MONITORING YEAR 2 ANNUAL BUFFER REPORT

FINAL

DRY CREEK MITIGATION SITE

Durham County, NC
NCDEQ Contract No. 6827
DMS ID No. 97082
NCDWR Project No. 2016-0369
RFP No. 16-006477

Neuse River Basin
HUC 03020201

Data Collection Period: September 2021
Draft Submission Date: November 3, 2021
Final Submission Date: November 19, 2021

PREPARED FOR:

NC Department of Environmental Quality
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

November 19, 2021

Lindsay Crocker
NC Department of Environmental Quality, Division of Mitigation Services
217 W. Jones Street, Suite 3000
Raleigh, NC 27609-1652

Subject: DMS Comments on Dry Creek MY2
Dry Creek, Project ID #97082, DMS Contract #6827

Dear Ms. Crocker,

We have reviewed the comments on the MY1 Report for the above referenced project dated November 18, 2021 and have revised the report based on these comments. The revised documents are submitted with this letter. Below are responses to each of your comments. For your convenience, the comments are reprinted with our response in italics.

Report Comments:

1. In future reports, you may omit the substrate monitoring per IRT/DMS clarification.
   This is noted for future monitoring reports.

2. The mortality between MY1 and 2 on parts of the project and lack of species diversity needs to be considered. It is understood that Wildlands believes that volunteers matching planted species will result in all plots being considered successful for the stream credit. The riparian buffer credit success requirement can be satisfied with appropriate volunteers currently in MY2. Please consider that in the narrative in the Monitoring Year 2 summary of the buffer report. Please also consider that DWR expects the site to have a minimum of four native hardwood and many of your plots are showing 3 species. This was discussed at length in the field and DMS understands that Wildlands is planning to look closely at this in MY3.
   The lack of species diversity will be assessed in future monitoring years.

Digital Comments:

1. Please submit the CVS mdb associated with the MY2 veg data for stream and buffer.
   The CVS mdb is now submitted with the final digital files.

2. Note that the total % stable performing as intended in Table 5a is listed as 99%, but it should be 100% based on the reported values.
   Table 5 has been updated.

If you have any questions, please contact me by phone (919) 851-9986, or by email (jlorch@wildlandseng.com).

Sincerely,

Jason Lorch, *Monitoring Coordinator*

PREPARED BY:

Wildlands Engineering, Inc.
312 West Millbrook Road, Suite 225
Raleigh, NC 27609

Jason Lorch
jlorch@wildlandseng.com
Phone: (919) 851-9986

DRY CREEK MITIGATION SITE

Monitoring Year 2 Report

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APPENDICES

Section 1: PROJECT OVERVIEW

1.1 Project Summary

Wildlands Engineering, Inc. (Wildlands) implemented a full delivery project at the Dry Creek Mitigation Site (Site) for the North Carolina Department of Environmental Quality Division of Mitigation Services (DMS) to restore a total of 9,811 linear feet of perennial and intermittent streams in Durham County, NC. The Site included the restoration of Dry Creek and seven unnamed tributaries. The Site also restored, enhanced, and preserved a total of 29.764 acres (1,209,399.84 ft^2) of riparian buffer at the Site, which will provide Riparian Buffer Credits and Nutrient Offset Credits. The Site is located approximately three miles northwest of Butner, NC and approximately 2 miles west of the Granville County/Durham County line (Figure 1) in the Neuse River Basin 8-Digit Hydrologic Unit Code (HUC) 03020201. The Site is located within a DMS targeted watershed for the Neuse River Basin HUC 03020201010050 and NC Division of Water Resources (NCDWR) Subbasin 03-04-01. The Site contains Dry Creek and eight unnamed tributaries (UT1-UT7; UT1a) which flow to Lake Michie on the Flat River and then into Falls Lake. The Flat River is classified as Water Supply Waters (WS-III), Nutrient Sensitive Waters (NSW). The downstream drainage area of the Site is 807 acres.

Prior to stream construction, the Site was a mix of active pastures, fields, and woodlands. Two in-line ponds were removed as part of the stream restoration, one on UT1 Reach 2 and one on Dry Creek Reach 1. Additionally, two other off-line ponds near UT1 were removed.

Work at the Site was planned, designed, and constructed per the Dry Creek Mitigation Plan (Wildlands, 2018) and the Consolidated Buffer Mitigation Rule (15A NCAC 02B .0295). The purpose of the riparian buffer restoration is to provide riparian buffer credits to compensate for buffer impacts within the HUC 03020201 and the Falls Lake Watershed. The service area for the Riparian Buffer Credits is depicted in Figure 2. The mitigation credits generated from the Site are listed in Tables 1a and 1b and shown in Figure 3.

1.2 Project Goals and Objectives

The major goals of the buffer restoration project are to provide ecological and water quality enhancements to the Neuse River Basin within the Falls Lake Water Supply Watershed by creating a functional riparian corridor and restoring the riparian buffer. This project supports specific goals identified in the 2010 Neuse River Basin Restoration Priorities Plan (RBRP) for the Neuse River Targeted Local Watershed. This document highlights the importance of riparian buffers for stream restoration projects. Riparian buffers immobilize and retain nutrients and suspended sediment. The RBRP also supports the Falls Lake Watershed Plan. Specific enhancements to water quality and ecological processes are outlined below:

- Decrease nutrient levels - Nutrient input will be decreased by filtering runoff from the agricultural fields through restored native buffer zones. The off-site nutrient input will also be absorbed on-site by dispersing flood flows through native vegetation, thereby reducing nutrient inputs to waters of the Neuse River Basin.
- Exclude cattle from project streams - Install fencing around project areas adjacent to cattle pastures.
- Decrease water temperature and increase dissolved oxygen concentrations - Establishment and maintenance of riparian buffers will create additional long-term shading of the channel reducing thermal pollution.
- Restore and enhance native floodplain vegetation - Plant native tree species in riparian zone where currently insufficient.

