1.67 inches of rain documented in one day at a nearby rain gauge.	---
October 27, 2014	October 14, 2014	Crest gauge data and wrack observed indicate a bankfull event after approximately 2.5 inches of rain documented in one day at a nearby rain gauge.	2
April 12, 2015	November 17, 2014	Crest gauge data indicates a bankfull event after approximately 1.44 inches of rain documented in one day at a nearby rain gauge.	---
July 13, 2015	June 11, 2015	Crest gauge data and laid back vegetation in the floodplain of UT1 indicate a bankfull event after approximately 1.68 inches of rain documented in one day at a nearby rain gauge.	---
July 13, 2015	June 26, 2015	Crest gauge data indicates a bankfull event after approximately 1.57 inches of rain was documented in one day at a nearby rain gauge.	3
September 11, 2015	August 19, 2015	Crest gauge data indicates a bankfull event after approximately 2.94 inches of rain was documented over three days at a nearby rain gauge.	---
November 18, 2015	September 26, 2015	Crest gauge data indicates a bankfull event after approximately 2.65 inches of rain was documented over two days at a nearby rain gauge.	---
November 18, 2015	October 3, 2015	Crest gauge data indicates a bankfull event after approximately 4.50 inches of rain was documented over three days at a nearby rain gauge.	---
August 23, 2016	June 5, 2016	Crest gauge data and wrack on the TOB of UT1 indicate a bankfull event after approximately 2.28 inches of rain documented in two days at a nearby rain gauge.	4
November 8, 2017	October 8, 2017	Crest gauge data and the observation of debris along the floodplain of UT-1 indicate a bankfull event occurred after 1.97 inches of rain was documented at a nearby rain gauge.	5, 6
September 25, 2018	August 2, 2018	Crest gauge data indicates a bankfull event after approximately 3.47 inches of rain was documented over three days at a nearby rain gauge.	---
September 25, 2018	August 11, 2018	Crest gauge data indicates a bankfull event after approximately 2.94 inches of rain was documented over three days at a nearby rain gauge.	---
September 25, 2018	August 31, 2018	Crest gauge data indicates a bankfull event after an approximately 2.86-inch rain event documented over three days at a nearby rain gauge.	7

Bankfull Photo 1:
Laid-back vegetation after a bankfull event

Bankfull Photo 2:
Wrack on the fence at the downstream crossing after a bankfull event

Bankfull Photo 3:
Laid-back vegetation after a bankfull event

Bankfull Photo 4:
Wrack on the TOB after a bankfull event

Bankfull Photo 5:
Debris deposited along the TOB and floodplain

Bankfull Photo 6:
Wrack on the TOB after a bankfull event

Bankfull Photo 7:
Debris deposited along the TOB and floodplain

APPENDIX F

WETLAND CONFIRMATION DATA

Figure 3. Wetland Confirmation Overview

Wetland Forms

N

0+00

0 125 250 500 750 1,000 Feet

Legend

- Easement Boundary
- Streams
- Crossings
- Powerline Right of Way
- Wetland Enhancement (Original Delineation) = 0.30 acres
- 2018 Wetland Delineation = 3.34 acres

Axiom Environmental
218 Snow Avenue
Raleigh, NC 27603
(919) 215-1693
Axiom Environmental, Inc.

WETLAND CONFIRMATION OVERVIEW
UT TO MARTINS CREEK (CONTRERAS)
DMS PROJECT # 92766
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE 3
Date: Nov 2018	
Project: 12-004.16	

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins Creek (Contreras) City/County: Murphy/Cherokee Sampling Date: 180501

Applicant/Owner: NC DMS State: NC Sampling Point: PA_04up

Investigator(s): Perkinson - Keith Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 6

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.036511 Long: -84.032705 Datum: WGS-84

Soil Map Unit Name: Arkaqua Loam 0-2% slopes occasionally flooded NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No X	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No X	

Remarks:
Just outside of floodplain bench along UT-1

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upland

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PA_04up

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus serrulata*	30	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	30 =Total Cover		
50% of total cover: 15	20% of total cover: 6		
Herb Stratum (Plot size: 5)			
1. *Carex*			
2. *Rubus sp*	5	Yes	
3. *Soldago*	20	Yes	
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	25 =Total Cover		
50% of total cover: 13	20% of total cover: 5		
Woody Vine Stratum (Plot size: 30)			
1. *Lonicera japonica*	10	Yes	FACU
2.			
3.			
4.			
5.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	40 (A)		70 (B)

