

Mitigation Project Name Pee Dee Stream Restoration Site
DMS ID 95350
River Basin Yadkin
Cataloging Unit 03040104

County Montgomery
Date Project Instituted 8/1/2012
Date Prepared 8/27/2018

USACE Action ID 2012-01077
NCDWR Permit No 2013-1140

Credit Release Milestone	Stream Credits					Wetland Credits								
	Scheduled Releases (Stream)	Warm	Cool	Cold	Anticipated Release Year (Stream)	Actual Release Date (Stream)	Scheduled Releases (Forested)	Riparian Riverine	Riparian Non-riverine	Non-riparian	Scheduled Releases (Coastal)	Coastal	Anticipated Release Year (Wetland)	Actual Release Date (Wetland)
Potential Credits (Mitigation Plan)		6,408.670												
Potential Credits (As-Built Survey)		6,504.000												
Potential Credits (IRT Approved)		6,408.267												
1 (Site Establishment)	N/A				N/A	N/A	N/A						N/A	N/A
2 (Year 0 / As-Built)	30%	1,951.200			2015	10/5/2015	30%						N/A	N/A
3 (Year 1 Monitoring)	10%	650.400			2016	4/25/2016	10%						N/A	N/A
4 (Year 2 Monitoring)	10%	640.827			2017	10/20/2017	10%						N/A	N/A
IRT Adjustment*		-38.290				10/20/2017							N/A	N/A
5 (Year 3 Monitoring) - NOT RELEASED	10%	640.827			2018	Not Released	15%						N/A	N/A
6 (Year 4 Monitoring)	5%				2019		5%						N/A	N/A
7 (Year 5 Monitoring)	10%				2020		15%						N/A	N/A
8 (Year 6 Monitoring)	5%				2021		5%						N/A	N/A
9 (Year 7 Monitoring)	10%				2022		10%						N/A	N/A
Stream Bankfull Standard	10%	640.827			2017	10/20/2017	N/A						N/A	N/A
Total Credits Released to Date		3,844.963												

*NOTE: Adjustment required due to IRT concerns on how the as-built credits were calculated

DEBITS (released credits only)

	1	1.5	2.5	5	1	3	2	5	1	3	2	5	1	3	2	5
	Stream Restoration	Stream Enhancement I	Stream Enhancement II	Stream Preservation	Riparian Restoration	Riparian Creation	Riparian Enhancement	Riparian Preservation	Nonriparian Restoration	Nonriparian Creation	Nonriparian Enhancement	Nonriparian Preservation	Coastal Marsh Restoration	Coastal Marsh Creation	Coastal Marsh Enhancement	Coastal Marsh Preservation
IRT Approved As-Built Amounts (feet and acres)	5,991.600	625.000														
IRT Approved As-Built Amounts (mitigation credits)	5,991.600	416.667														
Percentage Released	60%	60%														
Released Amounts (feet / acres)	3,594.960	375.000														
Released Amounts (credits)	3,594.960	250.000														
NCDWR Permit	USACE Action ID	Project Name														
N/A	N/A	SMUs located in pond bed - permanent reduction	452.000													
2016-0299	2002-01260	NCDOT TIP R-2536 - Asheboro Bypass, Randolph County	2,535.980													
	2016-02283	SR 1320 - Bridge 228 - Division 8, Montgomery County	82.000													
Remaining Amounts (feet / acres)	524.980	375.000														
Remaining Amounts (credits)	524.980	250.000														

Contingencies (if any): None

Signature of Wilmington District Official Approving Credit Release

Date

9/20/18

1 - For NCDMS, no credits are released during the first milestone

2 - For NCDMS projects, the second credit release milestone occurs automatically when the as-built report (baseline monitoring report) has been made available to the NCIRT by posting it to the NCDMS Portal, provided the following criteria have been met:

- 1) Approval of the final Mitigation Plan
- 2) Recordation of the preservation mechanism, as well as a title opinion acceptable to the USACE covering the property
- 3) Completion of all physical and biological improvements to the mitigation site pursuant to the mitigation plan
- 4) Receipt of necessary DA permit authorization or written DA approval for projects where DA permit issuance is not required

3 - A 10% reserve of credits is to be held back until the bankfull event performance standard has been met



302 Jefferson Street, Suite 110
Raleigh, NC 27605

Corporate Headquarters
5020 Montrose Blvd. Suite 650
Houston, TX 77006
Main: 713.520.5400

January 14, 2019

Harry Tsomides
NC DEQ Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

RE: Pee Dee Stream Restoration Site: MY4 Monitoring Report (NCDMS ID 95350)

Listed below are comments provided by DMS on December 11, 2018 regarding the Pee Dee Stream Restoration Site: Year 4 Monitoring Report and RES' responses.

Vegetation - general

Invasive vegetation (mostly privet) is still significant (3.12 acres, 15% of easement).

Please indicate how and when this will be addressed over the next year.

[RES will treat the invasive vegetation by cutting and spraying it. Due to the steep slopes in the easement, mulching is not an option. RES plans for the treatments to take place once in the spring, summer, and fall of 2019. This detail has been added to the report.](#)

Hydrology - general

While DMS acknowledges RES' plans and efforts to validate withheld credits on the site via adaptive management (stream characterization, flow gauges and excavation as described in the Adaptive Management section), please understand that DMS cannot approve any invoicing for the project beyond the current credit-approved amounts until the IRT approves any adaptive plans and subsequently approves credits on these credit-withheld reaches.

Thompson Creek 1-2 creditable footage should be 1014, not 1029 (approved mitigation plan length of 1314 minus 300). Please verify and change if agreed or clarify.

[This is correct and has been updated in Table 1.](#)

Project Credits / Table 1

During the 7/25/2018 field meeting with the IRT, additional hydrology monitoring was discussed along reaches where poor hydrology was observed in stream sections near the former ponds where silting had resulted in the lack of a well-defined channel, or a channel form that was dry. The following credits (716.7 total) are currently being withheld due to hydrology / channel formation questions:

Thompson 1 (100+00-102+50)

250 feet of Enhancement I (166.7 SMUs).

Thompson 1 (102+50-105+50)

300 feet of Restoration (300 SMUs).

Dale 1 (200+00-201+22)

122 feet Enhancement I (81.3 SMUs).

Dale 1 (201+22-203+75)

253 feet of Enhancement I (168.7 SMUs).



Please explain in the Table 1 notes the LF adjustments and any adaptive management plans.
[Done.](#)

Other edits

Visual Assessments should reflect any issues associated with the pond beds and stream formation.

[Table 5 and the CCPVs have been updated to reflect the issues associated with the pond beds and stream formation.](#)

Annual Monitoring Report

Monitoring Year 4 of 7

FINAL

Pee Dee Stream Restoration Project

NCDMS Contract No.: 004644

NCDMS Project No.: 95350

Montgomery County, NC

Data Collected: November 2018

Date Submitted: January 2019



Submitted to:

North Carolina Division of Mitigation Services

NCDEQ-DMS, 1652 Mail Service Center Raleigh NC 27699-1652

Prepared by:



302 Jefferson Street, Suite 110
Raleigh, North Carolina 27605

Contents

1.0 PROJECT SUMMARY	5
1.1. Goals and Objectives	5
1.2. Success Criteria.....	5
1.3. Project Setting and Background.....	6
1.4. Project Performance.....	7
2.0 METHODS	8
3.0 REFERENCES	9

Appendices

Appendix A. General Tables and Figures

Table 1. Project Components and Mitigation Credits

Table 2. Project Activity and Reporting History

Table 3. Project Contacts

Table 4. Project Information

Figure 1. Vicinity Map

Figure 2. Current Conditions Plan View Maps

Appendix B. Visual Assessment Data

Table 5. Visual Stream Morphology Stability Assessment

Table 6. Vegetation Condition Assessment

2018 Photo Station Photos

Appendix C. Vegetation Plot Data

(Vegetation plot monitoring not required for MY4)

Appendix D. Stream Geomorphology Data

(Cross section monitoring not required for MY4)

Table 12. Pebble Count Data Summary

Charts 1-9. MY4 Stream Reach Substrate Composition Charts

Table 13. Bank Pin Array Summary

Appendix E. Hydrology Data

Table 14. Verification of Bankfull Events

Table 15. 2018 Rainfall Summary

Appendix F. July 2018 IRT Credit Release Site Visit Memo

1.0 PROJECT SUMMARY

1.1. Goals and Objectives

The project goals address stressors identified in the TLW and include the following:

- Improve water quality within the restored channel reaches and downstream watercourses by reducing sediment and nutrient inputs and increasing dissolved oxygen levels
- Improve local aquatic and terrestrial ecological function via stream shading, habitat complexities, and organic/woody material introduction
- Improve aquatic and benthic macroinvertebrate habitat and associated stream bed form
- Improve site hydrology and attenuate flood flows on-site and downstream
- Provide approximately 18.6 acres of riparian area restoration with a native plant community
- Protect stream and riparian improvements with livestock best management practices
- Protect the site in perpetuity with a permanent conservation easement

The project goals will be addressed through the following project objectives:

- Implement Priority I or II restoration of 5,992 feet of stream and enhancement of 625 feet of stream
- Implement appropriate changes in dimension, pattern and/or profile to create geomorphologically stable conditions along project area reaches
- Modify degraded stream channels to enable proper sediment transport capacity and improved stream bed character
- Construct a floodplain bench that is accessible at the proposed bankfull channel elevation.
- Remove a major impoundment
- Integrate in-stream structures and native bank vegetation
- Plant native woody and herbaceous riparian vegetation with a minimum width of 50 feet from the edge of the restored channels
- Eradicate invasive, exotic or undesirable plant species
- Install cattle exclusion fencing, two new wells, two new cattle drinking stations, and upgrade eight existing cattle drinking stations

1.2. Success Criteria

The success criteria for the Pee Dee Stream Restoration Site follows accepted and approved success criteria presented in the USACE Stream Mitigation Guidelines and subsequent NCDMS and agency guidance. Specific success criteria components are presented below.

1.2.1. Stream Restoration

Dimension – Cross-section measurements should indicate little change from the as-built cross-sections. If changes do occur, they will be evaluated to determine whether the adjustments are associated with increased stability or whether they indicate movement towards an unstable condition.

Pattern and Profile – Measurements and calculated values should indicate stability with little deviation from as-built conditions and established morphological ranges for the restored stream type. Pool depths may vary from year to year, but the majority should maintain depths sufficient to be observed as distinct features in the profile. The pools should maintain their depth with flatter

water surface slopes, while the riffles should remain shallower and steeper. Pattern measurements will not be collected unless conditions seem to indicate that a detectable change appears to have occurred based on profile and/or dimension measurements.

Substrate – Calculated D₅₀ and D₈₄ values should indicate coarser size class distributions of bed materials in riffles and finer size class distributions in pools. The majority of riffle pebble counts should indicate maintenance or coarsening of substrate distributions. Generally, it is anticipated that the bed material will coarsen over time.

Sediment Transport – Depositional features should be consistent with a stable stream that is effectively managing its sediment load. Point bar and inner berm features, if present, should develop without excessive encroachment of the channel. Isolated development of robust (i.e. comprised of coarse material and/or vegetation actively diverting flow) mid-channel or lateral bars will be acceptable. Likewise, development of a higher number of mid-channel or lateral bars that are minor in terms of their permanency such that profile measurements do not indicate systemic aggradation will be acceptable, but trends in the development of robust mid-channel or alternating bar features will be considered a destabilizing condition and may require intervention or have success implications.

1.2.2. Surface Water Hydrology

Monitoring of stream surface water stages should indicate recurrence of bankfull flows on average every 1 to 2 years. At a minimum, throughout the monitoring period, the surface water stage should achieve bankfull or greater elevations at least twice. The bankfull events must occur during separate monitoring years.