- Permanently protect the Site from harmful uses - Establish a conservation easement on the Site to protect aquatic habitat and the receiving Water Supply Waters.

The 29.764-acre Site is protected with a permanent conservation easement. Of the protected area, Neuse Riparian Buffer Credits were generated by restoring 8.02 acres; preserving 14.28 acres; and enhancing 3.57 acres. The remaining protected 3.89 acres will not generate buffer mitigation credit. In general, riparian buffer restoration area widths on streams extend out to 200 feet from top of bank for Neuse River Riparian Buffer Credits. There is also potential to convert some buffer credits to nutrient offset credits, dependent on the need. Figure 3 details the buffer credit generation.

1.3 Monitoring Year 2 Data Assessment

The Mitigation Plan (Wildlands, 2018) was submitted and accepted by DMS in October 2018. Construction activities were performed by Land Mechanic Designs, Inc. and planting by Bruton Natural Systems, Inc. were completed in April 2020. The baseline as-built survey (MY0) was completed by Kee Mapping and Surveying in July 2020. Monitoring during Monitoring Year 1 (MY1) was conducted to assess the condition of the vegetation in November 2020. Refer to Appendix 1 for detailed Project Activity and Reporting History, Project Contact Table, and Project Information and Attributes.

Vegetative performance for buffer restoration areas will be in accordance with 15A NCAC 02B .0295(n)(2)(B) and (n)(4) (effective November 1, 2015). To meet success criteria, areas generating Neuse River Riparian Buffer Credits shall include a minimum of four native hardwood tree species, where no one species comprises greater than 50 percent of the stems, and shall have a survival of at least 260 planted stems per acre at the end of the required five-year monitoring period . For the monitoring to be complete and buffer credits to be awarded, NCDWR must provide written approval of successful revegetation of buffer restoration areas.

1.3.1 Vegetative Assessment

The quantity of monitoring vegetation plots was determined in accordance with the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008) such that at least 2 percent of the Site is encompassed in monitoring plots. A total of seven vegetation plots were established within the conservation easement boundaries which were at least five feet from the tops of stream banks. The plot corners have been marked and are recoverable either through field identification or with the use of a GPS unit. Reference photographs are taken at the origin looking diagonally across the plot to the opposite corner on an annual basis. Trees will be marked annually with flagging tape. Species composition, vigor, height, density, and survival rates will be evaluated by plot on an annual basis. The extent of invasive species coverage will also be monitored and controlled, as necessary.

The 2021 annual vegetation monitoring resulted in an average survivability of 324 planted stems per acre. This is greater than the final requirement of 260 stems per acre, but approximately 40% less than the MY0 density recorded (538 planted stems per acre) in April 2020. When including volunteers, the average stem density increased to 451 total stems per acre. The average number of stems per plot for MY2 was 8, compared to 13 stems per plots from MY0. Of the 7 vegetation plots, 4 plots are on track to meet the final success criteria required for MY5. Vegetation plots (VP) 5, 6, and 7 are not on track to meet the final success criteria of 260 planted stems per acre. However, vegetation plots 6 and 7 have sycamore (*Platanus occidentalis*) volunteers increasing the total stems per acre from 202 to 283 stems per acre (VP 6) and 243 to 607 stems per acre (VP 7); meeting the final success criteria of 260 stems per acre. Vegetation plot 5 missed the final success criteria by one planted stem. The surrounding area was visually assessed but was determined the average stem density was appropriate for MY2. Due to the high number of volunteers already germinating throughout the Site, no remedial action is needed at this

time. These vegetation plots will continue to be monitored to determine if remedial action is warranted. Overall, the Site is on track to meet its final success criteria. Refer to Appendix 3 for Vegetation Plot Criteria Attainment Data, CVS Vegetation Plot Metadata, and Planted and Total Stem Counts and Appendix 2 for Vegetation Plot Photographs, Vegetation Condition Assessment Table, and Monitoring Plan View Map.

1.3.2 Vegetation Areas of Concern

No vegetation areas of concern were identified during MY2.

1.4 Monitoring Year 2 Summary

Of the 7 vegetation plots, 4 are on track to meet the final success requirement of 260 planted stems per acre. Out of the three vegetation plots that did not meet criteria, two are on track to meet final criteria with desirable volunteer species, while one is an outlier to surrounding areas. Volunteer species are expected to continue to populate the Site due to the mature forest adjacent to the project. No remedial action will be taken at this time. Summary information/data related to the 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 Mitigation Plan (Wildlands, 2018) available on DMS's website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

Section 2: METHODOLOGY

Planted woody vegetation was monitored in accordance with the guidelines and procedures developed by the Carolina Vegetation Survey-EEP Level 2 Protocol (Lee et al., 2008). A total of seven 100 square meter vegetation plots were established within the Site conservation easement area.