Prevalence Index = B/A = 1.75

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: PA_04up

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ___ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PA_04up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10yr 5/3	80	10yr 5/6	20	D	M	Loamy/Clayey	
10-12	10yr 5/4	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

Excavated floodplain bench along left bank or UT-1

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins Creek (Contreras) City/County: Murphy/Cherokee Sampling Date: 180501

Applicant/Owner: NC DMS State: NC Sampling Point: PA_04w

Investigator(s): Perkinson - Keith Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 6

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.036511 Long: -84.032705 Datum: WGS-84

Soil Map Unit Name: Arkaqua Loam 0-2% slopes occasionally flooded NWI classification: BHWF

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
Floodplain bench collecting runoff from adjacent pasture via small crenulation, also receives overbank flooding suring storm events

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 1
Water Table Present?	Yes X	No ____	Depth (inches): 12
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Bankfull bench on 2nd order stream per NCWAM

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PA_04w

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus serrulata*	30	Yes	OBL
2. *Salix sericea*	20	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	50 =Total Cover		
50% of total cover: 25	20% of total cover: 10		
Herb Stratum (Plot size: 5)			
1. *Carex*			
2. *Rubus sp*	5	No	
3. *Juncus effusus*	20	Yes	FACW
4. *Impatiens capensis*	10	Yes	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	35 =Total Cover		
50% of total cover: 18	20% of total cover: 7		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	30	x 2 =	60
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	80 (A)		110 (B)

Prevalence Index = B/A = 1.38

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: PA_04w

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ____ **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PA_04w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10yr 6/3	80	10yr 4/2	20	D	M	Loamy/Clayey	
4-9	10yr 6/2	80	10yr 4/1	20	D	PL/M	Loamy/Clayey	
9-12	10yr 5/1	90	10yr 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

Excavated floodplain bench along left bank or UT-1

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins (Contreras) City/County: Murphy/Cherokee Sampling Date: 180501

Applicant/Owner: NC DMS State: NC Sampling Point: PB_01up

Investigator(s): Perkinson - Keith Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.036140 Long: -84.032708 Datum: WGS-84

Soil Map Unit Name: Arkaqua Loam 0-2% slopes occasionally flooded NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation N , Soil N , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upland

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PB_01up

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus serrulata*	20	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	20 =Total Cover		
50% of total cover: 10	20% of total cover: 4		
Herb Stratum (Plot size: 5)			
1. *Juncus effusus*	5	No	FACW
2. *Rubus*	30	Yes	
3. *Soldago*	10	Yes	
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	45 =Total Cover		
50% of total cover: 23	20% of total cover: 9		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	5	x 2 =	10
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	25 (A)		30 (B)

Prevalence Index = B/A = 1.20

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
Wetland and Stream mitigation site

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: PB_01up

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PB_01up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10yr 5/3	80					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

outside of floodplain

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins (Contreras) City/County: Murphy/Cherokee Sampling Date: 180501

Applicant/Owner: NC DMS State: NC Sampling Point: PG_11up

Investigator(s): Perkinson - Keith Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.035755, Long: -84.032536 Datum: WGS-84

Soil Map Unit Name: Arkaqua Loam 0-2% slopes occasionally flooded NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upland outside of depression in floodplain

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PG_11up

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus serrulata*	20	Yes	OBL
2. *Salix sericea*	10	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	30 =Total Cover		
50% of total cover: 15	20% of total cover: 6		
Herb Stratum (Plot size:)			
1. *Soldago*	10	Yes	
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	30 (A)		30 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Stream and wetland mitigation site

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: PG_11up

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ___ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PG_11up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10yr 5/4	90	10yr 5/6	10	C	M	Loamy/Clayey	Distinct redox concentrations
6-12	10yr 5/4	95	10yr 5/6	5	c	m	Loamy/Clayey	Distinct redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

Outside of depression within floodplain

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins (Contreras) City/County: Murphy/Cherokee Sampling Date: 180501

Applicant/Owner: NC DMS State: NC Sampling Point: PG_11w

Investigator(s): Perkinson - Keith Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.035755, Long: -84.032536 Datum: WGS-84

Soil Map Unit Name: Arkaqua Loam 0-2% slopes occasionally flooded NWI classification: BHWF

