



**MEREDELL FARM  
ANNUAL MONITORING REPORT  
YEAR 8 OF 8**

DMS Project #247  
Randolph County, North Carolina  
Completed Construction: 2008  
Submitted January 2016

**Submitted to:**

North Carolina Department of Environmental Quality  
Division of Mitigation Services

NCDEQ - DMS  
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## EXECUTIVE SUMMARY

The Meredell Farm Stream Restoration project falls within USGS hydrologic unit 03030003. The project lies within a rural setting that includes agricultural, forested, and low-density residential areas. The project is located on Koopman Dairies (formerly Meredell Farm), a small farm operation that includes dairy and row crop production. Prior to restoration work, the project stream had been historically destabilized through channelization and hoof-shear.

Baker Engineering designed the restoration plans and restoration was completed in 2008. SEPI Engineering & Construction (SEPI) began the stream and riparian monitoring for Meredell Farms in October 2013.

The goal of the project is to restore and improve the stream channel and riparian buffer form and function on-site through the following objectives:

- Restore 3,865 LF of channel dimension, pattern and profile.
- Enhance 4,704 LF of channel dimension, and/or profile.
- Preserve 5,136 LF of stream channel and riparian buffer.
- Improve floodplain functionality by matching floodplain elevation with bankfull stage.
- Establish native stream bank and floodplain vegetation in the permanent conservation easement.
- Improve the water quality in the Upper Cape Fear River watershed by fencing cattle out of the stream and reducing bank erosion.

SEPI performed stream and riparian monitoring in October 2015 for this Year 8 Annual Monitoring Report.

## VEGETATION ASSESSMENT

Vegetation monitoring in Year 8 included visual assessment of the riparian zone and buffer mitigation areas to update the Current Conditions Plan View (CCPV) and Carolina Vegetation Survey (CVS) assessment of 12 vegetation plots.

- The entire conservation easement was treated for privet and tree of heaven between 10/12/15 and 10/14/15 (See Appendix C for invasive treatment log)
- Good vegetation growth was primarily observed within the bankfull bench area for all reaches. The planted stems in reaches UT1, UT2, and M1 continue to become well established.
- The site continues to be free of encroachments to the easement.

Detailed data collected from the CVS assessment of the 12 vegetation plots can be found in **Appendix C** of this report. Ten of the 12 vegetation plots exceeded the riparian zone success criteria of 260 stems/acre after 8 years, and 4 of the 11 buffer vegetation plots exceeded the buffer mitigation success criteria of 320 stems/acre after 8 years. However, when volunteer stems are included, all vegetation plots except Plot 9 (202 stems/acre) exceeded the success criteria. The total average planted stem density for all twelve veg plots is 428 stems/acre for Year 8 Monitoring.

Invasive species continue to be treated on reaches UT1, UT2, UT3, UT4, UT5, and M1. The target species of concern includes *Ailanthus altissima* and *Ligustrum sinense*. Detailed maps on invasive species control efforts can be found in **Appendix C**.

## **STREAM ASSESSMENT**

Year 8 stream channel monitoring included a visual assessment of the stream channel and in-stream structures to update the Current Conditions Plan View (CCPV). Visual observations of the stream channel conditions were conducted to determine if the project is establishing toward the stream success criteria outlined in the approved Restoration Plan (2004). These goals are outlined below:

- Longitudinal Profile:
  - “The longitudinal profile data should show that the bedform features are remaining stable and are not aggrading or degrading. The pools should remain deep with flat water surface slopes and the riffles should remain steep and shallow.”

The visual assessment completed for the site indicated the project reaches were performing within established success criteria ranges. Some areas of headcuts and stream structure instabilities that were observed in previous monitoring years were observed this year, but had not increased in severity or number. The observed stream channel conditions are reflected in the CCPV figures (**Figures 2-9**) within this report and briefly discussed below.

- Two instream structures (Stations M1: 303+25 and 305+00) had flow going between the sill and arm boulders, but no further instability was observed as a result of the conditions.
- Two log vanes and one rootwad (Stations M1: 303+75, 314+50, and 321+00) had approximately 15% bank erosion.
- Six instances of headcut were observed on UT3, UT4, and UT5.
- There continues to be two small areas of concentrated overland runoff through the buffer on UT3a at Station 10+00 and UT4 at Station 10+00 that are causing erosion to the stream banks. One area was also observed on UT5 and Station 20+00.
- Two areas of split channel flow were identified along the existing stream at the upstream and downstream section of UT5.
- The sediment noted during the site assessment in May 2015 in UT1b, UT2a, and M1 Upper is no longer present in large amounts.

Geomorphic data was not collected for this annual report. Channel profile stability assessment includes the entire restored length of the project. Refer to **Appendix D** contained herein for detailed information on geomorphology in previous monitoring years.

## **SITE HYDROLOGY**

Year 8 hydrologic bankfull indicators were collected during monitoring field visits. These indicators include collection of visually observed wracklines at, or above, the bankfull elevation and recordation of the crest gauge height located at Station 307+000 on reach M1.

- Wracklines were noted above the bankfull bench and within the floodplain during the site assessment field visit conducted on October 19-20, 2015.
- A crest gauge reading of 1.13' was recorded during the annual monitoring field visit conducted on October 20, 2015. The baseline bankfull design maximum depth range for reach M1 is 1.0 foot (min) to 1.3 feet (max); therefore, the crest gauge reading indicates that a bankfull event had occurred onsite. Refer to photograph SP1 within **Appendix E** of this report.

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

## **METHODOLOGY**

The following methods were utilized during the Year 8 monitoring for data collection and post-processing:

- The CVS Level 2 methodology was utilized for the vegetation plot data collection.
- Geomorphological and longitudinal data were not required or collected for this monitoring year.
- Permanent cross-sectional data was not required or collected for this monitoring year.
- Particle size distribution was not required or collected for this monitoring year.

## REFERENCES

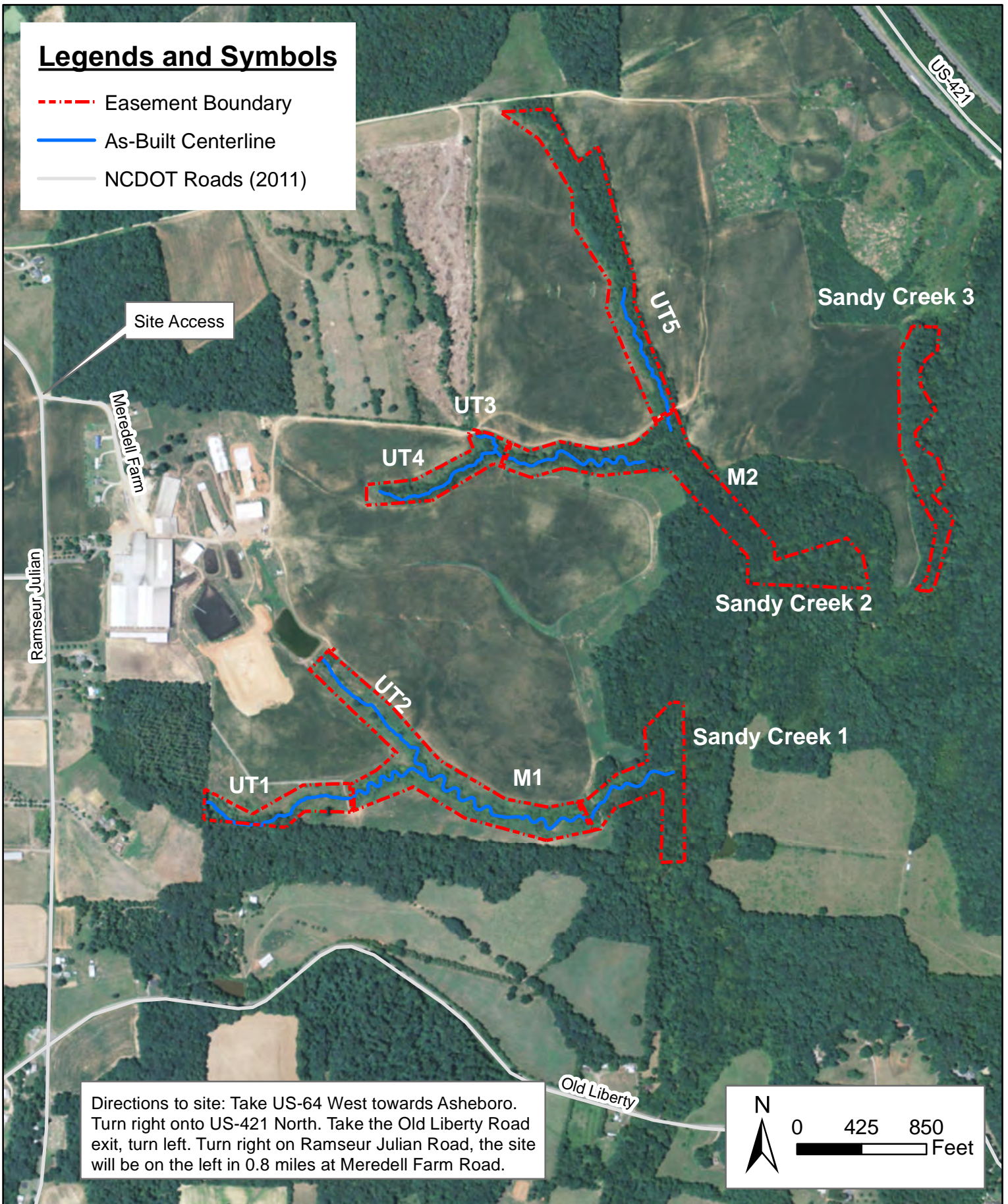
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Appendix A  
Project Vicinity Map and Background Files



## Legends and Symbols

- - - Easement Boundary
- As-Built Centerline
- NCDOT Roads (2011)



Directions to site: Take US-64 West towards Asheboro. Turn right onto US-421 North. Take the Old Liberty Road exit, turn left. Turn right on Ramseur Julian Road, the site will be on the left in 0.8 miles at Meredell Farm Road.