Section 3: REFERENCES

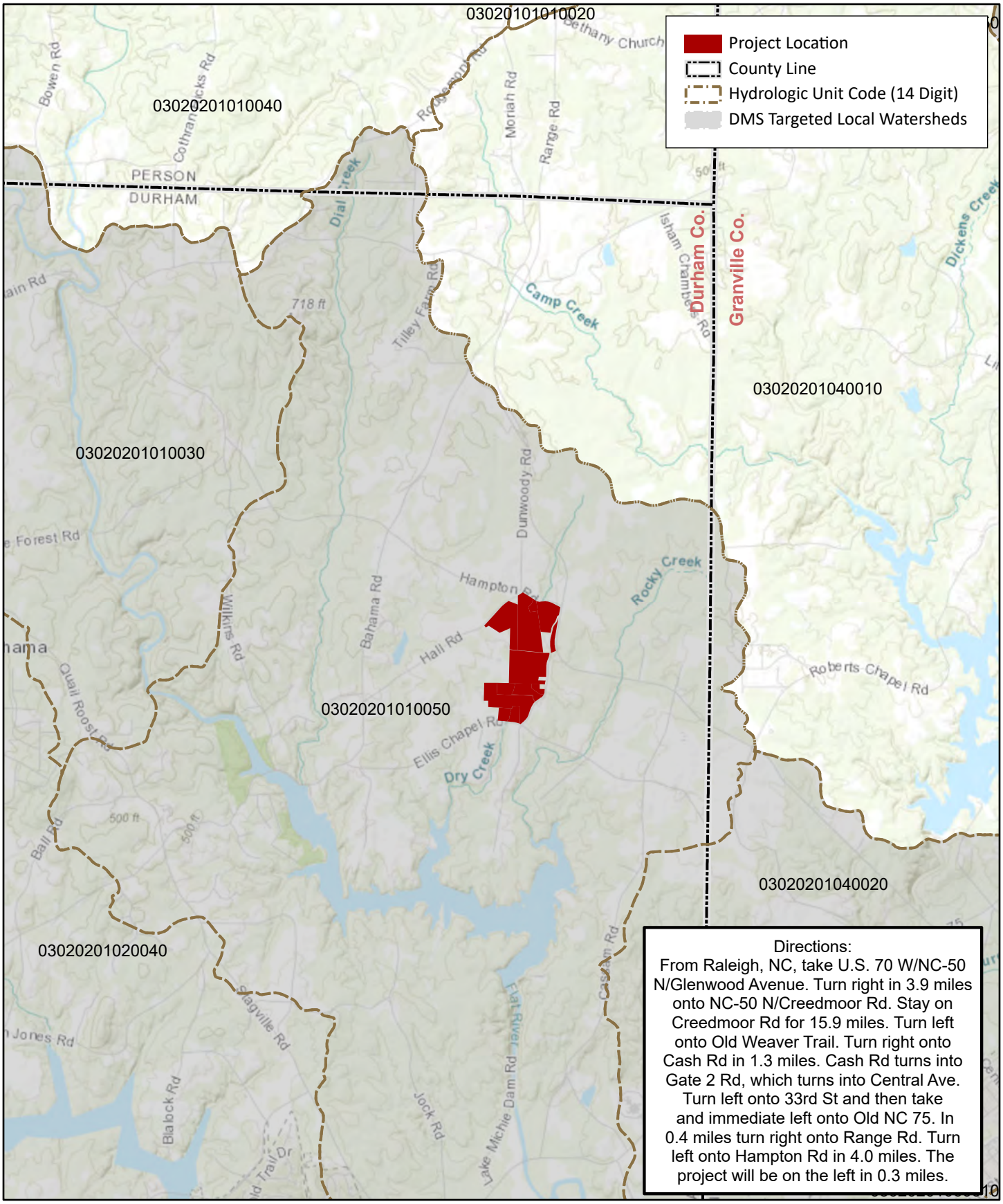
Breeding, R. 2010. Neuse River Basin Restoration Priorities. North Carolina Ecosystem Enhancement Program.

Lee, Michael T. Peet, Robert K., Steven D. Wentworth, Thomas R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2.

North Carolina Department of Environmental Quality, Division of Mitigation Services (NCDMS), 2017. Riparian Buffer and Nutrient Offset Buffer Baseline and Annual Monitoring Report Template version 2.0

Wildlands Engineering, Inc. (2018). Dry Creek Mitigation Site – Riparian Buffer Mitigation Plan. North Carolina Department of Environmental Quality, Division of Mitigation Services (NCDMS), Raleigh, NC.