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 5

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PG_11w

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus serrulata*	30	Yes	OBL
2. *Cornus amomum*	5	No	FACW
3. *Rosa multiflora*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
	40 =Total Cover		
50% of total cover: 20	20% of total cover: 8		
Herb Stratum (Plot size:)			
1. *Juncus effusus*	30	Yes	FACW
2. *Solidago*	5	No	
3. *Agrimonia parviflora*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40 =Total Cover		
50% of total cover: 20	20% of total cover: 8		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	40	x 2 =	80
FAC species	0	x 3 =	0
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	75 (A)		130 (B)

Prevalence Index = B/A = 1.73

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Stream and wetland mitigation site

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: PG_11w

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ___ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PG_11w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10yr 5/4	90	10yr 5/6	10	C	M	Loamy/Clayey	Distinct redox concentrations
8-12	10yr 5/3	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

Floodplain depression ponding rainfall and overbank, some F3 soils within wetland.

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins (Contreras) City/County: Murphy/Cherokee Sampling Date: 180502

Applicant/Owner: NC DMS State: NC Sampling Point: PI_02up

Investigator(s): Perkinson - Keith Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.034089 Long: -84.034089 Datum: WGS_84

Soil Map Unit Name: Arkaqua loam 0-2% slopes occasionally flooded NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Wetland located along floodplain bench

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upland

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PI_02up

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	5	=Total Cover	
50% of total cover: 3		20% of total cover:	1
Sapling/Shrub Stratum (Plot size: 15)			
1. *Carpinus caroliniana*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2
Herb Stratum (Plot size: 5)			
1. *Carex*	20	Yes	
2. *Soldago*	10	Yes	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	30	=Total Cover	
50% of total cover: 15		20% of total cover:	6
Woody Vine Stratum (Plot size: 25)			
1. *Lonicera japonica*	10	Yes	FACU
2.			
3.			
4.			
5.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	25 (A)		85 (B)

Prevalence Index = B/A = 3.40

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: PI_02up

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PI_02up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	7.5yr 4/6	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

Wetland along floodplain bench

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins (Contreras) City/County: Murphy/Cherokee Sampling Date: 180502

Applicant/Owner: NC DMS State: NC Sampling Point: PI_02Wet

Investigator(s): Perkinson - Keith Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.034089 Long: -84.034089 Datum: WGS_84

Soil Map Unit Name: Arkaqua loam 0-2% slopes occasionally flooded NWI classification: BHWF

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
Wetland located along floodplain bench

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): 1
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PI_02Wet

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer negundo*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	5 =Total Cover		
50% of total cover: 3	20% of total cover: 1		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix sericea*	25	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	25 =Total Cover		
50% of total cover: 13	20% of total cover: 5		
Herb Stratum (Plot size: 5)			
1. *Impatiens capensis*	20	Yes	FACW
2. *Microstegium vimineum*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	30 =Total Cover		
50% of total cover: 15	20% of total cover: 6		
Woody Vine Stratum (Plot size: 25)			
1. *Lonicera japonica*	10	Yes	FACU
2.			
3.			
4.			
5.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	25	x 1 =	25
FACW species	20	x 2 =	40
FAC species	15	x 3 =	45
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	70 (A)		150 (B)

Prevalence Index = B/A = 2.14

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: PI_02Wet

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ____ **No** ____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PI_02Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5yr 4/4	100					Loamy/Clayey	
2-10	7.5yr 5/2	75	7.5yr 5/6	25	C	M	Loamy/Clayey	Prominent redox concentrations
10-12	7.5yr 5/6	100					Loamy/Clayey	Dense Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

Wetland along floodplain bench

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins (Contreras) City/County: Murphy/Cherokee Sampling Date: 180502

Applicant/Owner: NC DMS State: NC Sampling Point: PX_120up

Investigator(s): Perkinson, Keith - Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): convex Slope (%): 5

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.030705 Long: -84.036093 Datum: WGS-84

Soil Map Unit Name: Junaluska-Brasstown Complex NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Upland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes ____	No X	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upland just outside of wetland near toe of slope

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: PX_120up

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	20	Yes	FAC
2. *Acer negundo*	20	Yes	FAC
3. *Liriodendron tulipifera*	10	Yes	FACU
4.			
5.			
6.			
7.			
	50	=Total Cover	
50% of total cover: 25	20% of total cover: 10		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Sambucus canadensis*	10	Yes	FAC
2. *Ilex opaca*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	20	=Total Cover	
50% of total cover: 10	20% of total cover: 4		
Herb Stratum (Plot size: 5)			
1. *Rubus*	10	Yes	
2. *Toxicodendron radicans*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	20	=Total Cover	
50% of total cover: 10	20% of total cover: 4		
Woody Vine Stratum (Plot size: 30)			
1. *Lonicera japonica*	10	Yes	FACU
2.			
3.			
4.			
5.			
	10	=Total Cover	
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 37.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column Totals:	80 (A)		270 (B)