<b>Title</b>	Project Vicinity Map		
<b>Prepared for:</b> NC Department of Environmental Quality Division of Mitigation Services	<b>Project</b>	Meredell Farm Stream Restoration Monitoring Year 8 -- 2014 Randolph County, North Carolina	
	<b>Date</b>	<b>Project Number</b>	<b>Figure</b>
	1/12/2016	247	1

**Table I. Project Components and Mitigation Credits  
Meredell Farm Stream Restoration Site/247**

Mitigation Credits									
Type	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
	R	RE	R	RE	R	RE			
Totals	5929.5	4607					570000		
Project Components									
Project Component -or- Reach ID	Stationing/Location		Existing Footage/Acreage		Approach (PI, PII etc.)	Restoration - or- Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio	
Ut 1a	10+00 – 21+00		1050			EI	930	1.5:1	
Ut 1b	21+00 – 28+80		571			R	780	1:1	
Ut 2a	10+00 – 18+00		800			EI	800	1.5:1	
Ut 2b	18+00 – 20+94		206			R	294	1:1	
M1	10+00 - 32+54		2103		I/II	R	2234	1:1	
Ut 3a	10+00 – 16+50		400			EII	630	2.5:1	
Ut 3b	16+50 - 20+79		836			R	429	1:1	
Ut 4	10+00 – 19+13		913			EII	913	2.5:1	
Ut 5	10+00 – 20+75		1075			EII	1055	2.5:1	
M2	NA		1398			P	1398	5:1	
Sandy Creek 1	NA		1033			P	694	5:1	
Sandy Creek 2	NA		801			P	654	5:1	
Sandy Creek 3	NA		1902			P	1861	5:1	
Component Summation									
Restoration Level	Stream (linear feet)	Riparian Wetland (acres)		Non-riparian Wetland (acres)	Buffer (square feet)	Upland (acres)			
		Riverine	Non-Riverine						
Restoration	3737				373,950				
Enhancement					8,750				
Enhancement I	1730								
Enhancement II	2598								
Creation									
Preservation	4607								
Preservation									
BMP Elements									
Element	Location	Purpose/Function		Notes					

**BMP Elements**

BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond; FS = Filter Strip; S = Grassed Swale; LS = Level Spreader; NI = Natural Infiltration Area; FB = Forested Buffer

\*DMS will be revising these assets to reflect the allowance for buffer preservation in the current buffer rule

**Table 2. Project Activity and Reporting History  
Meredell Farm Stream Restoration Site/247**

**Elapsed Time Since Grading Complete: 7 yrs 8 months**

**Elapsed Time Since Planting Complete: 7 yrs 9 months**

**Number of Reporting Years<sup>1</sup>: 8**

<b>Activity or Deliverable</b>	<b>Data Collection Complete</b>	<b>Completion or Delivery</b>
Restoration Plan		Sept-04
Final Design – Construction Plans		Jan-07
Construction	NA	Mar-08
Containerized, bare root and B&B plantings	NA	Feb-08
As-built Mapping	Nov-07	Apr-08
Year 1 Monitoring (baseline)*	Nov-08	Jun-09
Year 2 Monitoring	Nov-09	Apr-10
Year 3 Monitoring	Oct-10	Mar-11
Year 4 Monitoring	Oct-11	Jan-12
Year 5 Monitoring	Oct-12	Feb-13
Supplemental Planting	NA	Aug-13
Year 6 Monitoring	Nov-13	Jan-14
Year 7 Monitoring	Sep-14	Nov-14
Year 8 Monitoring	Oct-15	Nov-15

\*As-built plan view survey performed by Level Cross Surveying, PLLC. (No As-built monitoring data was collected or reported).

**Table 3. Project Contacts Table  
Meredell Farm Stream Restoration Site/247**

<b>Designer</b>	Buck Engineering, PC
Primary project design POC	8000 Regency Parkway, Suite 200, Cary, NC 27511 Kevin Tweedy, P.E. (919) 463-5488
<b>Construction Contractor</b>	RiverWorks, Inc.
Construction contractor POC	8000 Regency Parkway, Suite 200, Cary, NC 27511 (919) 459-9001
<b>Survey Contractor</b>	Level Cross Survey, PLLC
Survey contractor POC	668 Marsh Country Lane, Randleman, NC 27317 (336) 495-1713
<b>Planting Contractor</b>	
Planting contractor POC	
<b>Seeding Contractor</b>	
Contractor point of contact	
<b>Seed Mix Sources</b>	
<b>Nursery Stock Suppliers</b>	
<b>Monitoring Performers</b>	SEPI Engineering & Construction, Inc.
Stream Monitoring POC	1025 Wade Avenue, Raleigh, NC 27605 Philip Beach, PWS
Vegetation Monitoring POC	Kim Hamlin, Project Scientist

**Table 4. Project Attribute Table  
Meredell Farm Stream Restoration Site/247**

Project County	Randolph
Physiographic Region	Piedmont
Ecoregion	Carolina Slate Belt
Project River Basin	Cape Fear
USGS HUC for Project (14 digit)	03030003020010
NCDWQ Sub-basin for Project	03-06-09
Within extent of EEP Watershed Plan?	no
WRC Hab Class (Warm, Cool, Cold)	warm
% of project easement fenced or demarcated	100
Beaver activity observed during design phase?	No

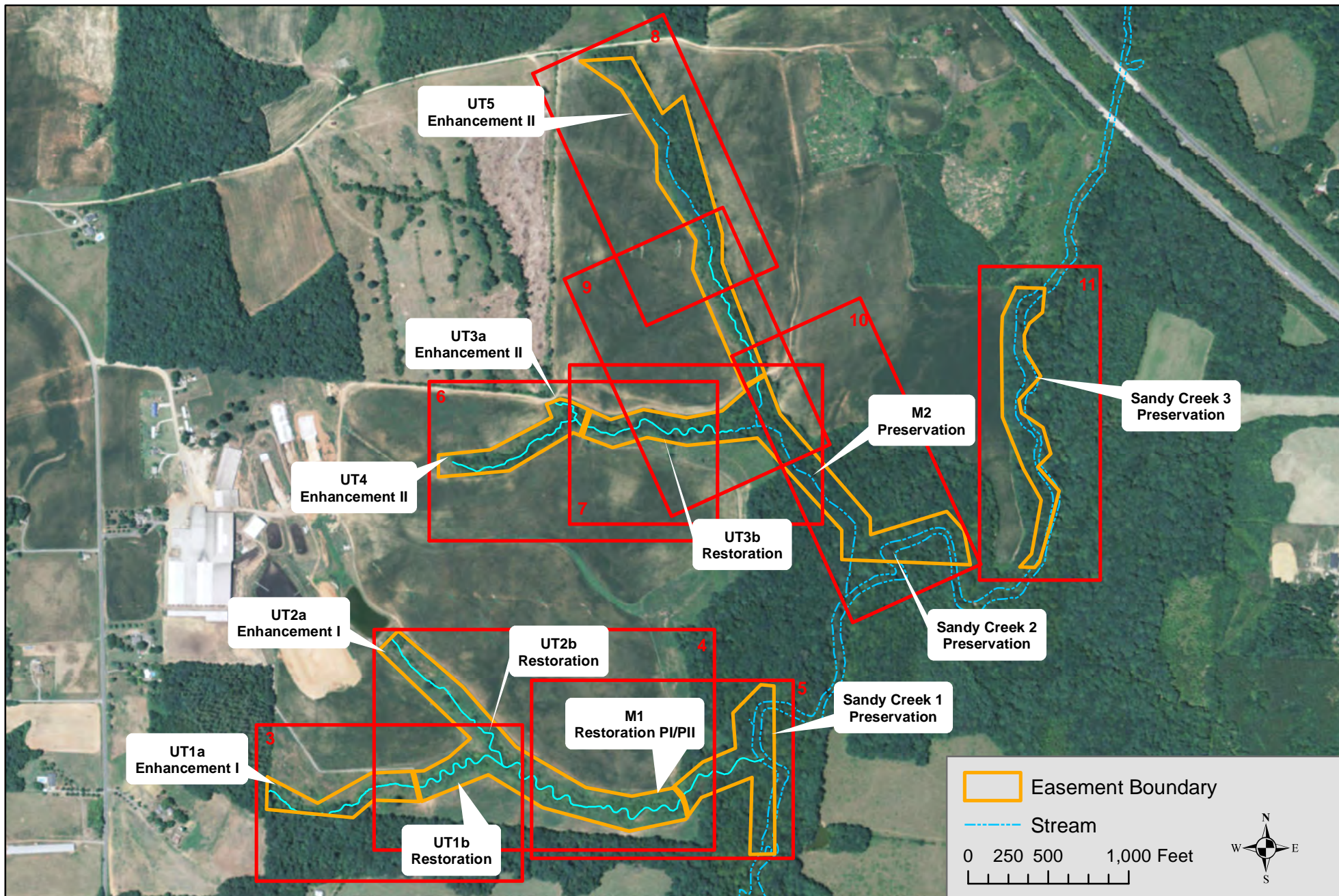
**Restoration Component Attribute Table**

	M1	M2	UT1	UT2	UT3	UT4	UT5
Drainage area (acres)	168	265	64	67	148	56	59
Stream order	2	2	1	1	1	1	1
Restored length (feet)	2234	1398	1710	1094	1059	913	1055
Perennial or Intermittent	P	P	P	P	P	P	P
Watershed type (Rural, Urban, Developing etc.)	R	R	R	R	R	R	R
Watershed LULC Distribution (e.g.)							
Residential	U	U	U	U	U	U	U
Ag-Row Crop	U	U	U	U	U	U	U
Ag-Livestock	U	U	U	U	U	U	U
Forested	U	U	U	U	U	U	U
Etc.	U	U	U	U	U	U	U
Watershed impervious cover (%)	U	U	U	U	U	U	U
NCDWQ AU/Index number	17-16-(1)						
NCDWQ classification	WS-III	WS-III	WS-III	WS-III	WS-III	WS-III	WS-III
303d listed?	No	No	No	No	No	No	No
Upstream of a 303d listed segment?	No	No	No	No	No	No	No
Reasons for 303d listing or stressor	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total acreage of easement	49.8						
Total vegetated acreage within the easement	49.8						
Total planted acreage as part of the restoration	8.3	0	6.2	3	2.2	0.6	0.7
Rosgen classification of pre-existing	G4c	E	G4/F4b/E4b/C4b	B5-1/E5-1	F4-1/C4-1	E5/G5	E5
Rosgen classification of As-built	C	N/A	C	C	C	N/A	N/A
Valley type	*	U	*	*	*	*	*
Valley slope	0.014	U	0.031	0.036	0.0126	0.0461	0.0429
Valley side slope range (e.g. 2-3.%)	U	U	U	U	U	U	U
Valley toe slope range (e.g. 2-3.%)	U	U	U	U	U	U	U
Cowardin classification	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trout waters designation	No	No	No	No	No	No	No
Species of concern, endangered etc.? (Y/N)	Y	Y	Y	Y	Y	Y	Y
Dominant soil series and characteristics							
Series	MaC	MaC/CmA	MaC	MaC	MaC	MaC	MaC
Depth	U	U	U	U	U	U	U
Clay%	U	U	U	U	U	U	U
K	U	U	U	U	U	U	U
T	U	U	U	U	U	U	U