APPENDIX 1. General Figures and Tables



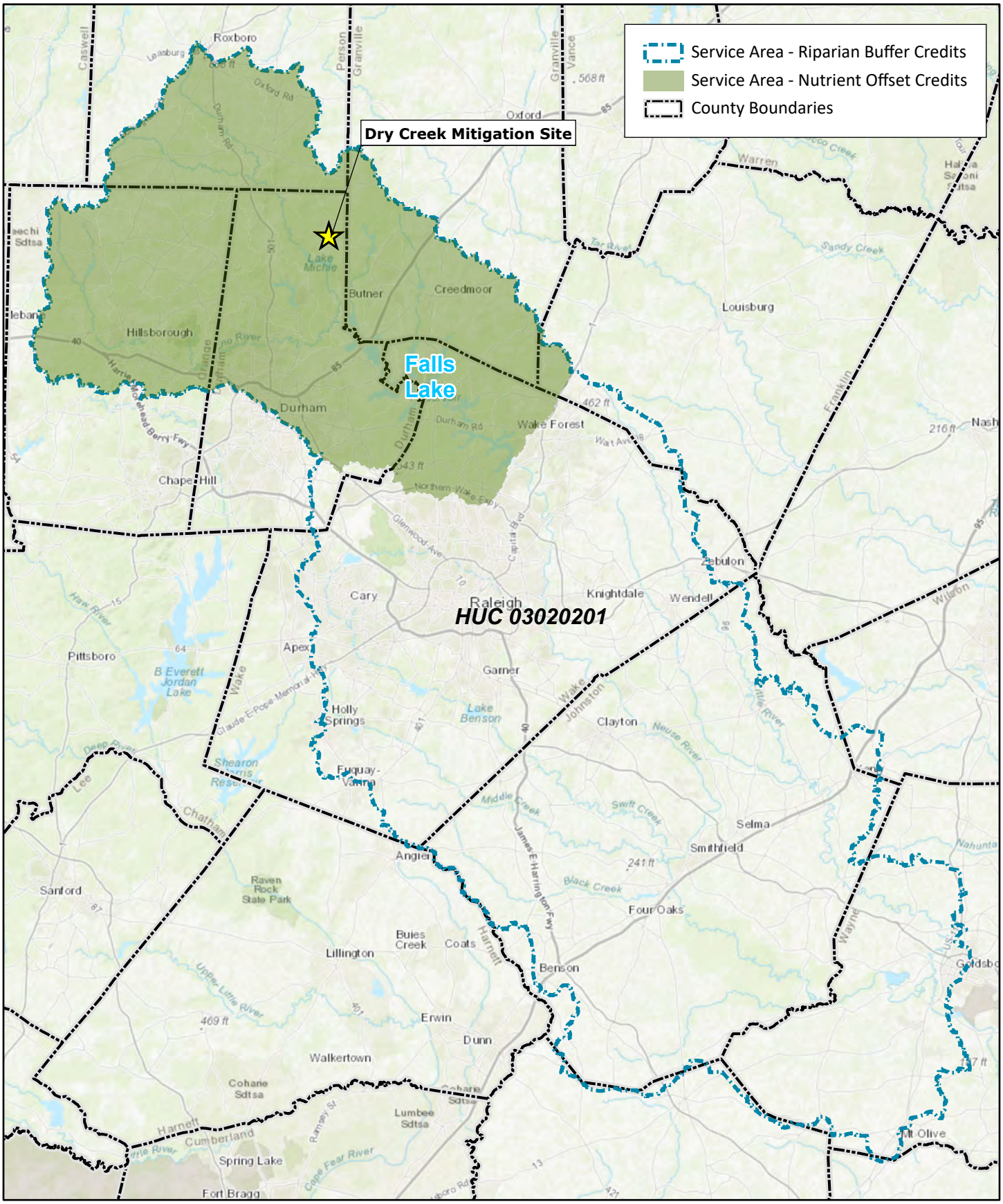
WILDLANDS ENGINEERING

0 0.5 1 Miles

N

Figure 1. Project Vicinity Map
Dry Creek Mitigation Site
Monitoring Year 2 Report (MY2)
Neuse River Basin (03020201)