1.2.3. Vegetation

Riparian vegetation monitoring shall be conducted for a minimum of seven years to ensure that success criteria are met per USACE guidelines. Accordingly, success criteria will consist of a minimum survival of 320 stems per acre by the end of the Year 3 monitoring period, a minimum of 260 stems per acre at the end of Year 5, and a minimum of 210 stems per acre in Year 7. If monitoring indicates either that the specified survival rate is not being met or the development of detrimental conditions (i.e., invasive species, diseased vegetation), appropriate corrective actions will be developed and implemented.

1.3. Project Setting and Background

The Pee Dee Stream Restoration Site (Site) encompasses approximately 21.0 acres of predominately agricultural land and includes three tributaries to Clarks Creek – Thompson Creek, Dale Branch, and Jerry Branch. The Site is located in the Yadkin River Watershed (NCDWR sub-basin 03-07-10 and HUC 03040104020020) approximately 1 mile south of the town of Pee Dee, NC in Montgomery County (**Figure 1**). Clarks Creek is listed as Class C water (NCDWR) and flows into the Pee Dee River. The Site is located within a NCDMS targeted local watershed.

Following 2016 monitoring the NCIRT requested a review of the differential between the Approved Mitigation Plan and Baseline Monitoring Report. The table below details the discrepancies by reach. The primary cause of increased baseline SMUs is survey methodology (thalweg vs. centerline). The Mitigation Plan lengths were based on centerline. Other causes of increased SMUs include field adjustments during construction and the design assumption of the channel pattern after pond removal. Additionally, credits for the stream reaches associated with the pond removals will be held until a later date. This is discussed further in Section 1.4.4. The new SMU total for this site is 5,691.6 (**Table 1**).

Reach	Mitigation Type	Proposed Length (LF)*	Mitigation Ratio	Proposed SMUs	Baseline SMUs
Thompson Creek 1	Enhancement I	401	1.5:1	166.7	162
Thompson Creek 1-2	P1 Restoration	504	1:1	1,314	1349
Dale Branch 1	Enhancement I	1,369	1.5:1	250	250
Dale Branch 2-5	P1 Restoration	3,440	1:1	2,955	2,993
Jerry Branch	P1 Restoration	1,852	1:1	1,670	1,691
Hudson Branch	P1 Restoration	707	1:1	52.6	59
Total		8,273		6,408.3	6,504.0

*The contracted amount of credits for this Site is 6,138 SMUs

1.4. Project Performance

Monitoring Year 4 (MY4) data was collected in November 2018. Monitoring activities included visual assessment of all reaches and the surrounding easement, 16 permanent photo stations, 12 pebble counts, and 6 bank pin arrays. Per the Approved Mitigation Plan, vegetation plot and cross-section data were not collected in MY4.

Summary information/data related to the occurrence of items such as beaver or easement 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 Restoration Plan) documents available on the NCDMS website (<http://portal.ncdenr.org/web/eep>). All raw data supporting the tables and figures in the appendices is available from NCDMS upon request.

1.4.1. Vegetation

Visual assessment of the easement (**Appendix B - Table 6, Figure 2**) indicates that herbaceous vegetation is well established throughout the project. Invasive exotic vegetation has been identified throughout the Site as Chinese privet (*Lingustrum sinense*). Invasive species treatments were administered in February and June of MY4. Treatments will continue throughout the monitoring period. RES plans to cut and spray the privet again in the spring, summer, and fall of 2019. RES remapped the invasive areas in MY4 and approximate size and locations of the invasive species areas are in **Table 6** and on **Figure 2**.

Vegetation plot data was not collected in MY4. It will be collected and reported again in MY5 and MY7.

1.4.2. Stream Geomorphology

Visual assessment of the stream was performed to document signs of channel instability, such as eroding banks, structural instability, or excessive sedimentation. With exception to the areas noted in Section

1.4.4, there was no indication of instability was observed during the visual assessment (**Table 5 and Figure 2**). Structures are intact and performing as designed.

Geomorphic data for MY4 was not collected. It will be collected and reported again in MY5 and MY7.

Substrate monitoring was performed during MY4. Riffle D_{50} ranged from medium gravel to coarse gravel on Jerry Branch, medium gravel to coarse gravel on Dale Branch, and coarse gravel on Thompson Branch. Substrate will be monitored in future years for shifts in particle size composition. Substrate composition data is presented in **Appendix D**.

1.4.3. Stream Hydrology

Since project completion in April 2015 at least six bankfull events have been documented on both Jerry and Thompson Branch and at least seven on Dale Branch. At least five bankfull events were recorded in MY4. One each on Jerry and Thompson Branches in the form of wrack lines and three on Dale Branch on the crest gauge (**Table 13**). The project has received multiple heavy precipitation events with no degradation to the channel or structures.

1.4.4. Adaptive Management

During a site visit with NCIRT and NCDMS at the Pee Dee Site in July 2018 (**Appendix F**), several problem areas were identified regarding the drained pond on Thompson 1 and the drained pond/wetland on Dale 1. Per the request of NCIRT, RES developed an Adaptive Management Plan to be sent to the IRT in early 2019. The Adaptive Management Plan proposes the installation of flow gauges above the old pond on Thompson 1, above the old pond/wetland on Dale 1, and at Cross Section 9 on Dale 2 to document at least intermittent flow. Additionally, RES proposes to excavate a baseflow channel through the old pond/wetland on Dale 1.

2.0 METHODS

Visual assessments of the project were performed at the beginning and end of the monitoring year. Permanent photo station photos were collected during vegetation monitoring. Additional vegetation or stream problem areas within the project area were photo-documented. Geomorphic measurements were taken using a Topcon GTS-312 Total Station. Three-dimensional coordinates associated with cross-section and profile data were collected in the field and geo-referenced (NAD83 State Plane feet FIPS 3200). Morphological data was limited to 22 cross-sections.

Survey data (MY0, MY1, MY2, MY3, MY5, MY7) was imported into CAD, ArcGIS, and Excel for data processing and analysis. Channel substrate was characterized using a Wolman Pebble Count as outlined in Harrelson et al. (1994) and processed using Microsoft Excel.

Vegetation success (MY0, MY1, MY2, MY3, MY5, MY7) is being monitored using 14 permanent monitoring plots. Vegetation monitoring followed CVS-EEP Level 1 Protocol for MY1 and is following Level 2 Protocol Version 4.2 for monitoring years 2-7 (Lee et al. 2008). Level 2 Protocol includes analysis of species composition and density of planted species. Data is processed using the CVS data entry tool. In the field, the four corners of each plot were permanently marked with rebar and photos of each plot taken from the origin each monitoring year.

Precipitation data was reported from the NCCRONOS station Uwharrie (Troy) up until its failure in June 2017. Precipitation data is now reported from the NCCRONOS station Albemarle 5.1 SSE. Three crest gauges were installed to document bankfull events, one each on Jerry, Dale, and Thompson branches.

During quarterly visits to the site, the height of the corkline was recorded and cross-referenced with known bankfull elevations at each crest gauge.

3.0 REFERENCES

- Harrelson, Cheryl, C. Rawlins and J. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Gen. Tech. Rep. RM-245. Rocky Mountain Forest and Range Experiment Station. USDA Forest Service. Fort Collins, Colorado
- Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2. <http://cvs.bio.unc.edu/methods.htm>; accessed November 2008.

Appendix A
General Tables and Figures

Table 1. Project Components and Mitigation Credits											
Pee Dee Stream Restoration Site											
Mitigation Credits											
	Stream		Riparian Wetland		Non-riparian Wetland		Buffer	Nitrogen	Phosphorous Nutrient Offset		
	R	RE	R	RE	R	RE	Nutrient Offset				
Type	R	RE	R	RE	R	RE					
Totals	5,691.6						-	-	-		
Project Components											
Project Component -or- Reach ID	Stationing/Location		Existing Footage/Acreage		Approach (PI, PII etc.)	Restoration -or- Restoration Equivalent	Restoration Footage or Acreage ¹	Creditable Footage	Mitigation Ratio	Credits ³	Notes ⁴
Thompson Creek 1	100+0 - 102 + 50		250		PI	EI	250	0	1.5	0	Adjustments above old pond
Thompson Creek 1 - 2	102+50 - 115+64		1,346		PI	R	1,314	1,014	1	1,014	Adjustments in old pond
Dale Branch 1	200+00 - 203+75		375		PI	EI	375	0	1.5	0	Adustments above and in old pond/wetland
Dale Branch 2 - 5	203+75 - 234+50		2,407		PI	R	2,955	2,955	1	2,955	
Jerry Branch	300+00 - 317+30		1,832		PI	R	1,670	1,670	1	1,670	
Hudson Branch	403+05 - 403+58		53		PI	R	52.6	52.6	1	52.6	
Component Summation											
Restoration Level	Stream	Riparian Wetland		Non-riparian Wetland	Buffer	Upland					
	(linear feet)	(acres)		(acres)	(square feet)	(acres)					
		Riverine	Non-Riverine								
Restoration	5,706.3	-	-	-	-	-					
Enhancement	-	-	-	-	-	-					
Enhancement I	250	-	-	-	-	-					
Enhancement II	-	-	-	-	-	-					
Creation	-	-	-	-	-	-					
Preservation	-	-	-	-	-	-					
High Quality Preservation	-	-	-	-	-	-					
BMP Elements											
Elemen ²	Location	Purpose/Function		Notes							
FB	Entire Site	Protect Stream									

¹Restoration footage accounts for crossings and exclusions.

²BR = 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

³Credit calculations were originally calculated along the as-built thalweg and updated to be calculated along stream centerlines for MY3 after discussions with NC IRT stemming from the April 3, 2017 Credit Release Meeting.

⁴An Adaptive Mangement Plan has been created to address the adjustments in Thompson Creek and Dale Branch. A brief description is included in Section 1.4.4 of the MY4 Report.

**Table 2. Project Activity and Reporting History
Pee Dee Stream Restoration Site**

Activity or Report	Data Collection Complete	Completion or Delivery
Mitigation Plan	Dec - 2013	Dec - 2013
Final Design - Construction Plans	N/A	Jan - 2014
Construction	N/A	April - 2015
Temporary S&E Mix Applied to Entire Project Area	N/A	April - 2015
Live Stakes and Bare Root Plantings for Entire Project Area	N/A	April - 2015
Baseline Monitoring Document (Year 0 Monitoring - Baseline)	April - 2015	July 2015
Year 1 Monitoring	Oct - 2015	Dec - 2015
Year 2 Monitoring	Jan - 2016	Oct - 2016
Year 3 Monitoring	Stream: June - 2017	Nov - 2017
	Vegetation: Sept - 2017	
Year 3 Invasive Species Treatment	---	June - 2017
Year 4 Invasive Species Treatment	---	Feb - 2018
Year 4 Invasive Species Treatment	---	June - 2018
Year 4 Monitoring	Nov -2018	Nov - 2018
Year 5 Monitoring		
Year 6 Monitoring		
Year 7 Monitoring		