Use N/A for items that may not apply. Use "--" for items that are unavailable and "U" for items that are unknown

\*UT1a, UT2a, and UT3a are considered high-slope colluvial systems. UT1b, UT2b, UT3b, UT4, UT5, and M1 are considered low-slope alluvial system

Appendix B  
Visual Assessment Data



**Title** Current Conditions Plan View Index Map

NC Department of  
Environmental Quality  
Division of Mitigation Services

**Project** Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**  
1/11/2016

**Project Number**  
247

**Figure**  
2



**Title**

Current Conditions Plan View UT1a, UT1b, UT2b

NC Department of Environmental Quality  
Division of Mitigation Services

**Project**

Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**

1/11/2016

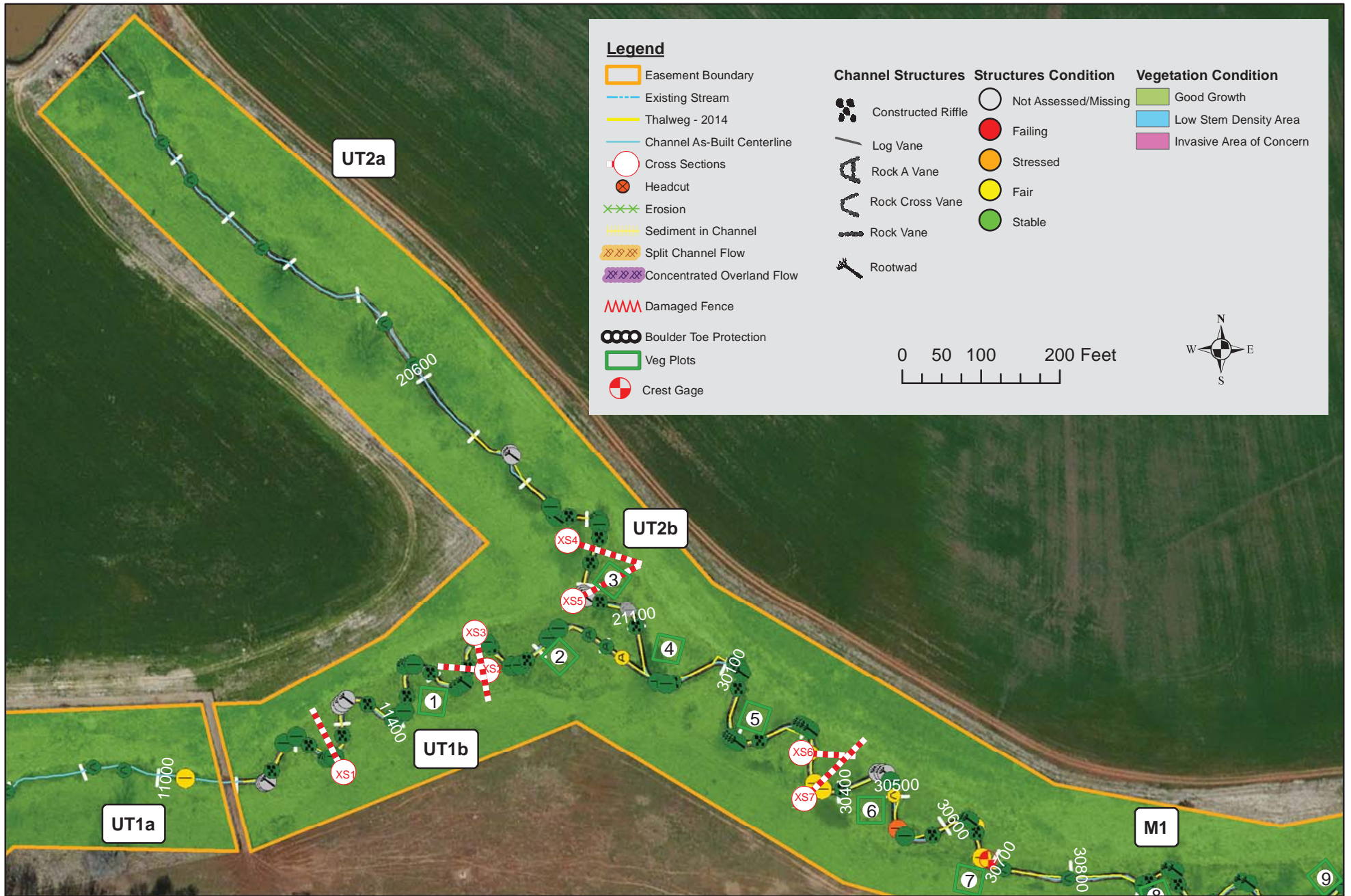
**Project Number**

247

**Figure**

3





**Title** Current Conditions Plan View UT1a, UT1b, UT2a, UT2b, M1

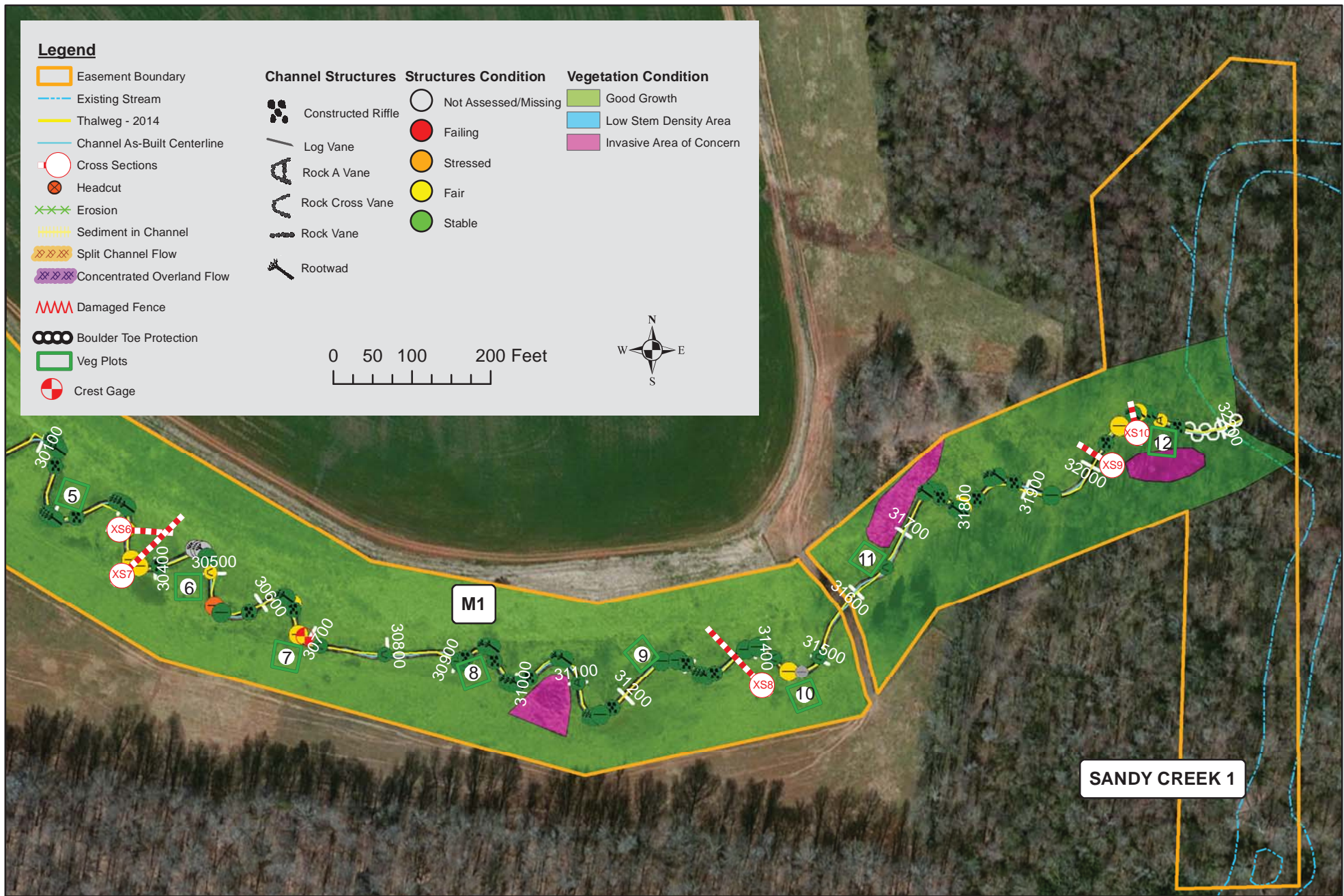
NC Department of  
Environmental Quality  
Division of Mitigation Services