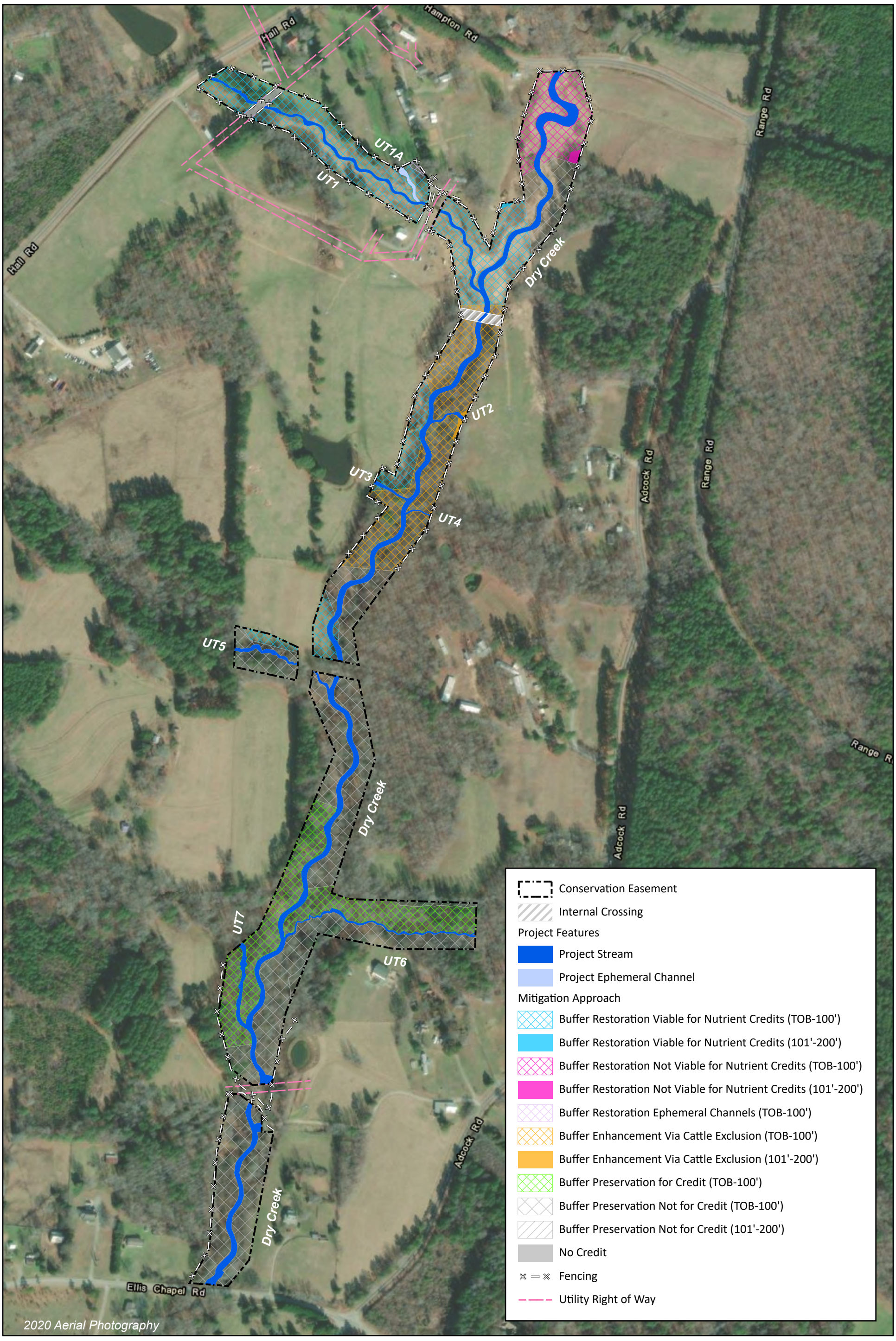
Durham County, NC



WILDLANDS ENGINEERING

Figure 2. Service Area Map
Dry Creek Mitigation Site
Monitoring Year 2 Report (MY2)
Neuse River Basin (03020201)

Durham County, NC



WILDLANDS ENGINEERING

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N

Figure 3. Project Component / Asset Map
Dry Creek Mitigation Site
Monitoring Year 2 Report (MY2)
Neuse River Basin (03020201)
Durham County, NC

Table 1a. Buffer Project Area and Assets: Riparian Buffer Credits

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

Location	Jurisdictional Streams	Restoration Type	Feature Type	Reach ID / Component	Buffer Width (ft)	Creditable Area (ac)*	Creditable Area (sf)*	Eligible Credit Area (ac)**	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits (BMU)	Riparian Buffer Credits (ac)
Rural	Subject	Restoration	I/P	Dry Creek, UT1, UT3, UT5	0-100	7.93	345,454.00	7.93	1	1	1	345,454.00	7.93
	Subject		I/P	Dry Creek, UT1, UT3, UT5	101-200	0.06	2,516.00	0.06	1	0.33	3.03	830.36	0.02
	Not Subject		Ephemeral Channel	UT1a	0-100	0.03	1,489.00	0.03	1	1	1	1,489.00	0.03
	Subject		Ephemeral Channel	UT1a	101-201	0	0.00	0.00	1	0.33	3.03	0.00	0.00
Rural	Subject	Enhancement via Cattle Exclusion	I/P	Dry Creek, UT3, UT4	0-100	3.53	153,970.00	3.53	2	0.75	2	76,985.00	1.77
				Dry Creek, UT3, UT4	101-200	0.04	1,692.00	0.04	2	0.33	6.06	279.21	0.01
Rural	Subject	Preservation	I/P	Dry Creek	0-100	14.04	611,691.00	3.87	10	1	10	16,837.37	0.39
Rural	Subject	Preservation		Dry Creek	101-200	0.24	10,342.00	0.00	10	0.33	30.3	0.00	0.00
											Total:	**441,874.94**	10.15

* Preservation creditable area is over 25% of the total mitigation area, therefore the eligible creditable area has been reduced to 25% of the total creditable mitigation area. With that adjustment, the Site is in compliance with 15A NCAC 02B 0.0295(o)(5) which limits preservation mitigation area to no more than 25% of total mitigated area.

** Creditable area on ephemeral channels is <1% of the total eligible mitigation area and is therefore in compliance with 15A NCAC 02B 0.0295(o)(7) without any adjustments.

Table 1b. Buffer Project Area and Assets: Nutrient Offset Credits

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

Location	Jurisdictional Streams	Restoration Type	Reach ID / Component	Buffer Width (ft)	Creditable Area (ac)*	Creditable Area (sf)*	Eligible Credit Area (ac)**	Convertible to Nutrient offset (Yes or No)	Nutrient Offset: N (lbs)	Nutrient Offset: P (lbs)
Rural	Subject	Restoration	Dry Creek, UT1, UT3, UT5	0-100	6.36	277,068.00	6.36	Yes	14460.75	932.89
				101-200	0.01	647.00	0.01	Yes	33.77	2.18
			Dry Creek Fescue Lawn	0-100	1.57	68,386.00	1.57	No	0.00	0.00
				101-200	0.04	1,869.00	0.04	No	0.00	0.00
			UT1a	0-100	0.03	1,489.00	0.03	Yes	93.37	5.01
				101-200	0	0.00	0	Yes	0.00	0.00
Rural	Subject	Enhancement via Cattle Exclusion	Dry Creek, UT3, UT4	0-100	3.53	153,970.00	3.53	No	0.00	0.00
				101-200	0.04	1,692.00	0.04	No	0.00	0.00
Rural	Subject	Preservation	Dry Creek	0-100	14.04	611,691.00	3.87	No	0.00	0.00
				101-200	0.024	10,342.00	0	No	0.00	0.00
								Total:	**14,587.89**	**940.08**

*The above creditable areas all meet the 50-foot minimum width for buffer or nutrient credit sales.