Prevalence Index = B/A = 3.38

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: PX_120up

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PX_120up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10yr 5/3	85	10yr 5/6	15	C	M	Loamy/Clayey	Distinct redox concentrations
6-12	10yr 5/3	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ? Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

just outside of toe slope into wetland

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins (Contreras) City/County: Murphy/Cherokee Sampling Date: 180502

Applicant/Owner: NC DMS State: NC Sampling Point: PX_120wet

Investigator(s): Perkinson, Keith - Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): convex Slope (%): 5

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.030705 Long: -84.036093 Datum: WGS-84

Soil Map Unit Name: Junaluska-Brasstown Complex NWI classification: RSF

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- X Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 0
Water Table Present?	Yes X	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Water at surface, really nice wetland near the top of a crenulation

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: PX_120wet

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	20	Yes	FAC
2. *Acer negundo*	20	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	40	=Total Cover	
50% of total cover: 20		20% of total cover: 8	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Sambucus canadensis*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover: 2	
Herb Stratum (Plot size: 5)			
1. *Impatiens capensis*	10	Yes	FACW
2. *Juncus effusus*	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	20	=Total Cover	
50% of total cover: 10		20% of total cover: 4	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	40	x 3 =	120
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	60 (A)		160 (B)

Prevalence Index = B/A = 2.67

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: PX_120wet

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody Plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody Vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ___ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PX_120wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10yr 5/3	85	10yr 5/6	15	C	M	Loamy/Clayey	Distinct redox concentrations
4-12	10yr 5/2	95	10yr 5/6	5	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

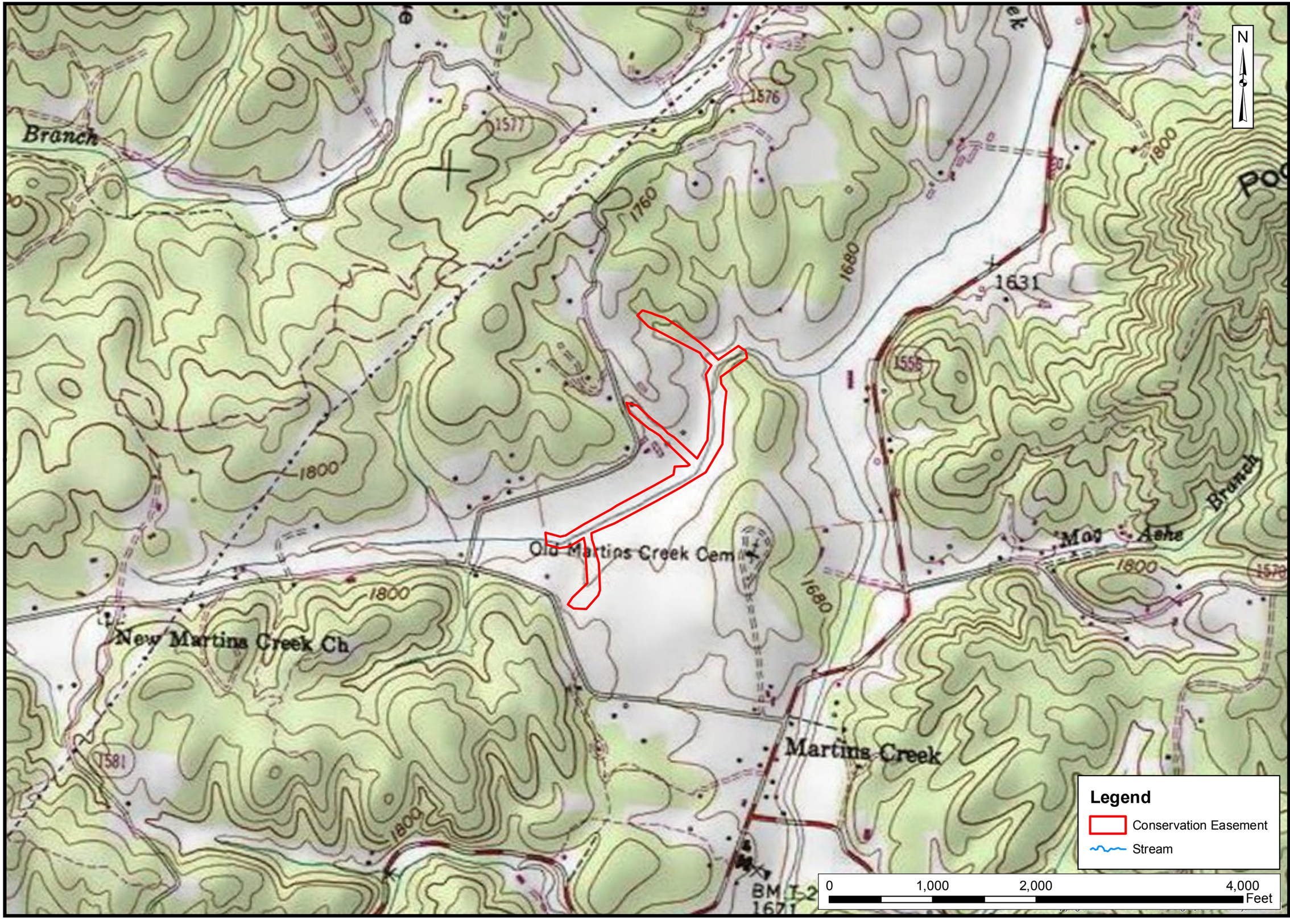
Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