**Project** Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**  
1/11/2016

**Project Number**  
247

**Figure**  
4



**Title** Current Conditions Plan View M1 and Sandy Creek 1

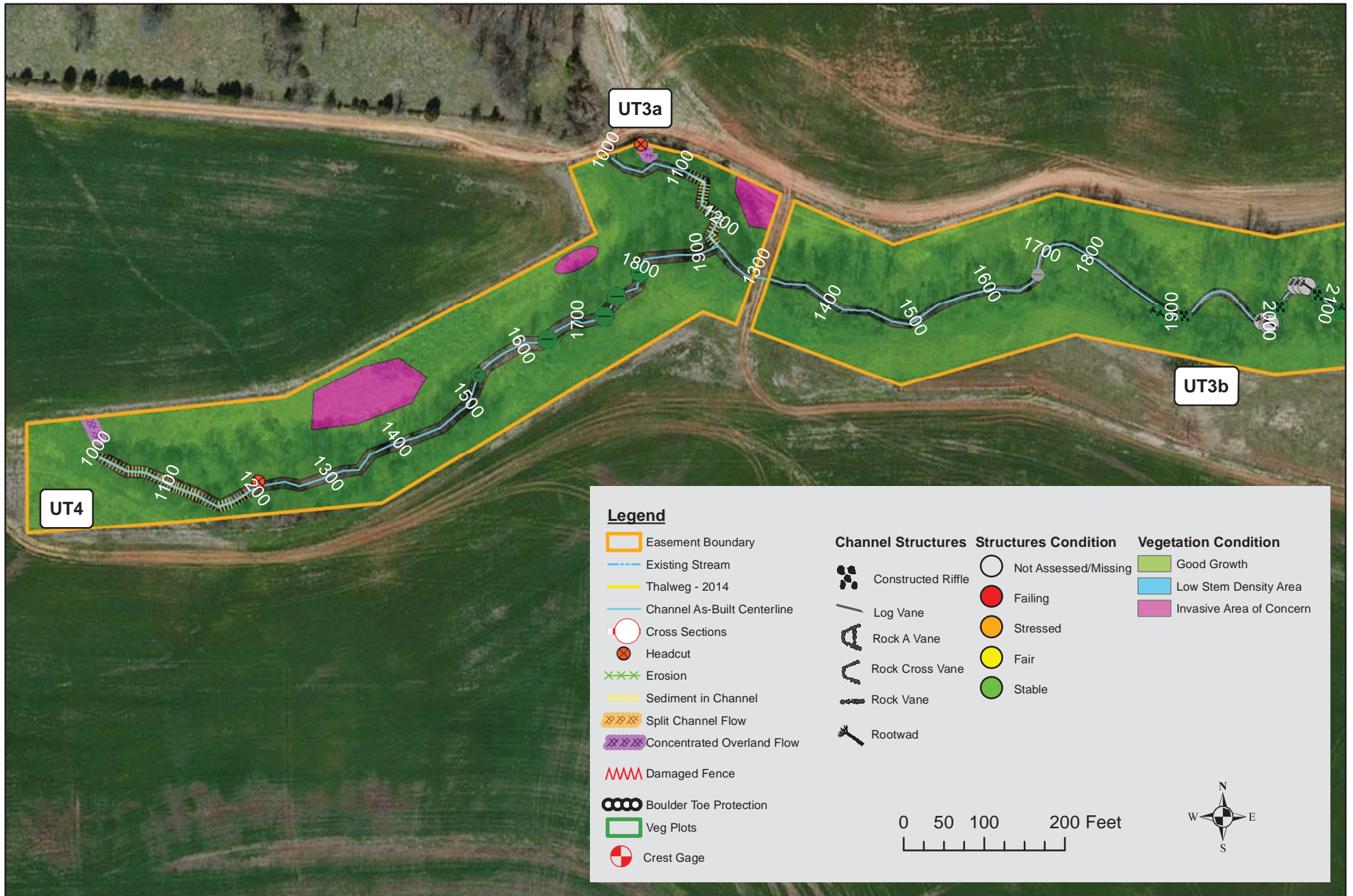
NC Department of Environmental Quality  
Division of Mitigation Services

**Project** Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**  
1/11/2016

**Project Number**  
247

**Figure**  
5



**Title**

Current Conditions Plan View UT3a, UT3b, UT4

NC Department of Environmental Quality  
Division of Mitigation Services

**Project**

Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**

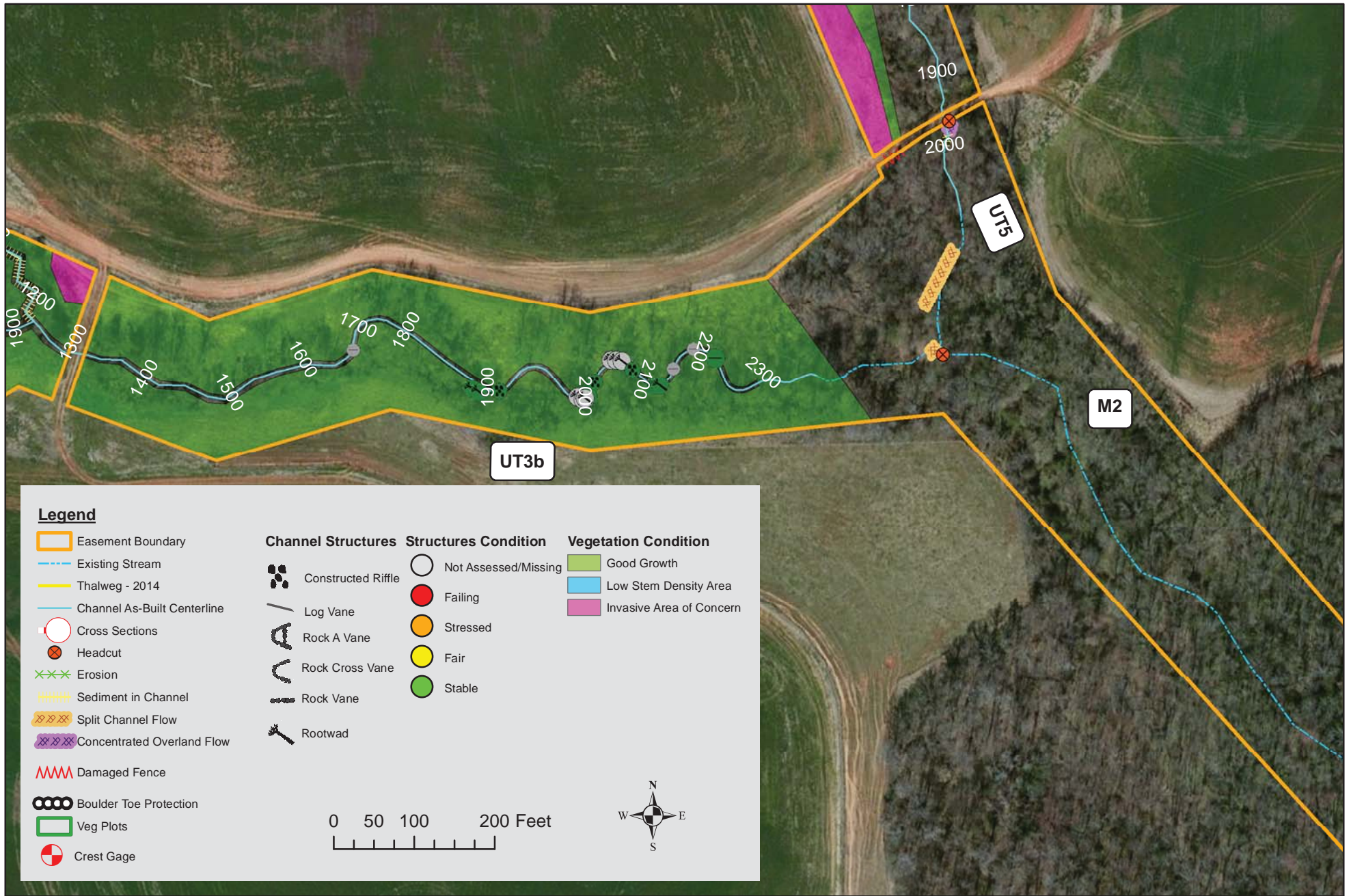
1/11/2016

**Project Number**

247

**Figure**

6



**Title** Current Conditions Plan View UT3b, UT5, M2

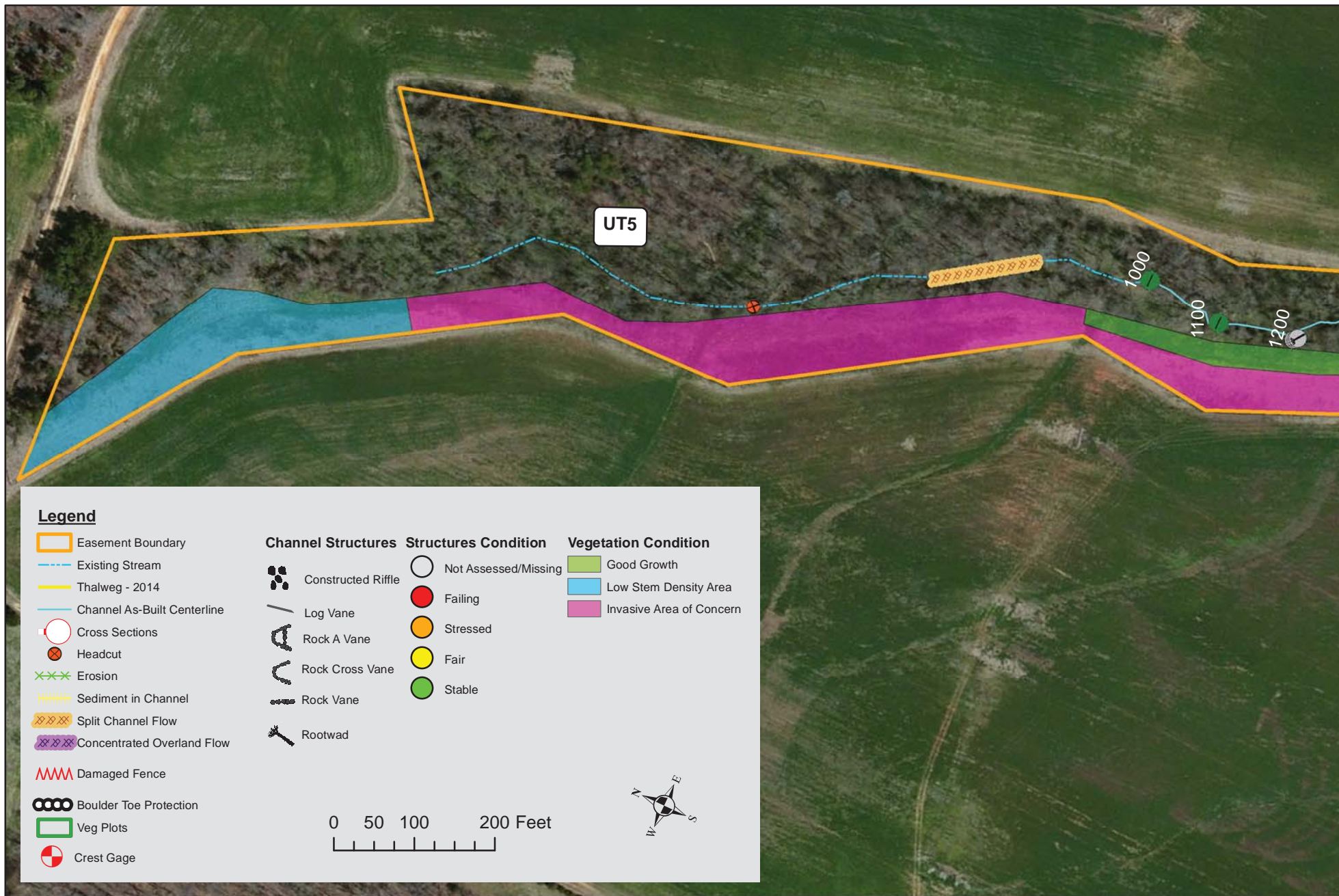
NC Department of  
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Division of Mitigation Services