** Impacts that occur in the watershed of Falls Lake in the upper Neuse River Basin may be offset only by load reductions in the same watershed; 15A NCAC 02B .0282 (2) (Figure 2).

Table 2. Project Activity and Reporting History

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

Activity or Report	Data Collection Complete	Completion or Scheduled Delivery
Mitigation Plan	October 2018	October 2018
Final Design - Construction Plans	November 2019	April 2019
Construction	October 2019-April 2020	April 2020
Temporary S&E mix applied to entire project area[1]	October 2019-April 2020	April 2020
Permanent seed mix applied to reach/segments[1]	October 2019-April 2020	April 2020
Bare root and live stake plantings for reach/segments	April 2020	April 24, 2020
Baseline Monitoring Document (Year 0)	April 27, 2020	August 2020
Year 1 Monitoring	November 4, 2020	December 2020
Year 2 Monitoring	September 16, 2021	December 2021
Year 3 Monitoring	2022	December 2022
Year 4 Monitoring	2023	December 2023
Year 5 Monitoring	2024	December 2024

[1]Seed and mulch is added as each section of construction is completed.

Table 3. Project Contact Table

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

Designer Nicole Macaluso, PE	**Wildlands Engineering, Inc.** 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986
Planting Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seeding Contractor	**Land Mechanic Designs, Inc.** 126 Circle G Lane Willow Spring, NC 27592
Seed Mix Sources	**Garrett Wildflower Seed Company**
Nursery Stock Suppliers **Bare Roots**	**Dykes and Sons Nursery and Greenhouse**
Live Stakes	**Bruton Natural Systems, Inc**
Monitoring Performers Monitoring POC	**Wildlands Engineering, Inc.** Jason Lorch 919.851.9986, ext. 107

Table 4. Project Information and Attributes

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

PROJECT INFORMATION	
Project Name	Dry Creek Mitigation Site
County	Durham County
Project Area (acres)	29.764
Planted Area (acres)	14.04
Project Coordinates (latitude and longitude)	36° 11' 07.92" N, 78° 49' 39.00" W
PROJECT WATERSHED SUMMARY INFORMATION	
Physiographic Province	Carolina Slate Belt of the Piedmont Physiographic Province
River Basin	Neuse River
USGS Hydrologic Unit 8-digit	03020201
USGS Hydrologic Unit 14-digit	3020201010050
DWR Sub-basin	03-04-01
Project Drainage Area (acres)	807
Project Drainage Area Percentage of Impervious Area	<1%
CGIA Land Use Classification	50% Forested, 40% Cultivated, 9% Residential Area

Table 5. Adjacent Forested Areas Existing Tree and Shrub Species

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

Common Name	Scientific Name	Wetland Indicator Status
Red Maple	*Acer rubrum*	FAC
Green Ash	*Fraxinus pennsylvanica*	FACW
Sweet Gum	*Liquidambar styraciflua*	FAC
River Birch	*Betula nigra*	FACW
Northern Red Oak	*Quercus rubra*	FACU
White Oak	*Quercus alba*	FACU