APPENDIX G

SUPPLEMENTAL DATA

Figure 4. USGS Topography Map
Figure 5. NRCS Soils Map
Preconstruction Photographs



Axiom Environmental, Inc.

Prepared for:

North Carolina Department of Environmental Quality

Division of Mitigation Services

Project:

UT TO MARTINS CREEK (CONTRERAS) MITIGATION PROJECT

DMS Project Number 92766
Cherokee County, NC

Title:

USGS TOPOGRAPHIC MAP

Murphy, NC 7.5 Minute Quad

Drawn by:	KRJ
Date:	Nov 2018
Scale:	1 in = 830 ft
Project No.:	12-004.16

FIGURE

4

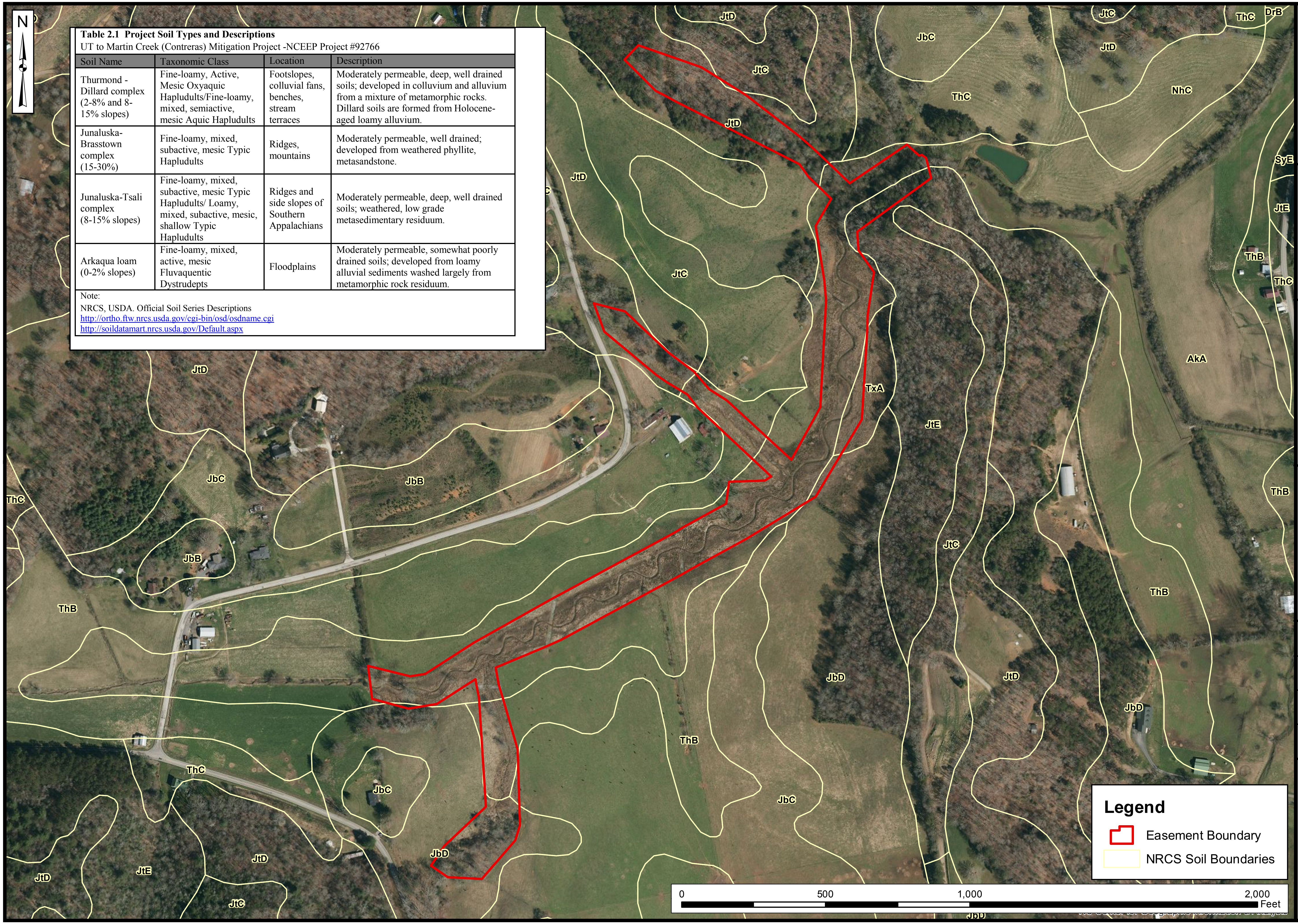


Table 2.1 Project Soil Types and Descriptions
UT to Martin Creek (Contreras) Mitigation Project -NCEEP Project #92766

Soil Name	Taxonomic Class	Location	Description
Thurmond - Dillard complex (2-8% and 8-15% slopes)	Fine-loamy, Active, Mesic Oxyaquic Hapludults/Fine-loamy, mixed, semiactive, mesic Aquic Hapludults	Footslopes, colluvial fans, benches, stream terraces	Moderately permeable, deep, well drained soils; developed in colluvium and alluvium from a mixture of metamorphic rocks. Dillard soils are formed from Holocene-aged loamy alluvium.
Junaluska-Brasstown complex (15-30%)	Fine-loamy, mixed, subactive, mesic Typic Hapludults	Ridges, mountains	Moderately permeable, well drained; developed from weathered phyllite, metasandstone.
Junaluska-Tsali complex (8-15% slopes)	Fine-loamy, mixed, subactive, mesic Typic Hapludults/ Loamy, mixed, subactive, mesic, shallow Typic Hapludults	Ridges and side slopes of Southern Appalachians	Moderately permeable, deep, well drained soils; weathered, low grade metasedimentary residuum.