**Project** Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**  
1/11/2016

**Project Number**  
247

**Figure**  
7



**Title** Current Conditions Plan View UT5

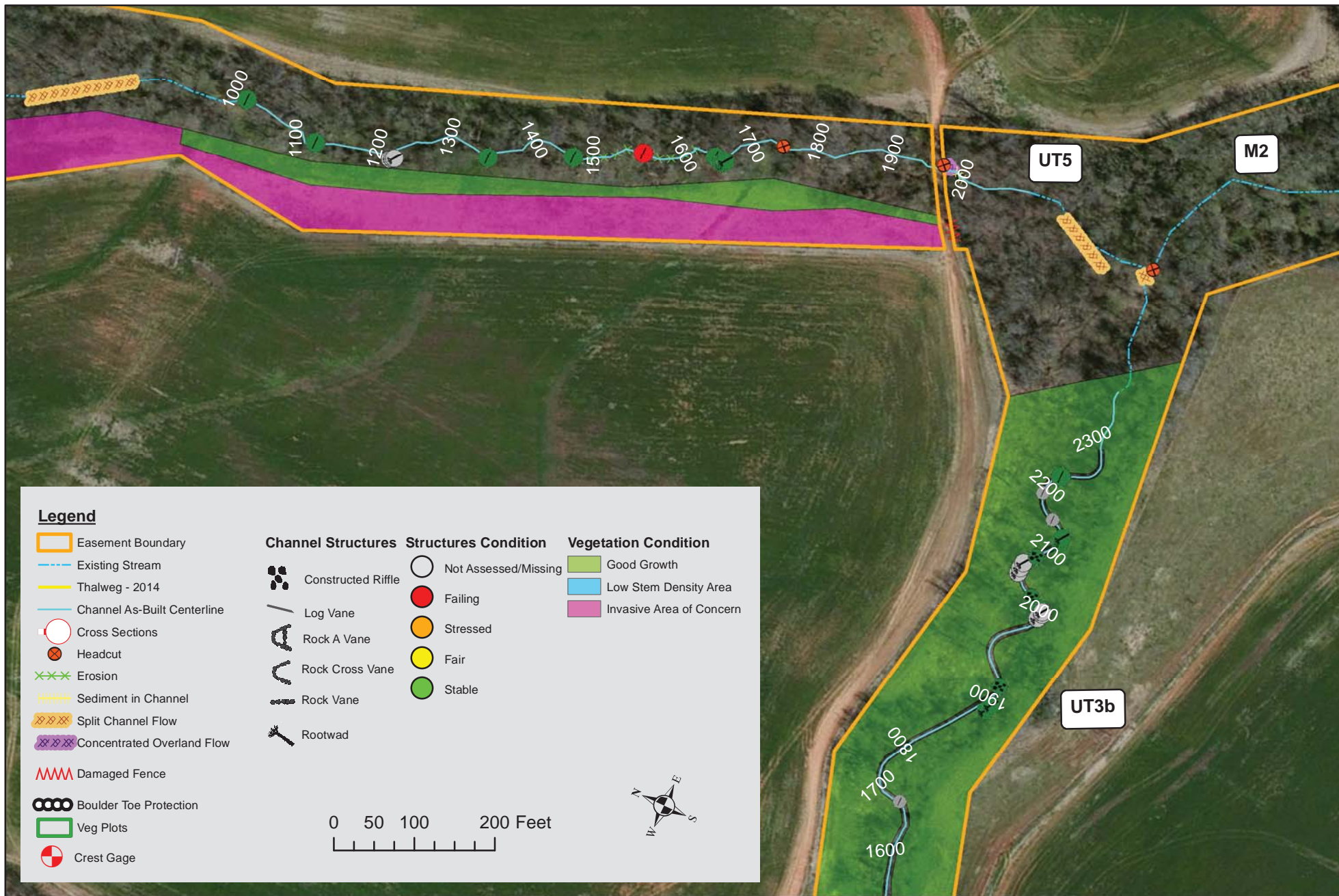
NC Department of Environmental Quality  
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**Project** Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**  
1/11/2016

**Project Number**  
247

**Figure**  
8



**Title** Current Conditions Plan View UT3b, UT5, M2

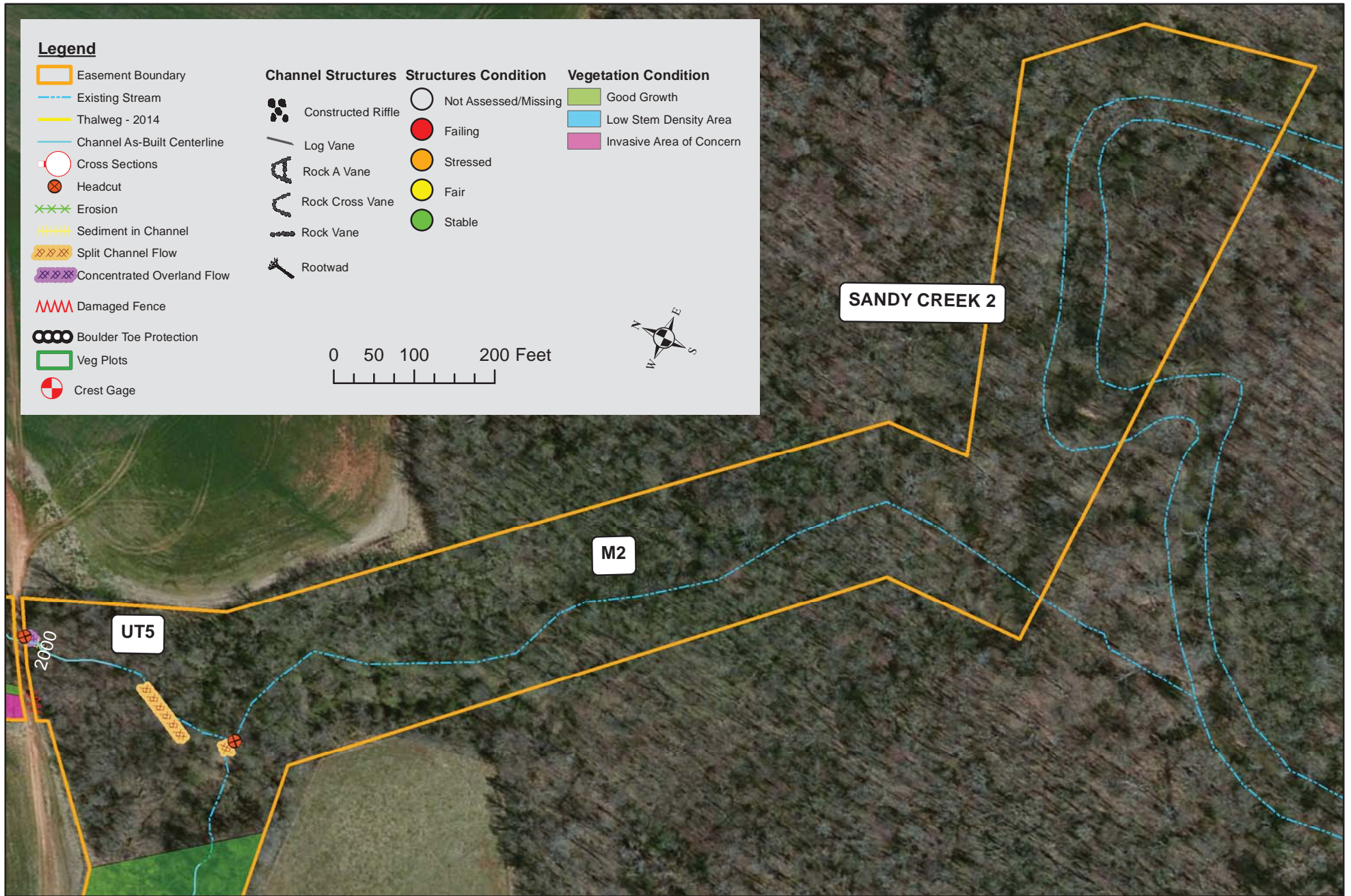
NC Department of Environmental Quality  
Division of Mitigation Services

**Project** Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**  
1/11/2016

**Project Number**  
247

**Figure**  
9



**Title** Current Conditions Plan View UT3b, UT5, M2, Sandy Creek 2

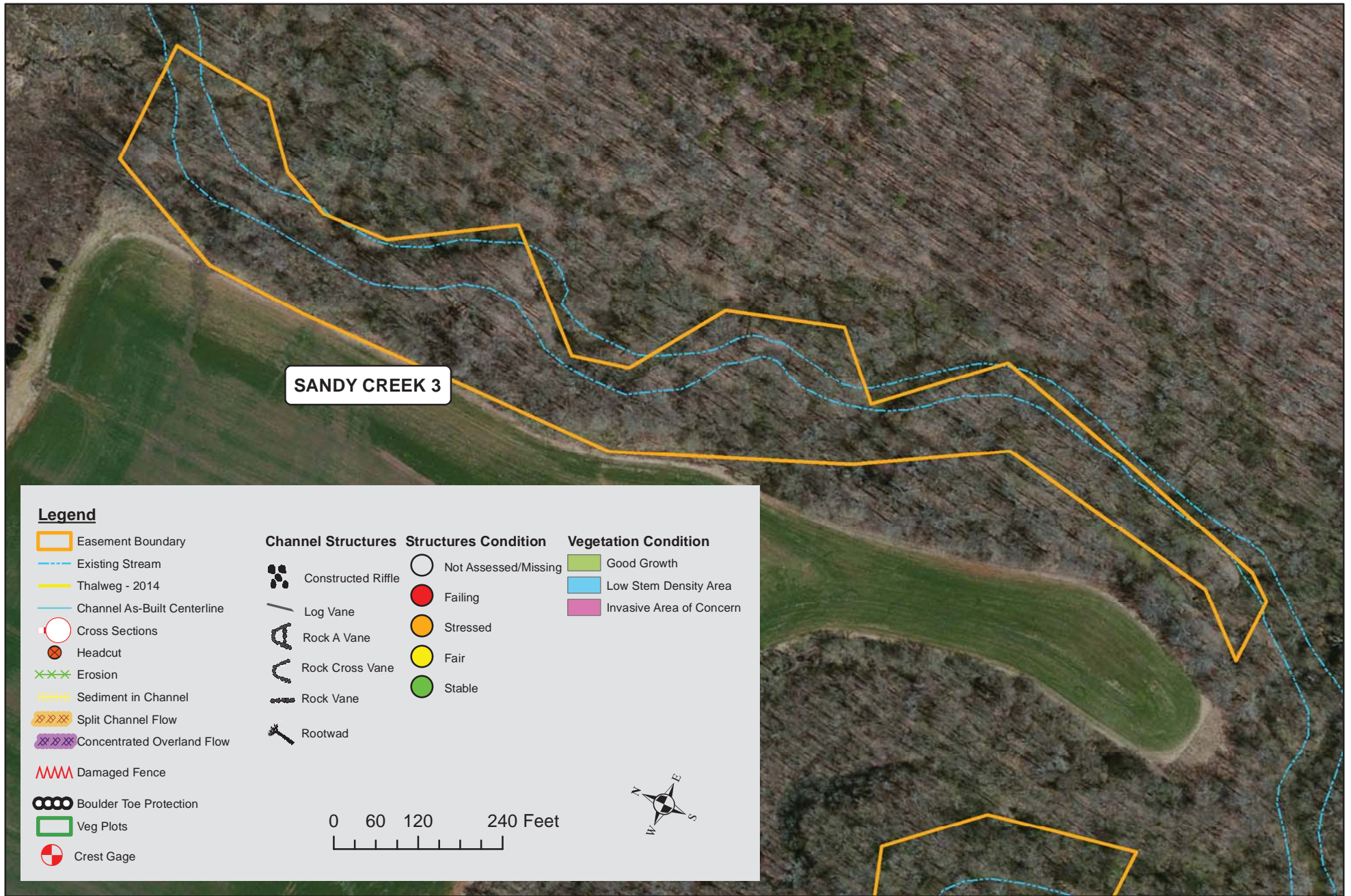
NC Department of Environmental Quality  
Division of Mitigation Services