Table 3. Project Contacts**Pee Dee Stream Restoration Site**

Prime Contractor	Resource Environmental Solutions, LLC 302 Jefferson Street; Suite 110 Raleigh, North Carolina 27605 David Godley (919) 209-1053
Designer	Wolf Creek Engineering 12-1/2 Wall St., Suite C Asheville, North Carolina 28801 Grant Ginn (828) 449-1930 ext 102
Construction Contractor	Northstate Environmental 2889 Lowery Street Winston Salem, North Carolina 27101 Darrell Westmoreland (336) 725-2010
Seeding Contractor	Northstate Environmental 2889 Lowery Street Winston Salem, North Carolina 27101 Darrell Westmoreland (336) 725-2010
Planting Contractor	Resource Environmental Solutions, LLC 302 Jefferson Street; Suite 110 Raleigh, North Carolina 27605 David Godley (919) 209-1053
As-built Surveys	Kee Mapping and Surveying PO Box 2566 Asheville, North Carolina 28802 Phillip B. Key (828) 575-9021
Seeding Mix Source	Green Resource 5204 Highgreen Court Colfax, NC 27235 (336) 855-6363
Bare Root Seedlings	ArborGen Inc. 2011 Broadbank Court Ridgeville, SC 29472 (888) 888-7158
	North Carolina Forest Service 762 Claridge Nursery Road Goldsboro, NC 27350 (888) 628-7337
Live Stakes	Bear Duck Farms, LLC 105 Dobbs Place Goldsboro, NC 27350
Monitoring Performers (Y0-Y2) 2015 - 2016	Equinox Environmental 37 Haywood St. Asheville, North Carolina 28802 Drew Alderman (828) 253-6856
Monitoring Performers (Y3+) 2017+	Resource Environmental Solutions, LLC 302 Jefferson Street; Suite 110 Raleigh, North Carolina 27605 Ryan Medric (919) 741-6268

Table 4. Project Baseline Information and Attributes

Project Information				
Project Name		Pee Dee Stream Restoration		
County		Montgomery County		
Project Area (acres)		21		
Project Coordinates (latitude and longitude)		35°15'26.95" N, 80°01'47.83" W		
Project Watershed Summary Information				
Physiographic Province		Piedmont		
River Basin		Yadkin		
USGS Hydrologic Unit 8-digit	03040104	USGS Hydrologic Unit 14-Digit	03040104020020	
DWQ Sub-basin		03-07-10		
Project Drainage Area (acres)		286		
Project Drainage Area Percentage of Impervious Area		<10%		
CGIA Land Use Classification		2.01.03 Hay and Pasture Land		
Reach Summary Information				
Parameters	Thompson Creek	Dale Branch	Jerry Branch	Hudson Branch
Length of reach (linear feet)	1,596	2,782	1,832	56
Valley classification (Rosgen)	II	II	II	II
Drainage area (acres)	102	58	83	19
NCDWQ stream identification score	30.5	34	30.5	21.5
NCDWQ Water Quality Classification	C	C	C	C
Morphological Description (stream type) (Rosgen)	B4	B4	B4	B4
Evolutionary trend (Rosgen)	IV	IV	IV	IV
Underlying mapped soils	GoE, BeC2, BaC2	GoE, CnA	GoE, BaC2, BaB2	BaC2
Drainage class	Well-drained	Well-drained	Well-drained	Well-drained
Soil Hydric status	Non-Hydric	Non-Hydric	Non-Hydric	Non-Hydric
Slope	2%	2%	2%	2%
FEMA classification	N/A	N/A	N/A	N/A
Native vegetation community	Agricultural	Agricultural	Agricultural	Agricultural
Percent composition of exotic invasive vegetation	5%	5%	5%	5%
Wetland Summary Information				
Parameters	-	-	-	-
Size of Wetland (acres)	-	-	-	-
Wetland Type (non-riparian, riparian riverine or riparian non-riverine)	-	-	-	-
Mapped Soil Series	-	-	-	-
Drainage class	-	-	-	-
Soil Hydric Status	-	-	-	-
Source of Hydrology	-	-	-	-
Hydrologic Impairment	-	-	-	-
Native vegetation community	-	-	-	-
Percent composition of exotic invasive vegetation	-	-	-	-
Regulatory Considerations				
Regulation	Applicable?	Resolved?	Supporting Documentation	
Waters of the United States – Section 404	Yes	Yes	NWP	
Waters of the United States – Section 401	Yes	Yes	401 Certification	
Endangered Species Act	N/A		ERTR	
Historic Preservation Act	N/A		ERTR	
Coastal Zone Management Act (CZMA)/ Coastal Area Management Act (CAMA)	N/A			
FEMA Floodplain Compliance	N/A			
Essential Fisheries Habitat	N/A		ERTR	

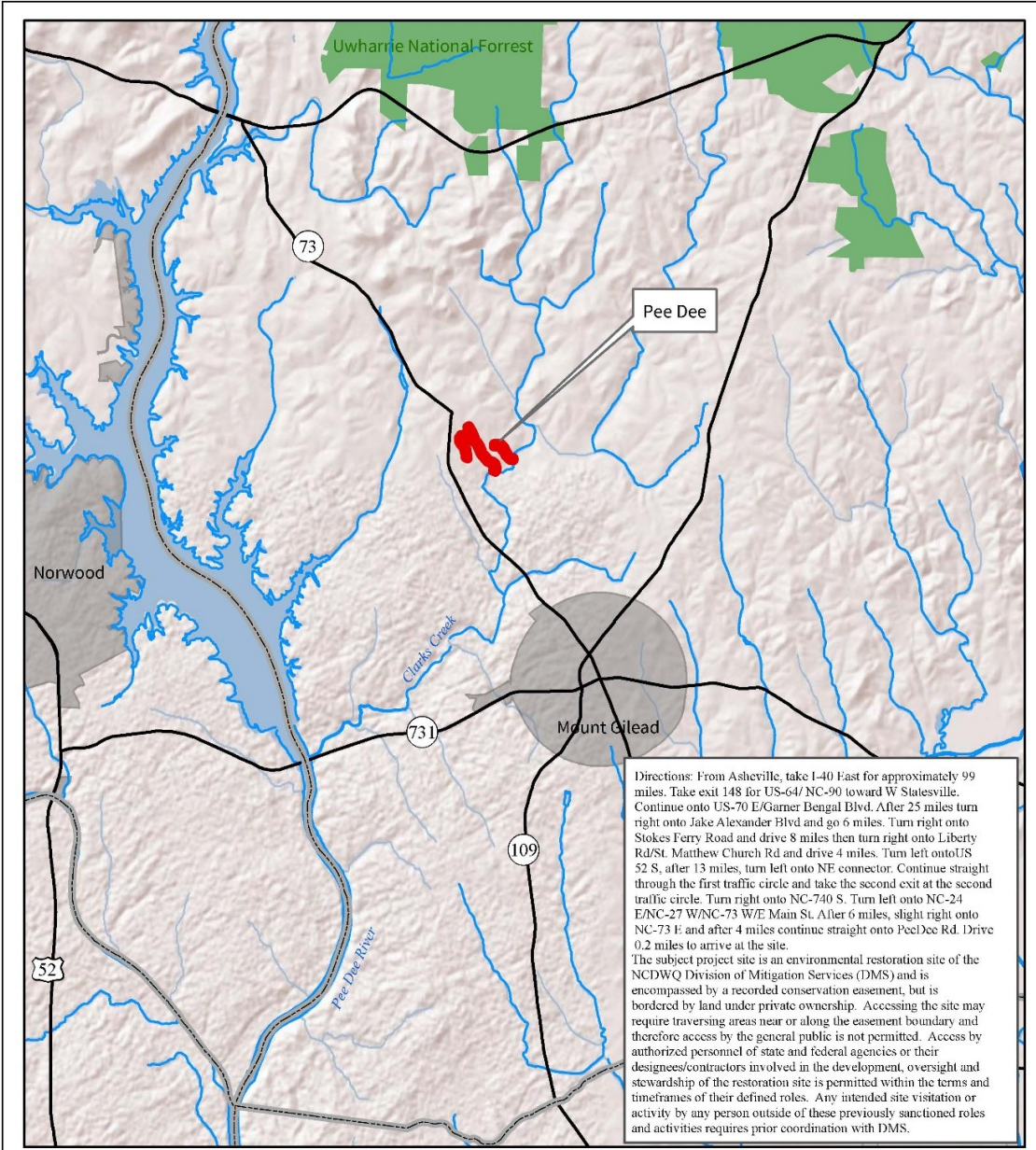
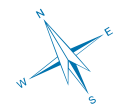


Figure 1: Vicinity Map
 Pee Dee Stream Restoration Site
 Project No. 95350
 Montgomery County, North Carolina

Notes: Conservation Easement from Key Mapping & Survey, P.A.

Miles



1 inch = 350 feet

Figure 2

**Pee Dee Stream
Restoration Project
MY4 2018**

**Current Conditions
Overview Map**

Date: 11/29/2018

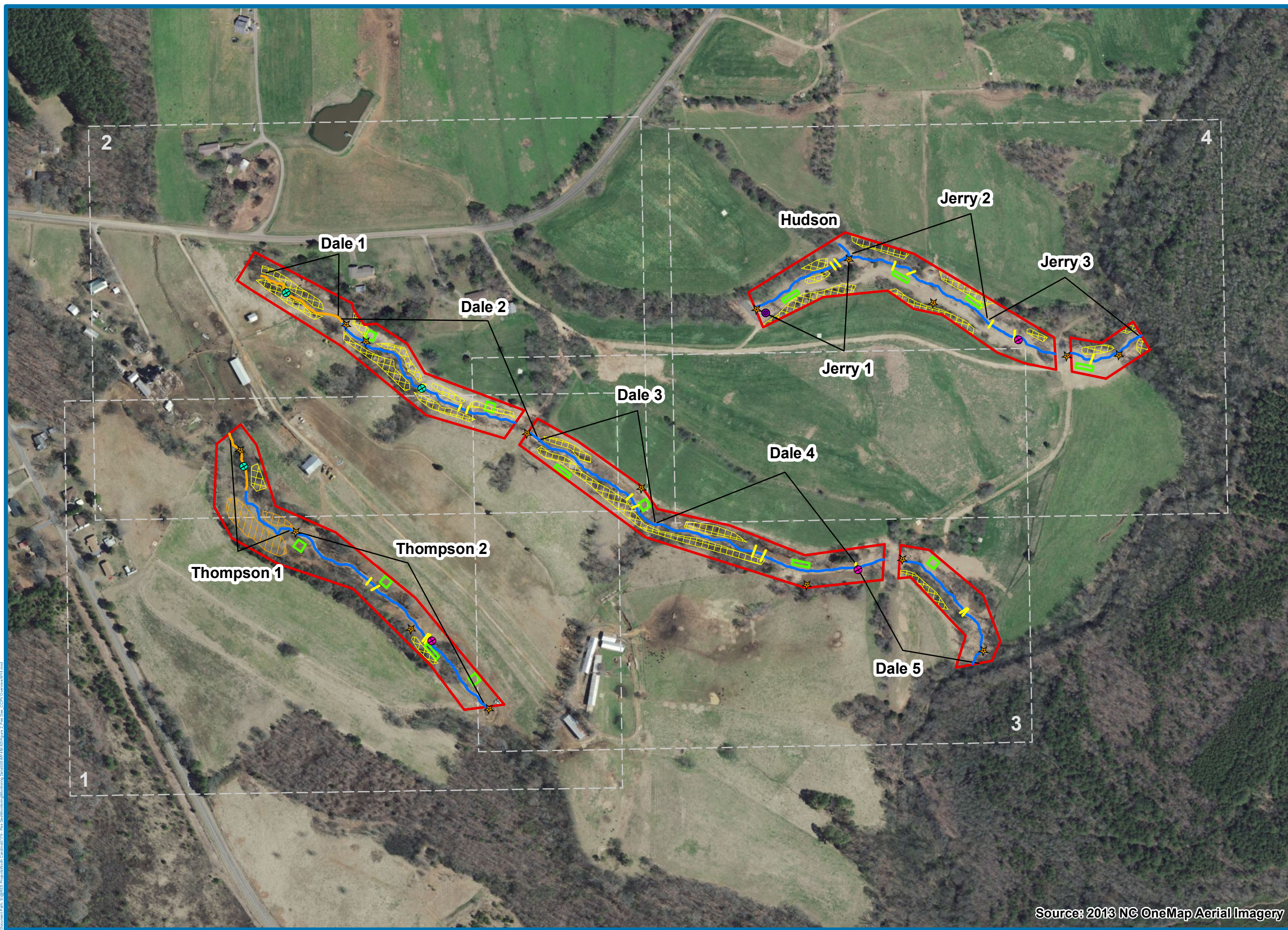
Drawn by: RTM

LEGEND

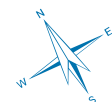
- Conservation Easement
- Vegetation Plot
- Cross Section
- Mitigation Type
- Restoration
- Enhancement I
- Crest Gauge
- Proposed Flow Gauge
- Rain Gauge
- Photo Station