Arkaqua loam (0-2% slopes)	Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts	Floodplains	Moderately permeable, somewhat poorly drained soils; developed from loamy alluvial sediments washed largely from metamorphic rock residuum.

Note:
NRCS, USDA. Official Soil Series Descriptions
http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi
http://soildatamart.nrcs.usda.gov/Default.aspx

Axiom Environmental, Inc.

Prepared for:
North Carolina Department of Environmental Quality
Division of Mitigation Services

Project:
UT TO MARTINS CREEK (CONTRERAS) MITIGATION PROJECT
DMS Project Number 92766
Cherokee County, NC

Title:
NRCS SOILS MAP

Drawn by: KRJ

Date: Nov 2018

Scale: 1 in = 300 ft

Project No.: 12-004.16

FIGURE
5

UT1 to Martin Creek (Contreras Site) Project Site
Photo Log

Notes: Photos depict common channel features across Contreras project Site.
* Pictures taken in January 2009

	
Source spring of UT1-1; also frequented by cattle	Source of UT1-1 downstream of source and upstream of wetland
	
UT1-1-1 near source and upstream of wetland	Small wetland in project area will placed in preservation

	
*UT1-1 below small pocket wetland and cattle crossing	Typical view of banks trampled by cattle on-site
	
Mainstem of UT1 to Martin Creek	*Mainstem of UT1 to Martin Creek

	
*Mainstem of UT1 to Martin Creek	Debris jams are common on UT1 to Martin Creek below UT1-3
	
Spring (UT1-2) below barn	UT1-3 receives runoff from adjacent fields as well as nearby road

	
UT1-3	Inadequate culvert crossing on UT1-3
	
Downstream of culvert outlet	*Confluence of mainstem UT to Martin Creek (UT1) and UT1-4

*UT1-4 upstream of road crossing

*UT1-4 on more gradual slope downstream of powerline crossing

UT1-4 at spring looking downstream; cattle recently accessed site