**Project** Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**  
1/11/2016

**Project Number**  
247

**Figure**  
10



**Title** Current Conditions Plan View Sandy Creek 3

NC Department of Environmental Quality  
Division of Mitigation Services

**Project** Meredell Farm Stream Restoration Monitoring Year 8 -- 2016 Randolph County, North Carolina

**Date**  
1/11/2016

**Project Number**  
247

**Figure**  
11



Table 5.1  
 Reach ID  
 Assessed Length

**Visual Stream Morphology Stability Assessment**  
 UT1  
 1880

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	5	5			100%			
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	5	5			100%			
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream 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%						
<b>Totals</b>										
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
<b>Totals</b>										
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	25	25			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	25	25			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	25	25			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	25	25			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	25	25			100%			

Table 5.2  
 Reach ID  
 Assessed Length

**Visual Stream Morphology Stability Assessment**  
 UT2  
 1580

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

Table 5.3  
 Reach ID  
 Assessed Length

**Visual Stream Morphology Stability Assessment**  
 M1  
 2254

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. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	25	25		100%				
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth $\geq$ 1.6)	23	23		100%				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	23	23		100%				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	26	26		100%				
2. Thalweg centering at downstream of meander (Glide)		26	26	100%						
<b>Totals</b>										
2. Bank	1. <u>Scoured/Eroding</u>	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. <u>Undercut</u>	Banks undercut/overhanging to the extent that mass wasting appears likely. Does <b>NOT</b> include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
<b>Totals</b>										
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	48	48			100%			
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	48	48			100%			
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	46	48			96%			
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	46	48			96%			
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio $\geq$ 1.6 Rootwads/logs providing some cover at base-flow.	48	48			100%			

**Table 6** **Vegetation Condition Assessment**  
**Planted Acreage<sup>1</sup>** **21**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	1	0.75	3.6%
<b>Total</b>				<b>1</b>	<b>0.75</b>	<b>3.6%</b>
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
<b>Cumulative Total</b>				<b>1</b>	<b>0.75</b>	<b>3.6%</b>

**Easement Acreage<sup>2</sup>** **55.6**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern <sup>4</sup>	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	7	2.63	4.7%
5. Easement Encroachment Areas <sup>3</sup>	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	0	0.00	0.0%

Appendix C  
Vegetation Plot Data

**Table 7. Vegetation Plot Criteria Attainment**

Vegetation Plot ID	MY1		MY2		MY3		MY4		MY5			
	Vegetation Survival Threshold Met?	Reach Mean	Vegetation Survival Threshold Met?	Reach Mean	Vegetation Survival Threshold Met?	Reach Mean	Vegetation Survival Threshold Met?	Reach Mean	Stream Riparian Zone Vegetation Survival Threshold (260 stems/acre) Met?	Reach Mean	Buffer Mitigation Vegetation Survival Threshold (320 stems/acre) Met?	Reach Mean
247-01-0001	Y	100%	Y	50%	Y	50%	Y	100%	N	50%	N	0%
247-01-0002	Y		N		N		Y		Y			
247-01-0003	Y	100%	Y	100%	Y	100%	Y	100%	N	50%	N	50%
247-01-0004	Y		Y		Y		Y		Y			
247-01-0005	Y	50%	Y	50%	Y	38%	N	38%	N	13%	N	0%
247-01-0006	N		N		N		N		N			
247-01-0007	N		N		N		N		N			
247-01-0008	Y		Y		Y		Y		N			
247-01-0009	N		N		N		N		N			
247-01-0010	N		N		N		N		N			
247-01-0011	Y		Y		Y		Y		N			
247-01-0012	Y		Y		Y		Y		Y		N/A	

Vegetation Plot ID	MY6				MY7				MY8				
	Stream Riparian Zone Vegetation Survival Threshold (260 stems/acre) Met?	Reach Mean	Buffer Mitigation Vegetation Survival Threshold (320 stems/acre) Met?	Reach Mean	Stream Riparian Zone Vegetation Survival Threshold (260 stems/acre) Met?	Reach Mean	Buffer Mitigation Vegetation Survival Threshold (320 stems/acre) Met?	Reach Mean	Stream Riparian Zone Vegetation Survival Threshold (260 stems/acre) Met?	Reach Mean	Buffer Mitigation Vegetation Survival Threshold (320 stems/acre) Met?	Reach Mean	
247-01-0001	Y	100%	N	50%	Y	100%	N	50%	Y	100%	N	50%	
247-01-0002	Y		Y		Y		Y		Y				
247-01-0003	Y	100%	N	0%	Y	100%	N	0%	Y	100%	N	0%	
247-01-0004	Y		N		Y		N		Y				
247-01-0005	Y	75%	Y	57%	Y	75%	Y	43%	Y	75%	N	43%	
247-01-0006	Y		Y		Y		N		Y				
247-01-0007	Y		Y		Y		Y		Y				
247-01-0008	Y		N		Y		N		Y				
247-01-0009	N		N		N		N		N				
247-01-0010	N		N		N		N		N				
247-01-0011	Y		Y		Y		Y		Y				
247-01-0012	Y		N/A		Y		Y		N/A		Y		N/A

Table 8. CVS Vegetation Plot Metadata  
Meredell Farm Stream Restoration Site/247

<b>Report Prepared By</b>	Kim Hamlin
<b>Date Prepared</b>	11/2/2015 11:21
<b>database name</b>	MDELL_247_MY08_2015_cvs-eep-entrytool-v2.3.1.mdb
<b>database location</b>	G:\Environmental\NCEEP Meredell Farms SMS\MY08\AnnualReport\MDELL_247_MY08_2015_AnnualMonitoringReport_DRAFT\3 - Vegetation Plot Data
<b>computer name</b>	W93
<b>file size</b>	49713152
<b>DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----</b>	
<b>Metadata</b>	Description of database file, the report worksheets, and a summary of project(s) and project data.
<b>Proj, planted</b>	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
<b>Proj, total stems</b>	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.
<b>Plots</b>	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
<b>Vigor</b>	Frequency distribution of vigor classes for stems for all plots.
<b>Vigor by Spp</b>	Frequency distribution of vigor classes listed by species.
<b>Damage</b>	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
<b>Damage by Spp</b>	Damage values tallied by type for each species.
<b>Damage by Plot</b>	Damage values tallied by type for each plot.
<b>Planted Stems by Plot and Spp</b>	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
<b>ALL Stems by Plot and spp</b>	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.
<b>PROJECT SUMMARY-----</b>	
<b>Project Code</b>	247
<b>project Name</b>	Meredell Farm
<b>Description</b>	Riparian Buffer Restoration
<b>River Basin</b>	Cape Fear
<b>length(ft)</b>	9601
<b>stream-to-edge width (ft)</b>	100
<b>area (sq m)</b>	201,533
<b>Required Plots (calculated)</b>	12
<b>Sampled Plots</b>	12





**Meredell Farm (#247)**  
**Year 8 (19-Oct-2015 to 20-Oct-2015)**  
 Vegetation Plot Summary Information

Plot #	Riparian Buffer Stems <sup>1</sup>	Stream/Wetland Stems <sup>2</sup>	Live Stakes	Invasives	Volunteers <sup>3</sup>	Total <sup>4</sup>	Unknown Growth Form
0001	6	11	9	0	15	35	0
0002	9	10	0	0	20	30	0
0003	6	13	0	0	13	26	2
0004	7	11	0	0	8	19	1
0005	7	7	0	0	13	20	0
0006	11	12	0	0	33	45	12
0007	11	11	0	0	12	23	0
0008	7	10	1	0	23	34	0
0009	1	1	1	0	3	5	0
0010	4	4	0	0	35	39	0
0011	14	16	2	0	16	34	0
0012	n/a	21	1	0	168	190	0

**Wetland/Stream Vegetation Totals**  
(per acre)

Plot #	Stream/Wetland Stems <sup>2</sup>	Volunteers <sup>3</sup>	Total <sup>4</sup>	Success Criteria Met?
0001	445	607	1416	Yes
0002	405	809	1214	Yes
0003	526	526	1052	Yes
0004	445	324	769	Yes
0005	283	526	809	Yes
0006	486	1335	1821	Yes
0007	445	486	931	Yes
0008	405	931	1376	Yes
0009	40	121	202	No
0010	162	1416	1578	No
0011	647	647	1376	Yes
0012	850	6799	7689	Yes
<b>Project Avg</b>	<b>428</b>	<b>1211</b>	<b>1686</b>	

**Riparian Buffer Vegetation Totals**  
(per acre)

Plot #	Riparian Buffer Stems <sup>1</sup>	Success Criteria Met?
0001	243	No
0002	364	Yes
0003	243	No
0004	283	No
0005	283	No
0006	445	Yes
0007	445	Yes
0008	283	No
0009	40	No
0010	162	No
0011	567	Yes
0012	n/a	n/a
<b>Project Avg</b>	<b>305</b>	

**Stem Class characteristics**

<sup>1</sup>Buffer

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

<sup>2</sup>Stream/Wetland

Stems Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines

<sup>3</sup>Volunteers Native woody stems. Not planted. No vines.