Vegetation Condition Assessment

Invasive Species	Target Community		
	No Fill	Marginal	Absent
Absent			
Present			



Source: 2013 NC OneMap Aerial Imagery



1 inch = 150 feet

Figure 2
1
**Pee Dee Stream
Restoration Project
MY4 2018**

**Current Conditions
Overview Map**

Date: 1/14/2019

Drawn by: RTM

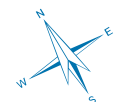
LEGEND

- ▭ Conservation Easement
- ▭ Vegetation Plot
- ▭ Cross Section
- Mitigation Type
- ▬ Restoration
- ▬ Enhancement I
- ▬ Withheld Stream Credit
- ⊕ Crest Gauge
- ⊗ Rain Gauge
- ⊕ Proposed Flow Gauge
- ★ Photo Station

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill	▨	▧
	Present	▨	▧	▩





1 inch = 150 feet

Figure 2
2
**Pee Dee Stream
Restoration Project
MY4 2018**

**Current Conditions
Overview Map**

Date: 1/14/2019 Drawn by: RTM

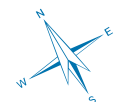
LEGEND

- Conservation Easement
- Vegetation Plot
- Cross Section
- Mitigation Type
- Restoration
- Enhancement I
- Withheld Stream Credit
- Crest Gauge
- Rain Gauge
- Proposed Flow Gauge
- ★ Photo Station

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill	No Fill	No Fill
	Present	Cross-hatch	Cross-hatch	Cross-hatch





1 inch = 150 feet

Figure 2
3
**Pee Dee Stream
Restoration Project
MY4 2018**

**Current Conditions
Overview Map**

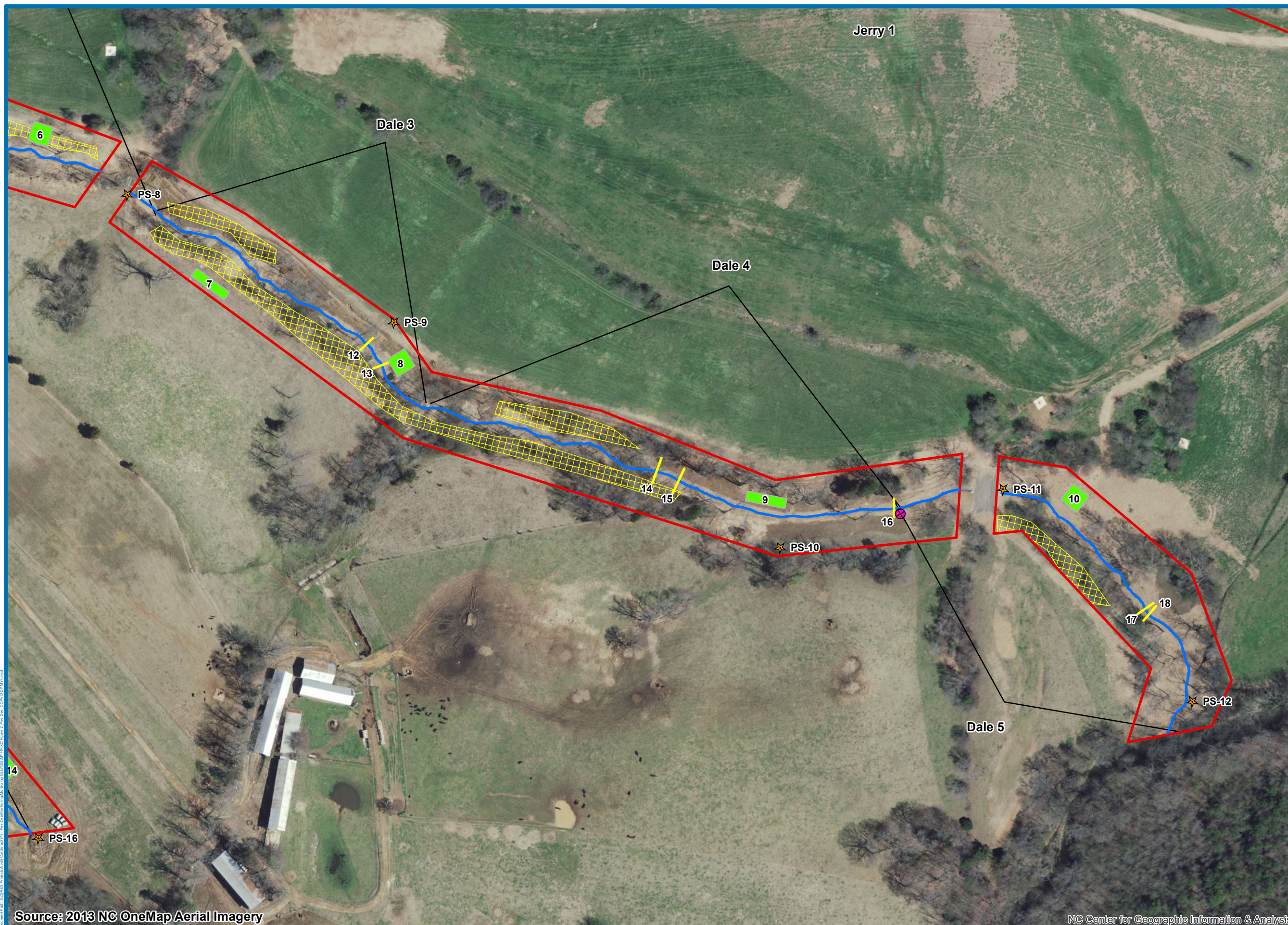
Date: 1/14/2019 Drawn by: RTM

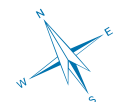
LEGEND

- ▭ Conservation Easement
- ▭ Vegetation Plot
- ▭ Cross Section
- Mitigation Type
- Restoration
- Enhancement I
- Withheld Stream Credit
- ⊕ Crest Gauge
- ⊗ Rain Gauge
- ⊕ Proposed Flow Gauge
- ★ Photo Station

Vegetation Condition Assessment

		Target Community		
		Present	Marginal	Absent
Invasive Species	Absent	No Fill		
	Present			





1 inch = 150 feet

Figure 2
4
**Pee Dee Stream
Restoration Project
MY4 2018**

**Current Conditions
Overview Map**

Date: 1/14/2019

Drawn by: RTM

LEGEND

- ▭ Conservation Easement
- ▭ Vegetation Plot
- ▭ Cross Section
- Mitigation Type
- Restoration
- Enhancement I
- Withheld Stream Credit
- ⊕ Crest Gauge
- ⊙ Rain Gauge
- ⊕ Proposed Flow Gauge
- ★ Photo Station

Vegetation Condition Assessment

Invasive Species	Target Community		
	No Fill	Marginal	Absent
Absent			
Present			



Appendix B
Visual Assessment Data

**Table 5. Visual Stream Morphology Stability Assessment
Pee Dee Stream Restoration Site - Jerry Branch
Assessed Length 1,832 feet**

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.	90	90		100%				
	3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6).	90	90		100%				
		2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	90	90		100%				
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	N/A	N/A		N/A				
		2. Thalweg centering at downstream of meander bend (Glide).	90	90		100%				
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 NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
	Totals				0	0	100%	N/A	N/A	N/A
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	91	91		100%				
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	91	91		100%				
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	91	91		100%				
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	91	91		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.	91	91		100%				

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Pee Dee Stream Restoration Site - Dale Branch
Assessed Length 2,782 feet**

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).			2	375	87%					
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%					
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	120	120			100%					
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	119			119				100%	
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).		119	119			100%					
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run).	N/A	N/A			N/A					
		2. Thalweg centering at downstream of meander bend (Glide).	119	119			100%					
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 <u>NOT</u> include undercuts that are modest, appear sustainable and are providing habitat.					0	0	100%	N/A	N/A	N/A
	3. <u>Mass Wasting</u>	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A		
	Totals				0	0	100%	N/A	N/A	N/A		
3. Engineered Structures	1. <u>Overall Integrity</u>	Structures physically intact with no dislodged boulders or logs.	122	122			N/A					
	2. <u>Grade Control</u>	Grade control structures exhibiting maintenance of grade across the sill.	122	122			N/A					
	2a. <u>Piping</u>	Structures lacking any substantial flow underneath sills or arms.	122	122			N/A					
	3. <u>Bank Protection</u>	Bank erosion within the structures extent of influence does <u>NOT</u> exceed 15%.	122	122			N/A					
	4. <u>Habitat</u>	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	122	122			N/A					

**Table 5 cont'd. Visual Stream Morphology Stability Assessment
Pee Dee Stream Restoration Site - Thompson Branch
Assessed Length 1,596 feet**

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).			2	550	66%			
		2. <u>Degradation</u> - Evidence of downcutting.			0	0	100%			
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate.	50	50			100%			
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6).	50	50					
	4. Thalweg Position	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle).	50	50			100%			
		1. Thalweg centering at upstream of meander bend (Run).	N/A	N/A			N/A			
	2. Thalweg centering at downstream of meander bend (Glide).	50	50			100%				
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 NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collapse.			0	0	100%	N/A	N/A	N/A
	Totals					0	0	100%	N/A	N/A
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	51	51			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	51	51			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	51	51			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does NOT exceed 15%.	51	51			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth Ratio ≥ 1.6. Rootwads/logs providing some cover at base-flow.	51	51			100%			

**Table 6. Vegetation Condition Assessment
Pee Dee Stream Restoration Site
Planted Acreage 21.0**

Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	N/A	0	0.00	0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	Orange Simple Hatch	2	0.50	2%
Totals			2	0.50	2%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	N/A	0	0.00	0%
Cumulative Totals			2	0.50	2%
Easement Acreage 21.0 acres					
Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	Yellow Crosshatch	24	3.12	15%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	N/A	0	0.00	0%

MY4 – 2018 Pee Dee Photo Station Photos



**Jerry Branch – Permanent Photo Station 1
Station 300+25 - Downstream**



**Jerry Branch – Permanent Photo Station 2
Station 305+04 – Upstream**



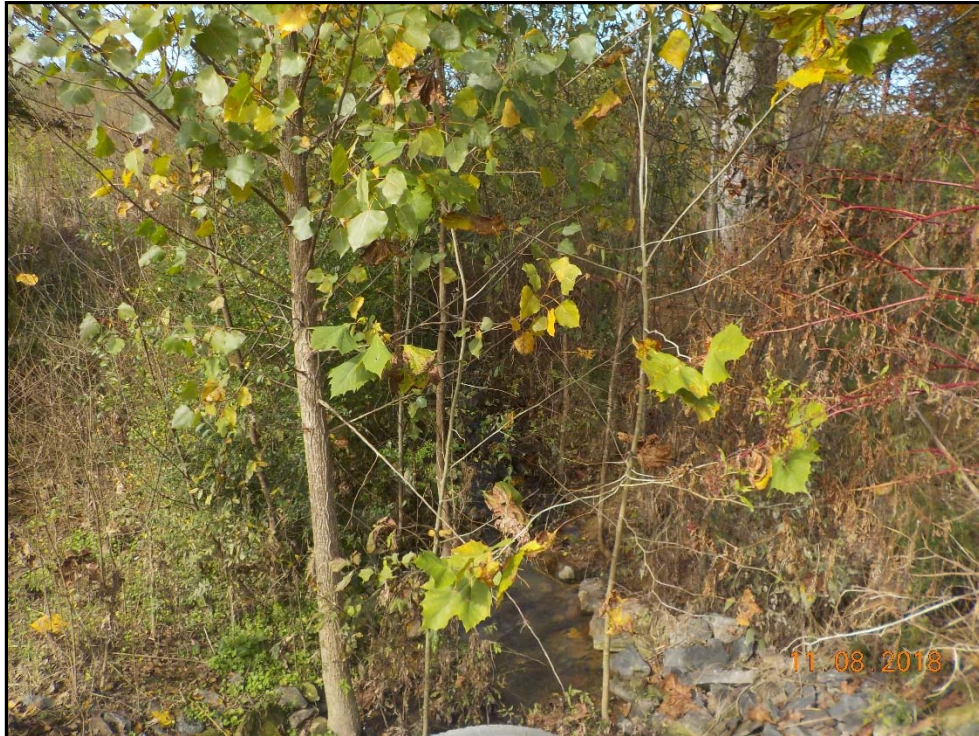
Jerry Branch – Permanent Photo Station 2
Station 305+04 - Downstream