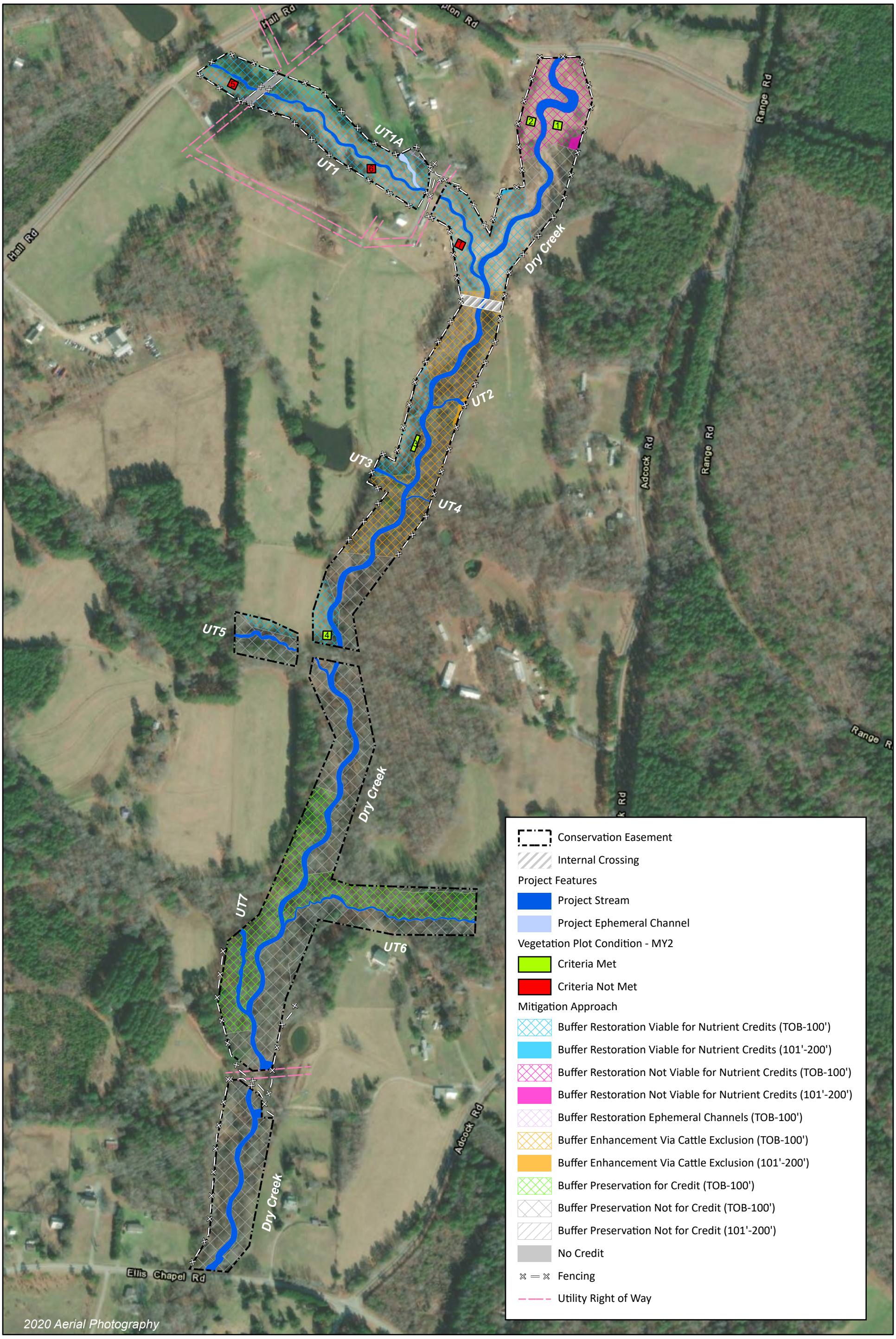
Table 6. Planted Tree Species

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

Common Name	Scientific Name	Number Planted	% of Total
Willow Oak	*Quercus phellos*	1,049	10%
Sycamore	*Platanus occidentalis*	2,098	19%
River Birch	*Betula nigra*	2,098	19%
Cherrybark Oak	*Quercus pagoda*	1,049	10%
Swamp Chestnut Oak	*Quercus michauxii*	1,049	10%
Tulip Poplar	*Liriodendron tulipifera*	1,049	10%
Eastern Cottonwood	*Populus deltoides*	630	6%
Black Willow	*Salix nigra*	920	9%
Green Ash	*Fraxinus pennsylvanica*	735	7%

APPENDIX 2. Visual Assessment Data



WILDLANDS ENGINEERING

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Figure 4. Monitoring Plan View Map
Dry Creek Mitigation Site
Monitoring Year 2 Report (MY2)
Neuse River Basin (03020201)
Durham County, NC

Table 7. Vegetation Condition Assessment Table

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

Planted Acreage **14.04**

Vegetation Category	Definitions	Mapping Threshold (Ac)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.1	0	0	0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0	0%
		Total	**0**	**0**	**0%**
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 Ac	0	0	0%
		Cumulative Total	**0**	**0.0**	**0%**

Easement Acreage **29.76**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale).	1,000	0	0	0%
Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale).	none	0	0	0%

VEGETATION PLOT PHOTOGRAPHS

VEG PLOT 1 *(9/16/2021)*

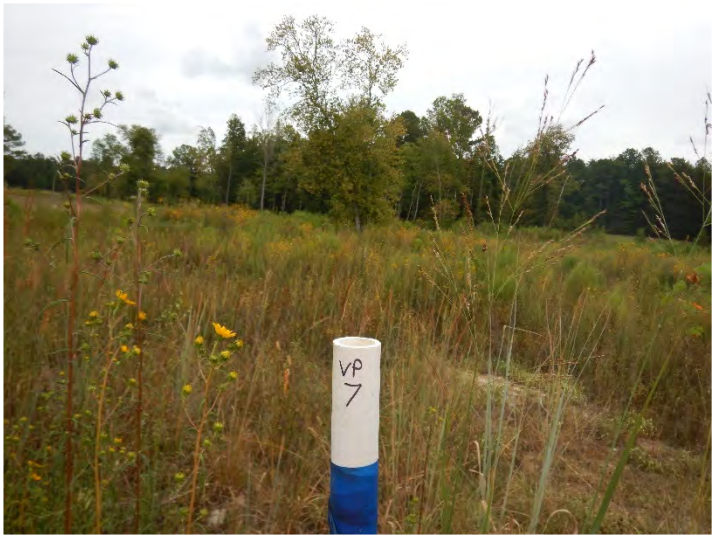
VEG PLOT 2 *(9/16/2021)*

VEG PLOT 3 *(9/16/2021)*

VEG PLOT 4 *(9/16/2021)*

VEG PLOT 5 *(9/16/2021)*

VEG PLOT 6 *(10/6/2021)*



VEG PLOT 7 *(9/16/2021)*

APPENDIX 3. Vegetation Plot Data

Table 8. Vegetation Plot Criteria Attainment Table

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

Plot	Success Criteria Met *	Tract Mean
Vegetation Plot 1	Yes	57%
Vegetation Plot 2	Yes	
Vegetation Plot 3	Yes	
Vegetation Plot 4	Yes	
Vegetation Plot 5	No	
Vegetation Plot 6	No**	
Vegetation Plot 7	No**	

*Success Criteria Met is based on the final success criteria for MY5 of 260 planted stems per acre.