<sup>4</sup>Total Planted + volunteer native woody stems. Includes live stakes. Excl. exotics. Excl. vines.

<b>Client</b>	NC Division of Mitigation Services		
<b>Project Site</b>	Meredell Farm Site (247)		
<b>Date</b>	10-12-2015		
<b>Start Time</b>	13:30	<b>End Time</b>	18:00
<b>Only PAL for Site for This Day?</b>	Yes	<b>If NO, this is PAL # of ##</b>	
<b>Temp (F)</b>	77	<b>Sky Cover</b>	Clear
<b>Wind Direction</b>	SSW	<b>Wind Speed</b>	1-5 mph
<b>Terrain: Flat (1) to Steep (5)</b>	1	<b>Vegetation Density: Sparse (1) to Dense (5)</b>	4
<b>Applicators</b>	Joshua G Merritt (NC 026-33717) Ben Wise Joel Wise		
<b>Application Method</b>	Basal Bark		
<b>Herbicide</b>	Element® 4 (triclopyr)		
<b>Herbicide Rate (%)</b>	25		
<b>Total Concentrate</b>	288 oz		
<b>Surfactant</b>			
<b>Surfactant Rate (%)</b>			
<b>Other (Dye, Marking Agent, etc.)</b>	Dye		
<b>Other Rate/Amt</b>	1 oz/gal		
<b>Diluent</b>	Diesel fuel		
<b>Total Solution</b>	18 gallons		
<b>Species Controlled</b>	Privet spp. Tree-of-Heaven		

**Area Description**

We started at the north end of the stream and worked south on the west side of the stream. There were high densities of tree-of-heaven and privet along the west side of this part of the easement. We were able to treat the whole area. Further treatment will be necessary in this area due to the high population of tree-of-heaven.

**Additional Comments**

<b>Client</b>	NC Division of Mitigation Services		
<b>Project Site</b>	Meredell Farm Site (247)		
<b>Date</b>	10-13-2015		
<b>Start Time</b>	9:30	<b>End Time</b>	16:40
<b>Only PAL for Site for This Day?</b>	No	<b>If NO, this is PAL # of ##</b>	1 of 2
<b>Temp (F)</b>	76	<b>Sky Cover</b>	Partly Cloudy
<b>Wind Direction</b>	SSW	<b>Wind Speed</b>	6-10 mph
<b>Terrain: Flat (1) to Steep (5)</b>	1	<b>Vegetation Density: Sparse (1) to Dense (5)</b>	4
<b>Applicators</b>	Joshua G Merritt (NC 026-33717) Ben Wise Joel Wise		
<b>Application Method</b>	Foliar Spray (Backpack)		
<b>Herbicide</b>	Element® 3A (triclopyr)		
<b>Herbicide Rate (%)</b>	3		
<b>Total Concentrate</b>	15.7 oz		
<b>Surfactant</b>	Agri-Dex®		
<b>Surfactant Rate (%)</b>	1		
<b>Other (Dye, Marking Agent, etc.)</b>	Dye		
<b>Other Rate/Armt</b>	1 oz/gal		
<b>Diluent</b>	Water		
<b>Total Solution</b>	4 gallons		
<b>Species Controlled</b>	Jap. Honeysuckle Privet spp. Tree-of-Heaven		

**Area Description** There were large tree-of-heaven that had been cut down and left on the site. Smaller tree-of-heaven were growing from the root system. The branch of the easement farthest west had very little invasives while the lower portion of the stream was full of privet. Had to basal bark and foliar spray most of these areas.

**Additional Comments**

<b>Client</b>	NC Division of Mitigation Services		
<b>Project Site</b>	Meredell Farm Site (247)		
<b>Date</b>	10-13-2015		
<b>Start Time</b>	9:30	<b>End Time</b>	16:40
<b>Only PAL for Site for This Day?</b>	No	<b>If NO, this is PAL # of ##</b>	2 of 2
<b>Temp (F)</b>	79	<b>Sky Cover</b>	Partly Cloudy
<b>Wind Direction</b>	SSW	<b>Wind Speed</b>	6-10 mph
<b>Terrain: Flat (1) to Steep (5)</b>	1	<b>Vegetation Density: Sparse (1) to Dense (5)</b>	4
<b>Applicators</b>	Joshua G Merritt (NC 026-33717) Ben Wise Joel Wise		
<b>Application Method</b>	Basal Bark		
<b>Herbicide</b>	Element® 4 (triclopyr)		
<b>Herbicide Rate (%)</b>	25		
<b>Total Concentrate</b>	288 oz		
<b>Surfactant</b>			
<b>Surfactant Rate (%)</b>			
<b>Other (Dye, Marking Agent, etc.)</b>	Dye		
<b>Other Rate/Amt</b>	1 oz/gal		
<b>Diluent</b>	Diesel fuel		
<b>Total Solution</b>	18 gallons		
<b>Species Controlled</b>	Privet spp. Tree-of-Heaven		

**Area Description** There were large tree-of-heaven that had been cut down and left on the site. Smaller tree-of-heaven were growing from the root system. The branch of the easement farthest west had very little invasives while the lower portion of the stream was full of privet. Had to basal bark and foliar spray most of these areas.

**Additional Comments**

<b>Client</b>	NC Division of Mitigation Services		
<b>Project Site</b>	Meredell Farm Site (247)		
<b>Date</b>	10-14-2015		
<b>Start Time</b>	9:00	<b>End Time</b>	17:30
<b>Only PAL for Site for This Day?</b>	No	<b>If NO, this is PAL # of ##</b>	1 of 3
<b>Temp (F)</b>	73	<b>Sky Cover</b>	Clear
<b>Wind Direction</b>	SSW	<b>Wind Speed</b>	6-10 mph
<b>Terrain: Flat (1) to Steep (5)</b>	2	<b>Vegetation Density: Sparse (1) to Dense (5)</b>	3
<b>Applicators</b>	Joshua G Merritt (NC 026-33717) Ben Wise Joel Wise		
<b>Application Method</b>	Foliar Spray (Backpack)		
<b>Herbicide</b>	Element® 3A (triclopyr)		
<b>Herbicide Rate (%)</b>	3		
<b>Total Concentrate</b>	69.3 oz		
<b>Surfactant</b>	Agri-Dex®		
<b>Surfactant Rate (%)</b>	1		
<b>Other (Dye, Marking Agent, etc.)</b>	Dye		
<b>Other Rate/Armt</b>	1 oz/gal		
<b>Diluent</b>	Water		
<b>Total Solution</b>	18 gallons		
<b>Species Controlled</b>	Jap. Honeysuckle Privet spp. Tree-of-Heaven		

**Area Description** Small privet bushes were located throughout the northern branch of the easement. There were large privet bushes located at the lower portions of the easement where small ground disturbance from construction occurred. All of these bushes were treated with backpack sprayers and the mist blower.

**Additional Comments**

<b>Client</b>	NC Division of Mitigation Services		
<b>Project Site</b>	Meredell Farm Site (247)		
<b>Date</b>	10-14-2015		
<b>Start Time</b>	9:30	<b>End Time</b>	17:30
<b>Only PAL for Site for This Day?</b>	No	<b>If NO, this is PAL # of ##</b>	2 of 3
<b>Temp (F)</b>	73	<b>Sky Cover</b>	Clear
<b>Wind Direction</b>	SSW	<b>Wind Speed</b>	6-10 mph
<b>Terrain: Flat (1) to Steep (5)</b>	2	<b>Vegetation Density: Sparse (1) to Dense (5)</b>	3
<b>Applicators</b>	Joshua G Merritt (NC 026-33717) Ben Wise Joel Wise		
<b>Application Method</b>	Mist Blower		
<b>Herbicide</b>	Element® 3A (triclopyr)		
<b>Herbicide Rate (%)</b>	3		
<b>Total Concentrate</b>	69.3 oz		
<b>Surfactant</b>	Agri-Dex®		
<b>Surfactant Rate (%)</b>	1		
<b>Other (Dye, Marking Agent, etc.)</b>	Dye		
<b>Other Rate/Amt</b>	1 oz/gal		
<b>Diluent</b>	Water		
<b>Total Solution</b>	18 gals		
<b>Species Controlled</b>	Jap. Honeysuckle Privet spp. Tree-of-Heaven		
<b>Area Description</b>	Small privet bushes were located throughout the northern branch of the easement. There were large privet bushes located at the lower portions of the easement where small ground disturbance from construction occurred. All of these bushes were treated with backpack sprayers and the mist blower.		
<b>Additional Comments</b>			

**Client** NC Division of Mitigation Services  
**Project Site** Meredell Farm Site (247)  
**Date** 10-14-2015  
**Start Time** 9:30 **End Time** 17:30  
**Only PAL for Site for This Day?** No **If NO, this is PAL # of ##** 3 of 3  
**Temp (F)** 73 **Sky Cover** Clear  
**Wind Direction** SSW **Wind Speed** 6-10 mph  
**Terrain: Flat (1) to Steep (5)** 2 **Vegetation Density: Sparse (1) to Dense (5)** 3  
**Applicators** Joshua G Merritt (NC 026-33717)  
 Ben Wise  
 Joel Wise  
**Application Method** Basal Bark  
**Herbicide** Element® 4 (triclopyr)  
**Herbicide Rate (%)** 25  
**Total Concentrate** 64 oz  
**Surfactant**  
**Surfactant Rate (%)**  
**Other (Dye, Marking Agent, etc.)** Dye  
**Other Rate/Amt** 1 oz/gal  
**Diluent** Diesel fuel  
**Total Solution** 4 gallons  
**Species Controlled** Privet spp.  
 Tree-of-Heaven

**Area Description** Small privet bushes were located throughout the northern branch of the easement. There were large privet bushes located at the lower portions of the easement where small ground disturbance from construction occurred. All of these bushes were treated with backpack sprayers and the mist blower.