Hudson Branch – Permanent Photo Station 2
Station 305+04 – Looking Upstream from Confluence with Jerry Branch
September 20, 2017



Jerry Branch – Permanent Photo Station 3
Looking North Northwest/Upstream Jerry Branch



Jerry Branch – Permanent Photo Station 4
Station 304+80 – Upstream



Jerry Branch – Permanent Photo Station 4
Station 304+80 – Downstream



Jerry Branch – Permanent Photo Station 5
Station 316+95 – Upstream



Dale Branch – Permanent Photo Station 6
Station 204+15 – Upstream



Dale Branch – Permanent Photo Station 7
Station 205+15 – Upstream



Dale Branch – Permanent Photo Station 8
Station 212+95 – Upstream



Dale Branch – Permanent Photo Station 8
Station 212+95 – Downstream



Dale Branch – Permanent Photo Station 9
Looking North-Northwest – Upstream Dale



Dale Branch – Permanent Photo Station 9
Looking South-Southeast- Downstream



Dale Branch – Permanent Photo Station 10
Looking North-Northeast – Upstream



Dale Branch – Permanent Photo Station 10
Looking South-Southwest – Downstream



Dale Branch – Permanent Photo Station 11
Station 229+20 – Upstream



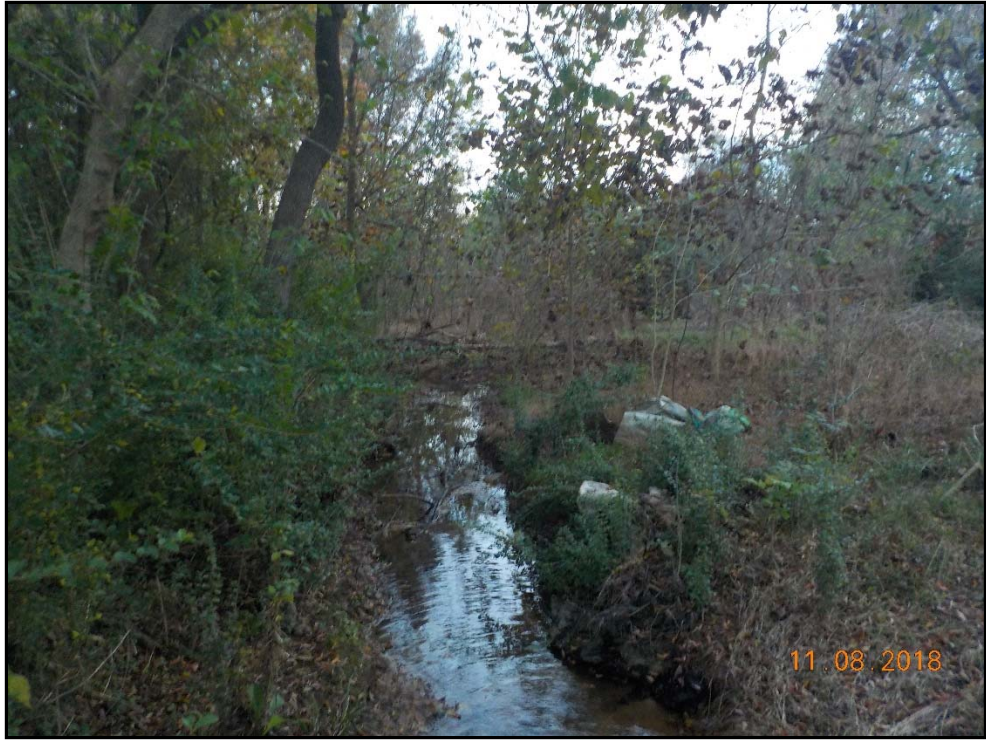
Dale Branch – Permanent Photo Station 11
Station 229+20 – Downstream



Dale Branch – Permanent Photo Station 12
Station 234+25 – Upstream



Dale Branch – Permanent Photo Station 12
Station 234+25 – Downstream



Thompson Branch – Permanent Photo Station 13
Station 101+15 – Downstream



Thompson Branch – Permanent Photo Station 14
Station 105+25 – Upstream



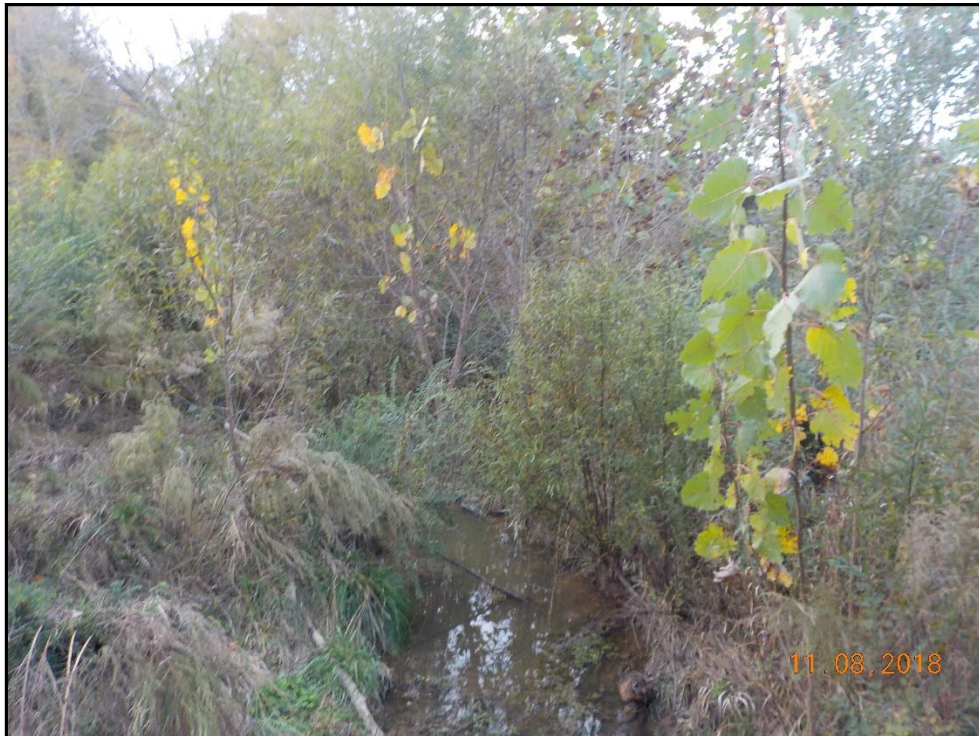
Thompson Branch – Permanent Photo Station 14
Station 105+25 – Downstream



Thompson Branch – Permanent Photo Station 15
Station 115+50 – Upstream



Thompson Branch – Permanent Photo Station 15
Station 111+50 – Downstream



Thompson Branch – Permanent Photo Station 16
Station 115+85 – Upstream

Appendix C
Vegetation Plot Data
(Vegetation plot monitoring not required for MY4)

Appendix D
Stream Geomorphology Data
(Cross section monitoring not required for MY4)

Table 12. Pebble Count Data Summary

Stream Reach	MY1 - 2015		MY2 - 2016		MY3 - 2017		MY4 - 2018		MY5 - 2019		MY6 - 2020		MY7 - 2021	
	Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count		Pebble Count	
	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)	D ₅₀ (mm)	D ₈₄ (mm)
Jerry Branch 1	0.2	34	0.062	5.2	12	58	11	28						
Jerry Branch 2	22	44	5.2	9.6	12	30	22	78						
Jerry Branch 3	20	44	15	51	40	76	12.5	45						
Dale Branch 2	14	45	6.3	32	16	51	24	49						
Dale Branch 3	2.1	13	4.4	30	8	80	9.4	60						
Dale Branch 4	21	44	5	37	14	71	14.9	35						
Dale Branch 5	33	60	16	41	32	69	48	96						
Thompson Branch 2	15	51	20	51	50	95	30	76						

Charts 1-9. MY3 Stream Reach Substrate Composition Charts

Chart 1.

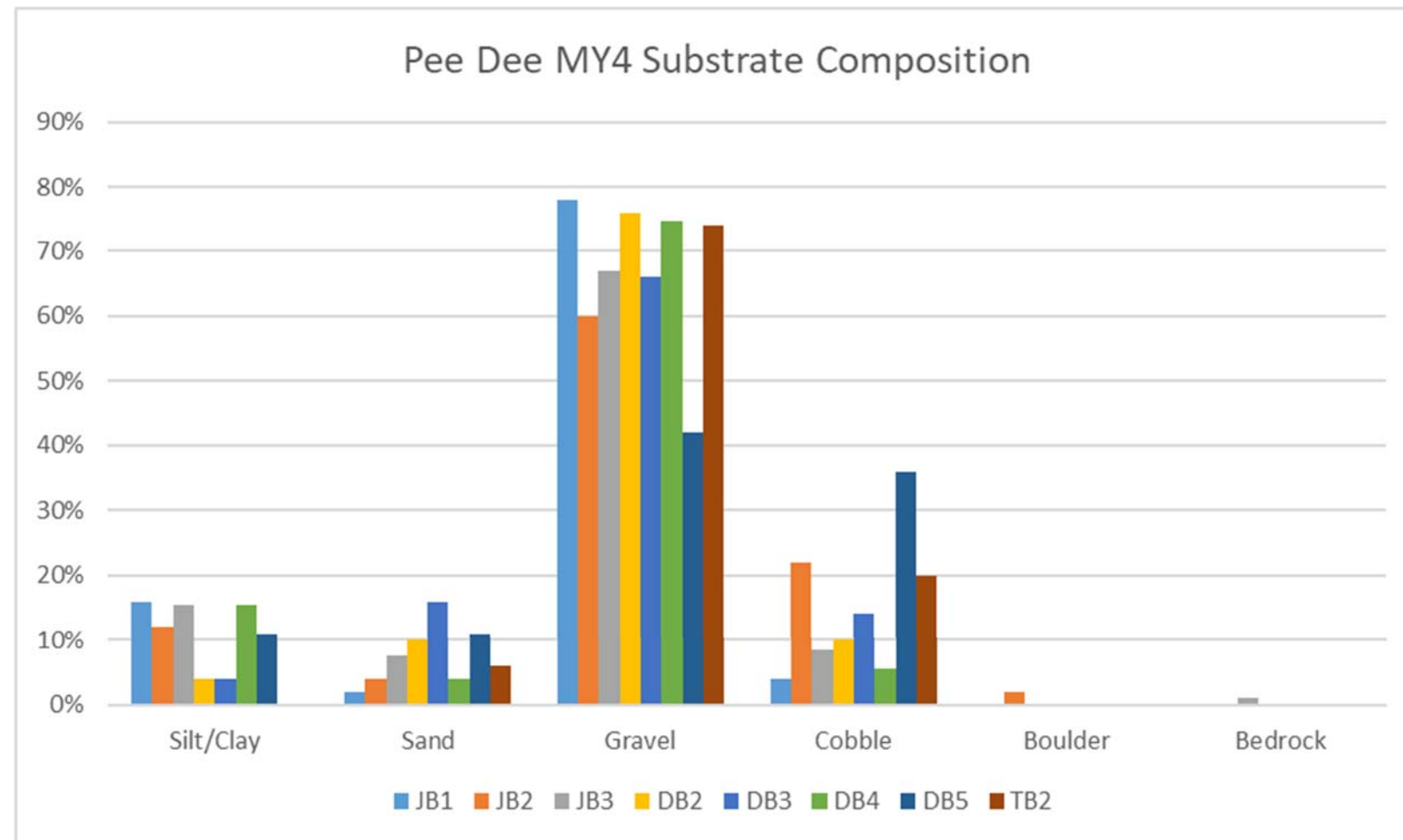


Chart 2.