**Vegetation Plot 6 and 7 meet the final success criteria for MY5 of 260 stems per acre when including volunteers.

Table 9. CVS Vegetation Tables - Metadata
Dry Creek Mitigation Site
Monitoring Year 2 - 2021

Report Prepared By	Madison LaSala
Date Prepared	9/17/2021 11:37
Database Name	Dry Creek MY2.mdb
Database Location	F:\Monitoring\Dry Creek\MY2
Computer Name	NICOLE-PC
File Size	74514432
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Project Planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Project Total Stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and Spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	97082
Project Name	Dry Creek
Description	
Sampled Plots	8

Table 10. Planted and Total Stem Counts

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

			Current Plot Data (MY2 2021)								
			VP 1			VP 2			VP 3		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Betula nigra	River Birch	Tree	6	6	6	2	2	2			
Fraxinus pennsylvanica	Green Ash	Tree							3	3	3
Liquidambar styraciflua	Sweet Gum	Tree									
Liriodendron tulipifera	Tulip-poplar	Tree									
Platanus occidentalis	Sycamore	Tree	1	1	2	6	6	6	5	5	7
Populus deltoides	Eastern Cottonwood	Tree	2	2	2						
Quercus michauxii	Swamp Chestnut Oak	Tree							2	2	2
Quercus pagoda	Cherrybark Oak	Tree				1	1	1			
Quercus phellos	Willow Oak	Tree				1	1	1			
Salix nigra	Black Willow	Tree			7						
		Stem count	9	9	17	10	10	10	10	10	12
		size (ares)	1			1			1		
		size (ACRES)	0.02			0.02			0.02		
		Species count	3	3	4	4	4	4	3	3	3
		Stems per ACRE	364	364	688	405	405	405	405	405	486

Color for Density

- Exceeds requirements by 10%
- Exceeds requirements, but by less than 10%
- Fails to meet requirements, by less than 10%
- Fails to meet requirements by more than 10%
- Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes

P-all: Number of planted stems including live stakes

T: Total stems

Table 10. Planted and Total Stem Counts

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

			Current Plot Data (MY2 2021)											
			VP 4			VP 5			VP 6			VP 7		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Betula nigra	River Birch	Tree				3	3	3	2	2	2			
Fraxinus pennsylvanica	Green Ash	Tree	1	1	1	1	1	1	1	1	1			
Liquidambar styraciflua	Sweet Gum	Tree			1									2
Liriodendron tulipifera	Tulip-poplar	Tree												
Platanus occidentalis	Sycamore	Tree	2	2	8				2	2	4	3	3	10
Populus deltoides	Eastern Cottonwood	Tree										1	1	1
Quercus michauxii	Swamp Chestnut Oak	Tree	5	5	5							2	2	2
Quercus pagoda	Cherrybark Oak	Tree	1	1	1	2	2	2						
Quercus phellos	Willow Oak	Tree	1	1	1									
Salix nigra	Black Willow	Tree												
		Stem count	10	10	17	6	6	6	5	5	7	6	6	15
		size (ares)	1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02		
		Species count	5	5	6	3	3	3	3	3	3	3	3	4
		Stems per ACRE	405	405	688	243	243	243	202	202	283	243	243	607

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes

P-all: Number of planted stems including live stakes

T: Total stems

Table 10. Planted and Total Stem Counts

Dry Creek Mitigation Site

Monitoring Year 2 - 2021

			Annual Means								
			MY2 (2021)			MY1 (2020)			MY0 (2020)		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Betula nigra	River Birch	Tree	13	13	13	16	16	16	23	23	23
Fraxinus pennsylvanica	Green Ash	Tree	6	6	6	6	6	6	6	6	6
Liquidambar styraciflua	Sweet Gum	Tree			3						
Liriodendron tulipifera	Tulip-poplar	Tree				3	3	3	10	10	10
Platanus occidentalis	Sycamore	Tree	19	19	31	22	22	22	22	22	22
Populus deltoides	Eastern Cottonwood	Tree	3	3	3	5	5	5	9	9	9
Quercus michauxii	Swamp Chestnut Oak	Tree	9	9	9	10	10	10	8	8	8
Quercus pagoda	Cherrybark Oak	Tree	4	4	4	8	8	8	9	9	9
Quercus phellos	Willow Oak	Tree	2	2	2	5	5	5	6	6	6
Salix nigra	Black Willow	Tree			7						
		Stem count	56	56	78	75	75	75	93	93	93
		size (ares)	7			7			7		
		size (ACRES)	0.17			0.17			0.17		
		Species count	7	7	9	8	8	8	8	8	8
		Stems per ACRE	324	324	451	434	434	434	538	538	538

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of planted stems excluding live stakes

P-all: Number of planted stems including live stakes

T: Total stems

APPENDIX 4. Overview Photographs