**Additional Comments**

Appendix D  
Stream Survey Data



Table 10a.1 Baseline Stream Data Summary  
Meredell Farm Stream Restoration Site/247 - Reach: UT1b (780 feet)

Parameter	Gauge <sup>2</sup>	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline							
		LL	UL	Eq.	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Med	Max	Min	Mean	Med	Max	SD <sup>5</sup>	n		
<b>Dimension and Substrate - Riffle Only</b>																											
Bankfull Width (ft)					4.1	8.0	6.4	14.7	4.0	6								7.3									
Floodprone Width (ft)					6.0	25.5	17.0	59.0	20.0	6																	
Bankfull Mean Depth (ft)					0.5	0.6	0.6	0.7	0.1	6							0.6										
<sup>1</sup> Bankfull Max Depth (ft)					0.8	0.9	0.9	1.1	0.1	6						0.7	0.8	0.9									
Bankfull Cross Sectional Area (ft <sup>2</sup> )					2.6	4.6	3.8	8.3	2.2	6							4.5										
Width/Depth Ratio					5.7	14.0	11.8	26.2	7.4	6							12										
Entrenchment Ratio					1.3	3.3	2.5	6.9	2.3	6																	
<sup>1</sup> Bank Height Ratio					1.1	3.0	3.4	4.6	1.5	6							1										
<b>Profile</b>																											
Riffle Length (ft)																											
Riffle Slope (ft/ft)					0.093			0.022								0.013	0.018	0.022									
Pool Length (ft)																											
Pool Max depth (ft)						2.4										1.2	1.5	1.8									
Pool Spacing (ft)					18			171								14.7	25.7	36.7									
<b>Pattern</b>																											
Channel Beltwidth (ft)					10			140								26	42.5	59									
Radius of Curvature (ft)					13			45								15	18.5	22									
Rc:Bankfull width (ft/ft)					1.6			5.6								2	2.5	3									
Meander Wavelength (ft)					80			400								51	66	81									
Meander Width Ratio					10			50.2								7	9	11									
<b>Transport parameters</b>																											
Reach Shear Stress (competency) lb/f <sup>2</sup>								0.81									0.26										
Max part size (mm) mobilized at bankfull								50									50										
Stream Power (transport capacity) W/m <sup>2</sup>																											
<b>Additional Reach Parameters</b>																											
Rosgen Classification					G4, F4b, E4b C4b						C4																
Bankfull Velocity (fps)																											
Bankfull Discharge (cfs)																											
Valley length (ft)																											
Channel Thalweg length (ft)																											
Sinuosity (ft)								1.2									1.4										
Water Surface Slope (Channel) (ft/ft)								0.0258									0.011										
BF slope (ft/ft)																	0.0159										
<sup>3</sup> Bankfull Floodplain Area (acres)																											
<sup>4</sup> % of Reach with Eroding Banks																											
Channel Stability or Habitat Metric																											
Biological or Other																											

Table 10a.2 Baseline Stream Data Summary  
Meredell Farm Stream Restoration Site/247 - Reach: UT2b (294 feet)

Parameter	Gauge <sup>2</sup>	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
		LL	UL	Eq.	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Med	Max	Min	Mean	Med	Max	SD <sup>5</sup>	n
<b>Dimension and Substrate - Riffle Only</b>																									
Bankfull Width (ft)					4.9	6.6	6.8	8.1	1.3	4									7.3						
Floodprone Width (ft)					10.0	12.3	11.0	17.0	3.2	4															
Bankfull Mean Depth (ft)					0.4	0.6	0.5	0.8	0.2	4									0.6						
<sup>1</sup> Bankfull Max Depth (ft)					0.8	1.0	1.0	1.2	0.2	4								0.7	0.8	0.9					
Bankfull Cross Sectional Area (ft <sup>2</sup> )					2.4	3.7	3.1	6.2	1.8	4									4.5						
Width/Depth Ratio					9.8	12.8	11.6	18.4	3.9	4									12						
Entrenchment Ratio					1.6	1.9	1.9	2.3	0.3	4															
<sup>1</sup> Bank Height Ratio					2.2	2.6	2.3	3.7	0.7	4									1						
<b>Profile</b>																									
Riffle Length (ft)																									
Riffle Slope (ft/ft)					0.009			0.225										0.016	0.021	0.027					
Pool Length (ft)																									
Pool Max depth (ft)						1												1.2	1.5	1.8					
Pool Spacing (ft)					30			67										14.7	25.7	36.7					
<b>Pattern</b>																									
Channel Beltwidth (ft)						15												26	42.5	59					
Radius of Curvature (ft)					3			13										15	18.5	22					
Rc:Bankfull width (ft/ft)					0.4			1.9										2	2.5	3					
Meander Wavelength (ft)					60			95										51	66	81					
Meander Width Ratio					8.8			13.9										7	9	11					
<b>Transport parameters</b>																									
Reach Shear Stress (competency) lb/f <sup>2</sup>								0.565										0.439							
Max part size (mm) mobilized at bankfull								sand										sand							
Stream Power (transport capacity) W/m <sup>2</sup>								31.1										20.9							
<b>Additional Reach Parameters</b>																									
Rosgen Classification								B5, E5										C4							
Bankfull Velocity (fps)								2.9										3.1							
Bankfull Discharge (cfs)								13																	
Valley length (ft)																									
Channel Thalweg length (ft)																									
Sinuosity (ft)								1.12										1.2							
Water Surface Slope (Channel) (ft/ft)								0.0321										0.0134							
BF slope (ft/ft)																		0.0166							
<sup>3</sup> Bankfull Floodplain Area (acres)																									
<sup>4</sup> % of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Table 10a.3 Baseline Stream Data Summary  
Meredell Farm Stream Restoration Site/247 - Reach: M1 (3200 feet)

Parameter	Gauge <sup>2</sup>	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
		LL	UL	Eq.	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Mean	Med	Max	SD <sup>5</sup>	n	Min	Med	Max	Min	Mean	Med	Max	SD <sup>5</sup>	n
<b>Dimension and Substrate - Riffle Only</b>																									
Bankfull Width (ft)					4.6	6.4	6.7	7.6	1.3	4								10.2							
Floodprone Width (ft)					6.0	10.0	10.5	13.0	2.9	4															
Bankfull Mean Depth (ft)					0.8	1.0	1.0	1.1	0.1	4								0.8							
<sup>1</sup> Bankfull Max Depth (ft)					1.2	1.3	1.4	1.4	0.1	4						1	1.15	1.3							
Bankfull Cross Sectional Area (ft <sup>2</sup> )					3.7	7.0	7.4	9.4	2.5	4								8.6							
Width/Depth Ratio					5.8	6.8	6.7	7.9	0.9	4								12							
Entrenchment Ratio					1.2	1.5	1.5	1.9	0.3	4															
<sup>1</sup> Bank Height Ratio					2.8	3.0	2.9	3.4	0.3	4								1							
<b>Profile</b>																									
Riffle Length (ft)																									
Riffle Slope (ft/ft)																	0.016	0.021	0.026						
Pool Length (ft)																									
Pool Max depth (ft)																1.7	2.1	2.5							
Pool Spacing (ft)																20.3	35.55	50.8							
<b>Pattern</b>																									
Channel Beltwidth (ft)					20			30									36	58.5	81						
Radius of Curvature (ft)					16			25									20	25	30						
Rc:Bankfull width (ft/ft)					2.5			3.9									2	2.5	3						
Meander Wavelength (ft)					70			170									71	91.5	112						
Meander Width Ratio					11			26.6									7	9	11						
<b>Transport parameters</b>																									
Reach Shear Stress (competency) lb/f <sup>2</sup>								0.61										0.54							
Max part size (mm) mobilized at bankfull								52										52							
Stream Power (transport capacity) W/m <sup>2</sup>																									
<b>Additional Reach Parameters</b>																									
Rosgen Classification								G4c																	
Bankfull Velocity (fps)																									
Bankfull Discharge (cfs)																									
Valley length (ft)																									
Channel Thalweg length (ft)																									
Sinuosity (ft)								1.08																	
Water Surface Slope (Channel) (ft/ft)								0.013																	
BF slope (ft/ft)																									
<sup>3</sup> Bankfull Floodplain Area (acres)																									
<sup>4</sup> % of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

**Table 10b.1 Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)  
Meredell Farm Stream Restoration Site/247 - Reach: UT1b (780 feet)**

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design					As-built/Baseline				
<sup>1</sup> Ri% / Ru% / P% / G% / S%																				
<sup>1</sup> SC% / Sa% / G% / C% / B% / Be%																				
<sup>1</sup> d16 / d35 / d50 / d84 / d95 / dj <sup>p</sup> / dj <sup>sp</sup> (mm)	0.8	11.2	38.4	63.2	50															
<sup>2</sup> Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																				
<sup>3</sup> Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																				

**Table 10b.2 Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)  
Meredell Farm Stream Restoration Site/247 - Reach: UT2b (294 feet)**

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design					As-built/Baseline				
<sup>1</sup> Ri% / Ru% / P% / G% / S%																				
<sup>1</sup> SC% / Sa% / G% / C% / B% / Be%																				
<sup>1</sup> d16 / d35 / d50 / d84 / d95 / dj <sup>p</sup> / dj <sup>sp</sup> (mm)	0.035	0.05	0.13	0.22	0.5															
<sup>2</sup> Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																				
<sup>3</sup> Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																				

**Table 10b.3 Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)  
Meredell Farm Stream Restoration Site/247 - Reach: M1 (3200 feet)**

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design					As-built/Baseline				
<sup>1</sup> Ri% / Ru% / P% / G% / S%																				
<sup>1</sup> SC% / Sa% / G% / C% / B% / Be%																				
<sup>1</sup> d16 / d35 / d50 / d84 / d95 / dj <sup>p</sup> / dj <sup>sp</sup> (mm)	0.3	16.5	60.4	128	52															
<sup>2</sup> Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																				
<sup>3</sup> Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																				

Appendix E  
Hydrologic Data

**Table 11. Verification of Bankfull Events  
Meredell Farm Stream Restoration Site/247**

Date of Data Collection	Date of Occurrence	Method	Photo # (if available)
8/24/2010	N/A	*Crest Gauge Reading: 1.96'	
10/20/2011	N/A	Crest Gauge indicates BKF event	
3/26/2012	N/A	Wracklines indicate BKF event on UT1b	SP2 (MY5 report)
10/18/2012	N/A	*Crest Gauge Reading: 1.17'	SP1 (MY5 report)
10/30/2013	N/A	*Crest Gauge Reading: 3.6'	SP1 (MY6 report)
10/30/2013	N/A	Wracklines indicate BKF event on M1	SP2 (MY6 report)
10/1/2014	N/A	*Crest Gauge Reading: 1.17'	SP1 (MY7 report)
10/20/2015	N/A	*Crest Gauge Reading: 1.13'	SP1 (below)

\*Design bankfull depth range for reach M1 is 1.0' to 1.3'. Crest gauge readings occurring at, above, or within this range are recorded as bankfull indicators



SP1: Crest Gauge Reading