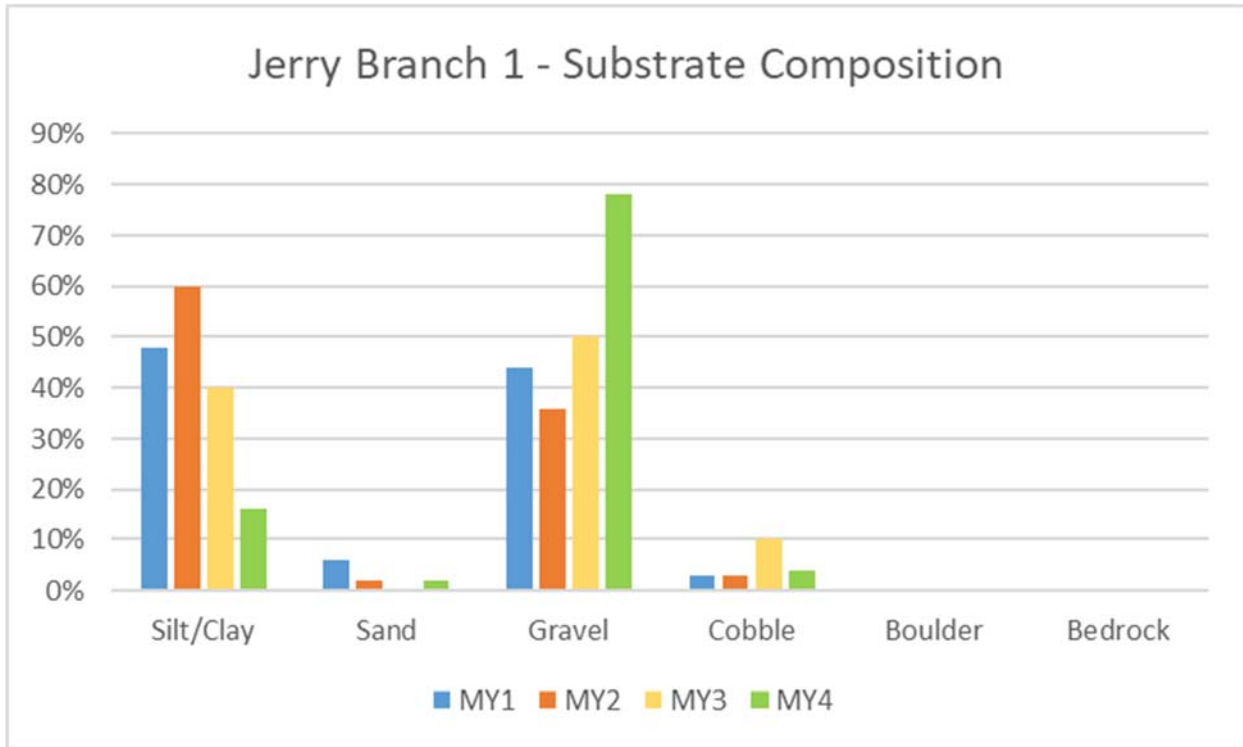


Chart 3.

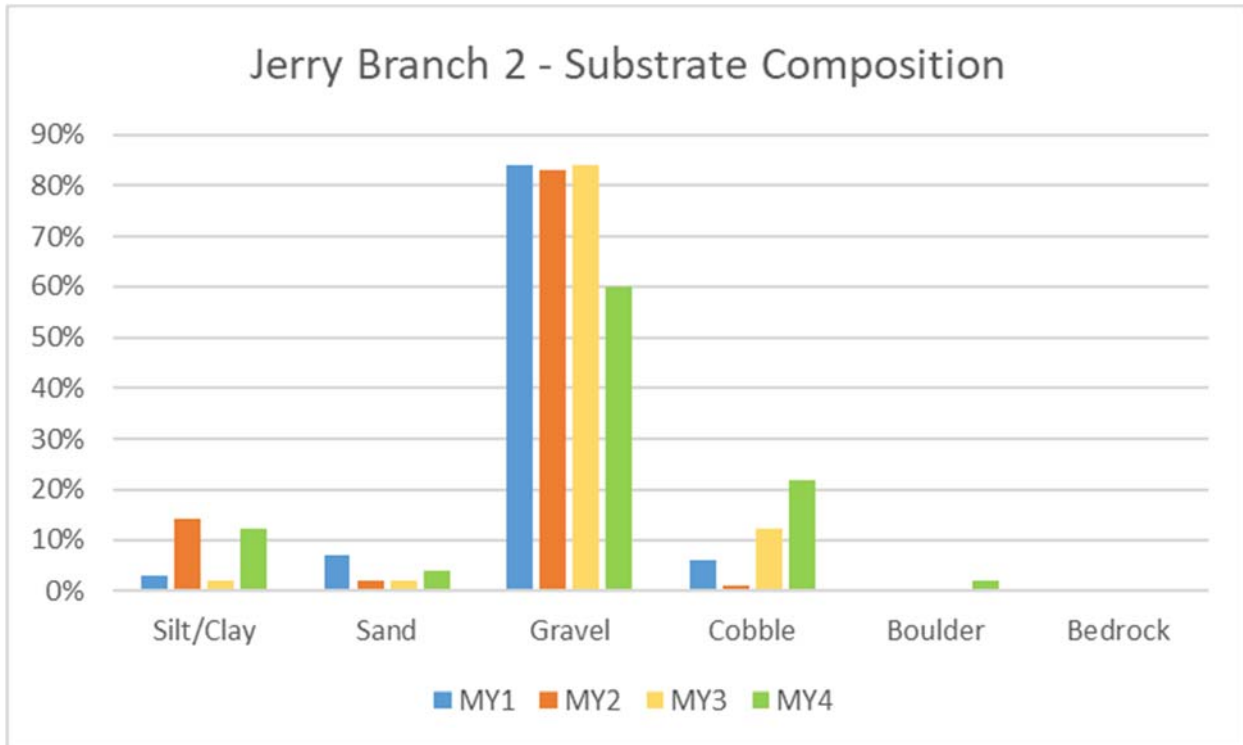


Chart 4.

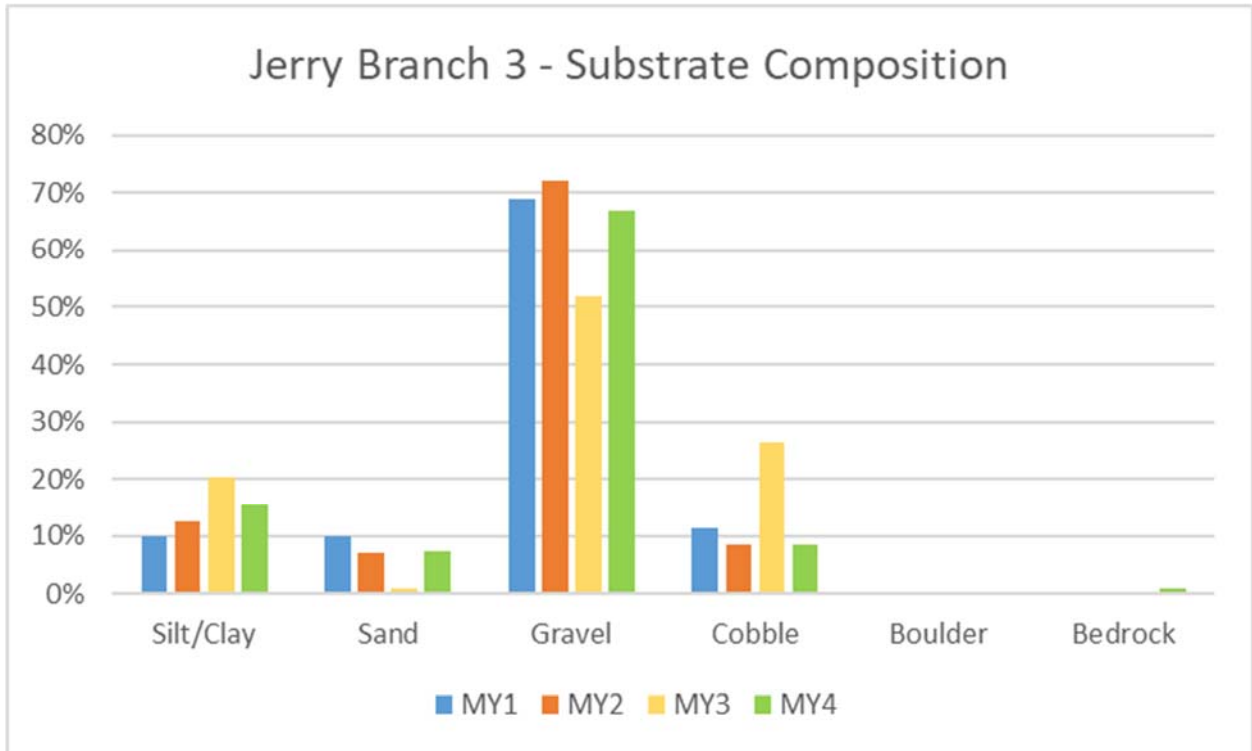


Chart 5.

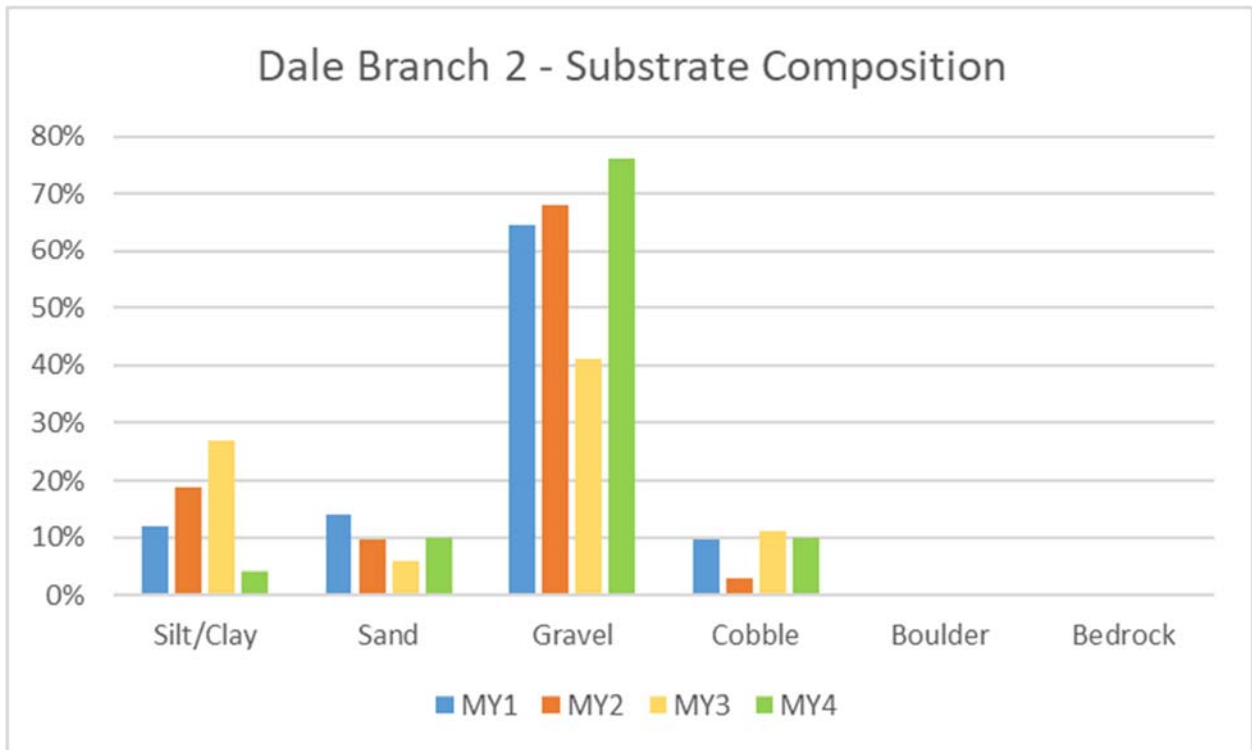


Chart 6.

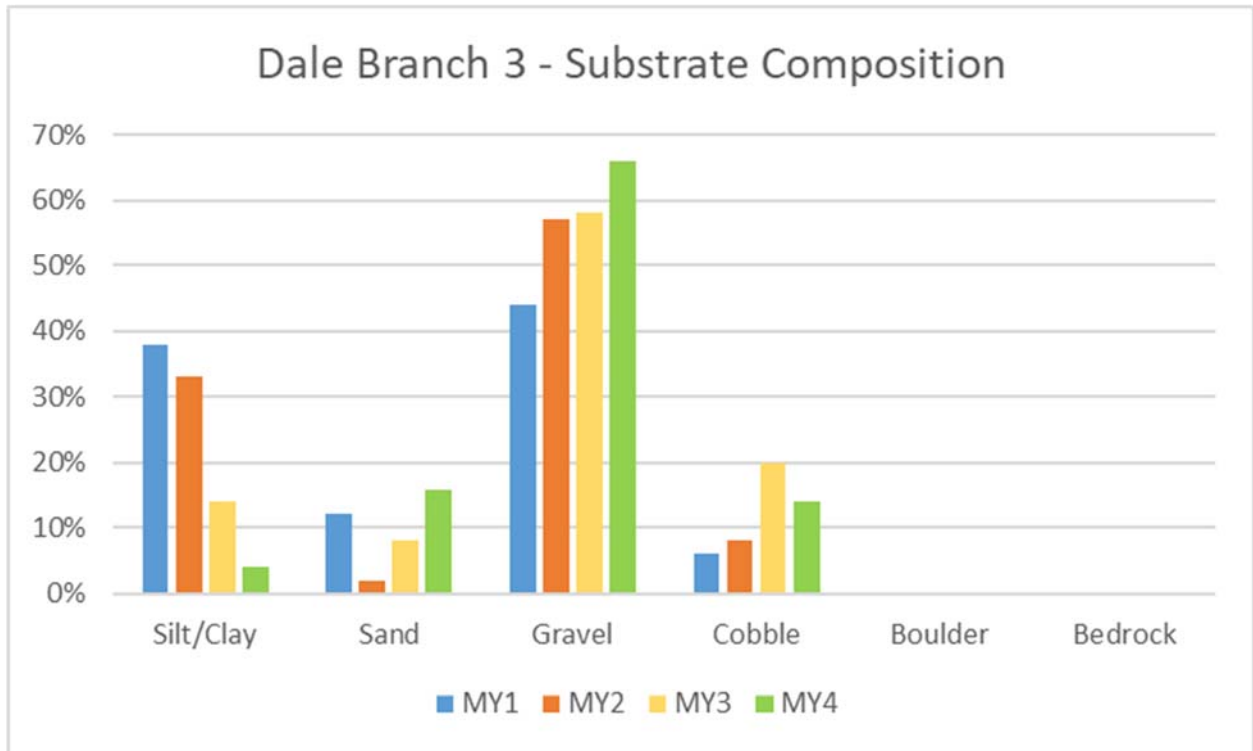


Chart 7.

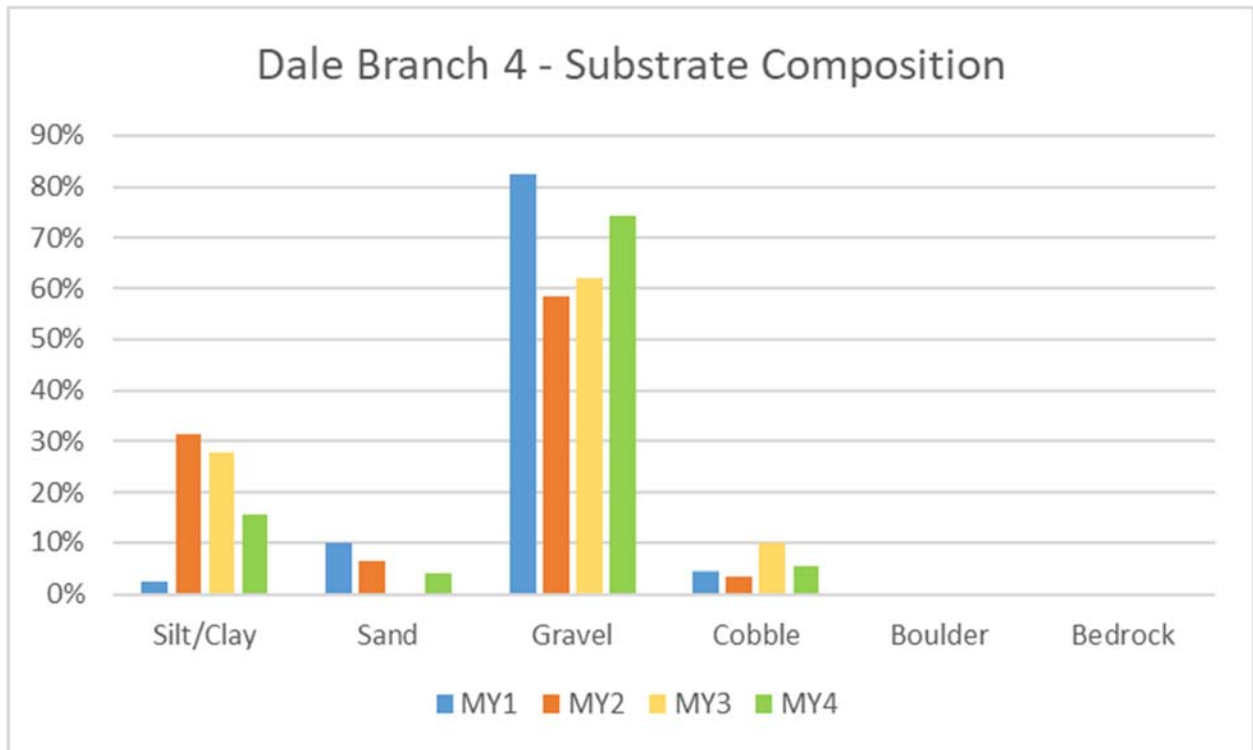


Chart 8.

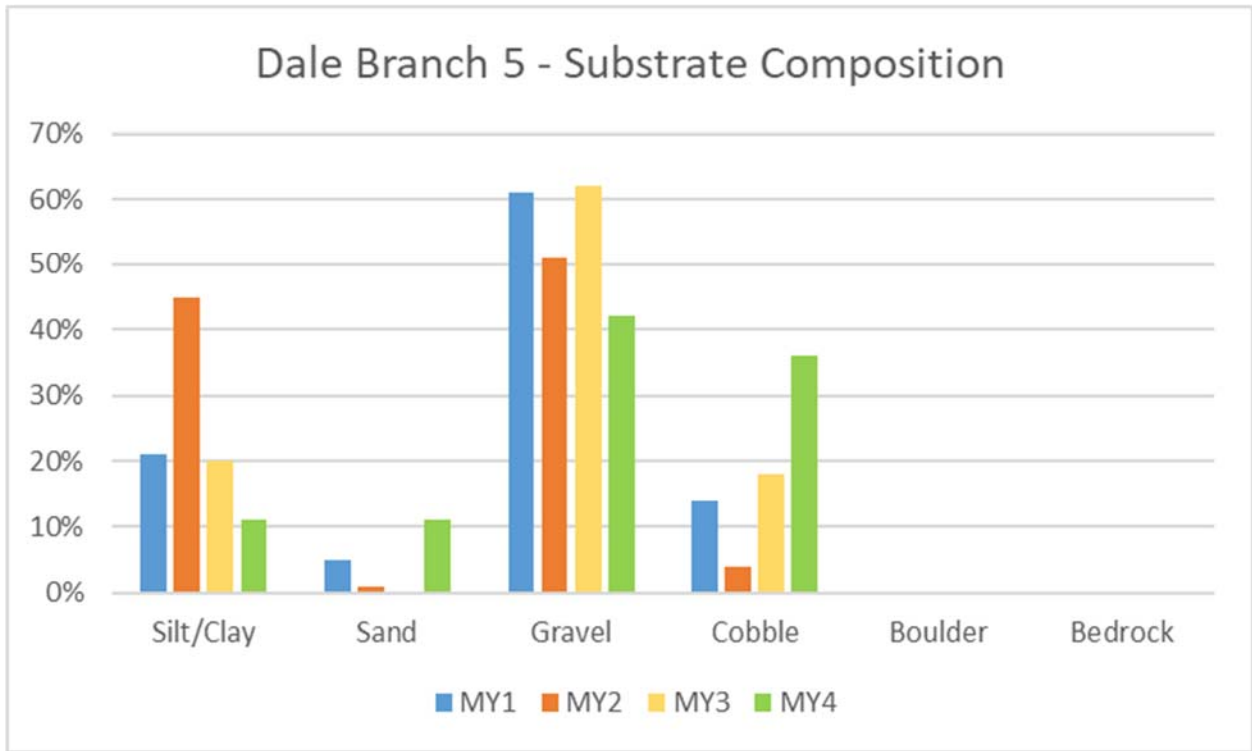


Chart 9.

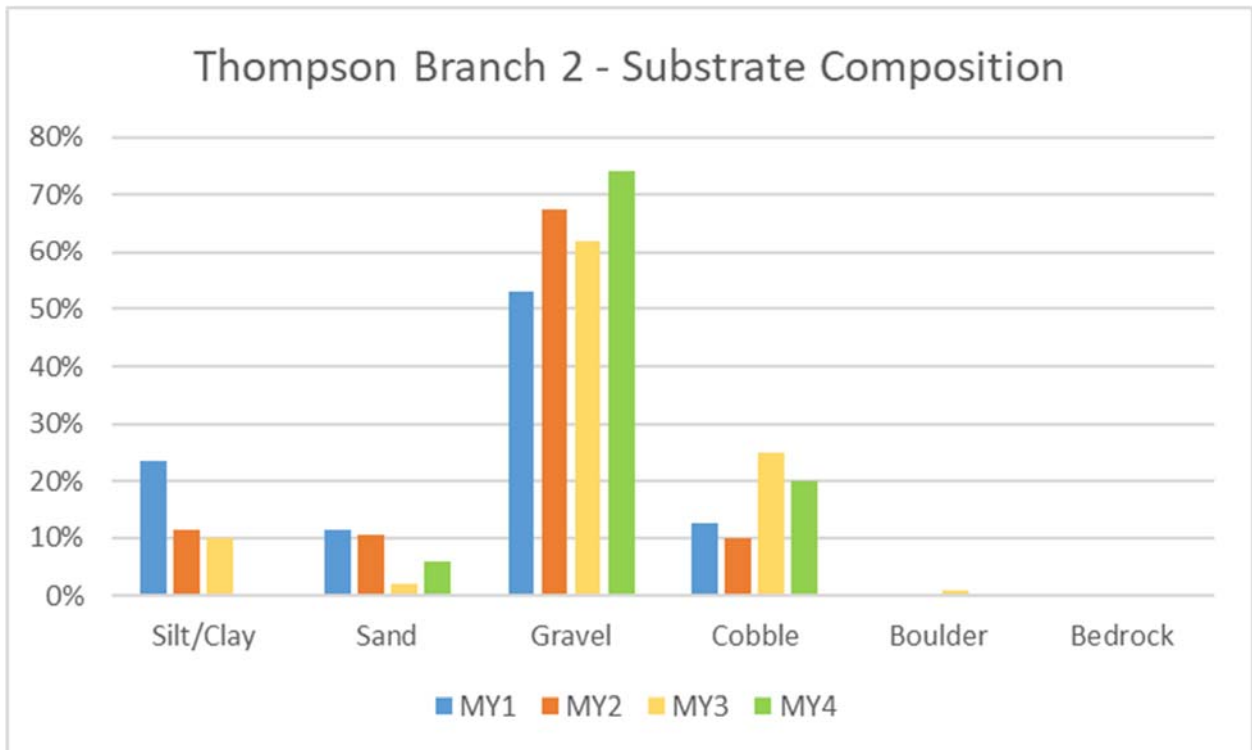


Table 13. Pee Dee Bank Pin Array Summary

Bank Pin Location	Position	Year 1 Reading (mm)	Year 2 Reading (mm)	Year 3 Reading (mm)	Year 4 Reading (mm)
Cross Section 1	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	0.0	0.0	0.0	0.0
	Downstream	0.0	6.35	0.00	0.00
Cross Section 5	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	0.0	0.0	0.0	0.0
	Downstream	0.0	0.0	0.0	0.0
Cross Section 13	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	0.0	0.0	0.0	0.0
	Downstream	0.0	0.0	0.0	0.0
Cross Section 18	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	19.1	0.0	0.0	0.0
	Downstream	0.0	0.0	0.0	0.0
Cross Section 19	Upstream	12.7	0.0	0.0	0.0
	At Cross Section	6.4	19.05	0.0	0.0
	Downstream	0.00	19.05	0.0	0.0
Cross Section 21	Upstream	0.0	0.0	0.0	0.0
	At Cross Section	0.0	0.0	0.0	0.0
	Downstream	0.0	50.8	0.0	0.0

Appendix E

Hydrology Data

Table 14. Verification of Bankfull Events

Reach	Method	Number of Bankfull Events	Maximum Bankfull Height (ft.)
Jerry Branch	Crest Gauge	≥1	0.88
Dale Branch	Crest Gauge	≥3	1.08
Thompson Branch	Crest Gauge	≥1	0.67

Photo Verification of Bankfull Events



Wrack line @ Crest Gauge Jerry Branch – 0.88 ft. (Est. Date of Occurrence: 9/17/2018)



Crest Gauge @ Dale Branch – 1.08 ft. (Est. Date of Occurrence: 9/17/2018)



Wrack line @ Crest Gauge Thompson Branch – 0.67 ft. (Est. Date of Occurrence: 9/17/2018)

Table 15. 2018 Rainfall Summary

Month	Average	Normal Limits		Albemarle Station Precipitation
		30 Percent	70 Percent	
January	4.07	2.74	4.87	3.66
February	3.41	2.47	4.03	2.42
March	4.28	3.05	5.07	2.78
April	3.15	1.86	3.82	5.46
May	3.61	2.54	4.28	3.37
June	4.34	2.56	5.27	3.11
July	4.84	3.08	5.83	5.83
August	4.50	2.89	5.42	5.37
September	4.48	2.26	5.48	12.83
October	3.75	2.19	4.53	6.87
November	3.34	1.98	4.05	8.22
December	3.66	2.52	4.35	8.43
Total	47.43	30.14	57.00	68.35

Appendix F
July 2018 IRT Credit Release Site Visit Memo

MEMORANDUM



302 Jefferson Street, Suite 110

Raleigh, North Carolina 27605

919.209.1052 tel.

919.829.9913 fax

TO: NCIRT; NCDMS

FROM: Ryan Medric - RES

DATE: 7/25/2018

RE: Pee Dee MY3 IRT Credit Release Site Visit

Attendees: Todd Tugwell (USACE), Kim Browning (USACE), Mac Haupt (NCDWR), Paul Wiesner (NCDMS), Melonie Allen (NCDMS), Harry Tsomides (NCDMS), David Godley (RES), Brian Hockett (RES), Ryan Medric (RES)

Site Visit Date: July 12, 2018

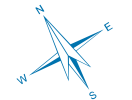
The IRT, DMS, and RES had a site visit at the Pee Dee Stream Restoration Site to discuss credit release. The main topic of discussion was the IRT's concern over the formation of the streams in and above the old ponds on Thompson 1 and Dale 1. Additionally, invasive species were seen throughout the easement. RES will need to continue to heavily treat the invasive species for the rest of the monitoring period. Specific comments and concerns are below.

- Thompson 1 (100+00-102+50): The IRT noted that this reach had a defined flow path but the lack of sorting in the bed material and uniform bedform were characteristic of a stream with less than intermittent flow. It was determined that in order to receive credit on this reach, RES would need to address the issues in the pond bottom below it. 250 feet of Enhancement I credit will be withheld (166.7 SMUs).
- Thompson 1 (102+50-105+50): The stream channel in the pond bottom could not be found. As it has been noted on previous site visits, the cracked soil from the pond bottom drying causes any surface water to quickly drain. It is obvious where the channel picks back up near the old dam location. In order to receive credit on any of Thompson 1, RES will need to submit a Remedial Action Plan to address the channel forming and stream flow issues. 300 feet of Restoration credit will continue to be withheld (300 SMUs).
- Dale 1 (200+00-201+22): The reach above the pond bottom/wetland had better bedform formation and sorting than the reach above the pond on Thompson. The IRT determined that in order to receive credit on this reach, RES would need to install a flow gauge/camera to document intermittent flow. Credits, however, will be withheld: 122 feet Enhancement I (81.3 SMUs).
- Dale 1 (201+22-203+75): This area consists of a wetland that formed in an old pond bottom prior to construction. The stream channel is absent of targeted bedform and riffle/pool sequence in this section. The IRT determined that to receive credits on this reach, RES

would need to develop a Remedial Action Plan to address the channel formation and flow issues. 253 feet of Enhancement I credit will be withheld (168.7 SMUs).

- Dale 2: The IRT suggested that it would be a good idea to install a flow gauge/camera on this reach preferably between XS 8 and 9 in order to help demonstrate at closeout that the reach was obtaining at least intermittent flows.
- Hudson: DMS brought the IRT to this reach to see if they thought it needed a flow gauge. The IRT decided that the reach was short enough that it did not need a flow gauge.

In total the amount of credits that are withheld from Pee Dee are 716.7 SMUs. RES will decide if a Remedial Action Plan is appropriate to address the problems in and above the old pond bottoms as well as add a flow camera above the pond bottom on Dale 1 and in-between XS 8 and 9 on Dale 2.



1 inch = 150 feet

**Pee Dee Stream
Restoration Project**

**MY3 2017
Credit Release Map**

Date: 7/16/2018

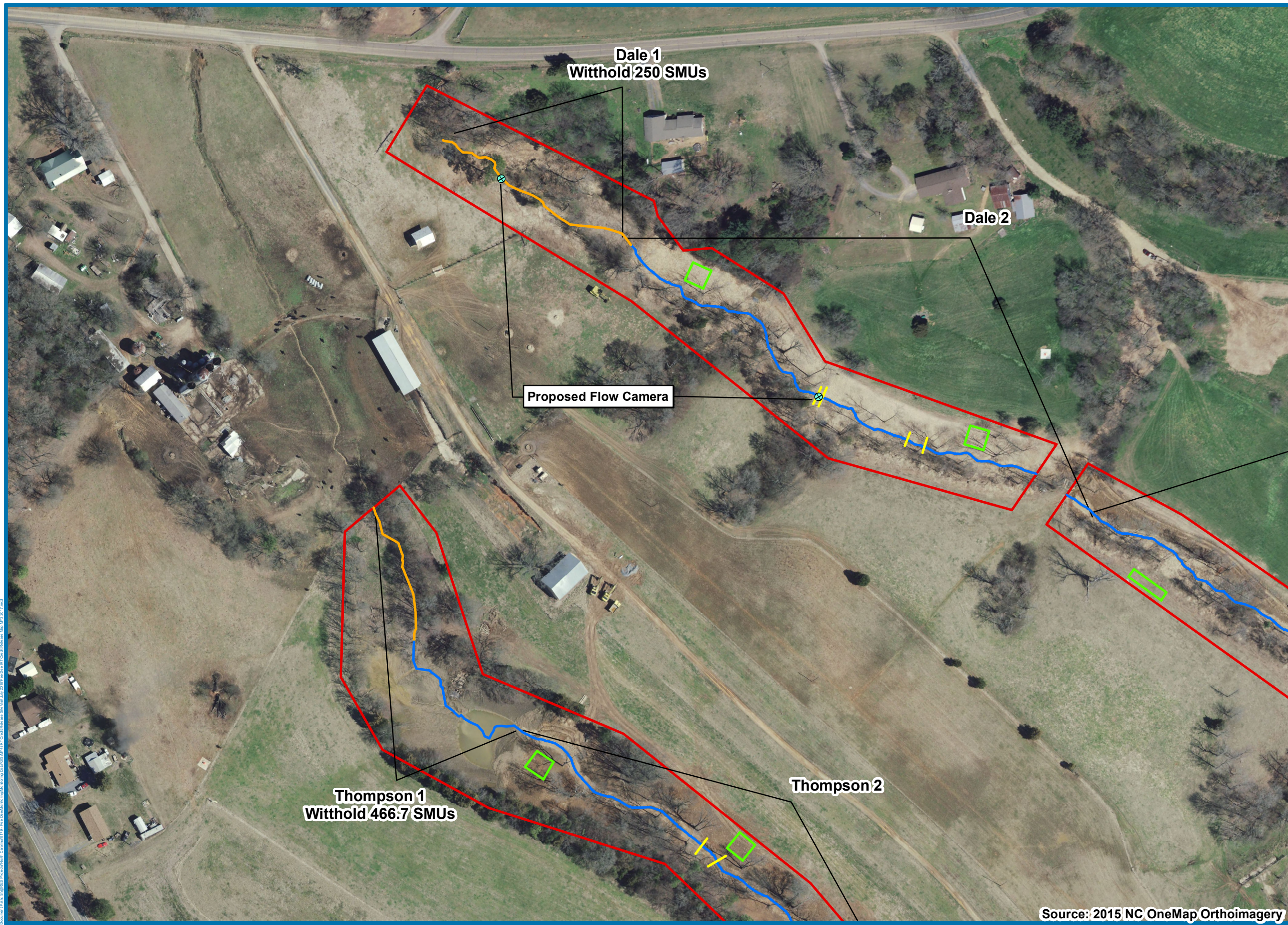
Drawn by: RTM

LEGEND

- ▭ Conservation Easement
- ⊕ Crest Gauge
- ⊕ Proposed Flow Camera
- ⊙ Rain Gauge
- Cross Section
- Restoration
- Enhancement I
- ▭ Vegetation Plot

Riparian Buffer Conditions

Invasive Species	Target Community		
	Present	Marginal	Absent
Absent	No Fill		
Present			
Common			



Source: 2015 NC OneMap Orthoimagery

Document Path: S:\BIBS\Projects\North Carolina\0175 - Pee Dee\Monitoring\Monitoring Data\2017\2017 Credit Release Map\2017.mxd