



**MONITORING YEAR 4
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 2023
Draft Submission Date: December 19, 2023
Final Submission Date: January 24, 2024

PREPARED FOR:



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



January 24, 2024

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

Subject: DMS Comments on the MY4 2023 Draft Report
Dry Creek ID # 87082, DMS Contract # 6827

Dear Ms. Mir,

We have reviewed the comments on the MY4 draft report for the above referenced project dated December 19, 2023 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.

Buffer Report:

1. Table 1a – Due to the recently discovered rounding differences between DMS and Wildlands buffer asset table, we recommend changing the “Riparian Buffer Credits” Column. Please use 830.281 instead of 830.36, 279.18 instead of 279.21 and the total to 441,874.831 instead of 441,874.94, so that it will match the DMS ledgers.

Response: Wildlands updated Table 1 to reflect the DMS ledgers.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Jason Lorch", enclosed in a white rectangular box.

Jason Lorch, *Monitoring Coordinator*

PREPARED BY:



Wildlands Engineering, Inc.
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Raleigh, NC 27609

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DRY CREEK MITIGATION SITE
Monitoring Year 4 Report

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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 eight unnamed tributaries. The Site also restored, enhanced, and preserved a total of 29.764 acres (1,209,399.84 ft²) of riparian area on 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), and 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 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 riparian 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 areas. 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 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 mitigation credits to nutrient offset credits, dependent on the need. Figure 3 details the buffer credit generation.

1.3 Monitoring Year 4 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. Refer to Appendix 1 for detailed Project Activity and Reporting History, Project Contact Table, and Project Information and Attributes.

Vegetative performance for riparian 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 stems per acre at the end of the required five-year monitoring period. For the monitoring to be complete and buffer mitigation credit to be awarded, NCDWR must provide written approval of successful revegetation of riparian restoration areas. Methodology for annual monitoring is presented in the MY0 Annual Report (Wildlands, 2020).

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 planted area 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 2023 annual vegetation monitoring resulted in an average survivability of 422 stems per acre. This is greater than the final requirement of 260 stems per acre. The average number of stems per plot for MY4 was 9. All seven vegetation plots have greater than 260 stems per acre and are on track to meet the final success criteria required for MY5. Many desirable volunteers including sycamore, black willow, box elder, and persimmon are establishing across the Site. Overall, the Site is on track to meet its final success criteria.

Herbaceous vegetation is abundant across the Site and includes native pollinator species indicating a healthy riparian habitat. The riparian habitat is helping to reduce nutrient runoff from the cattle fields outside the easement and stabilizing the stream banks. Refer to Appendix 3 for Vegetation Plot Data and Vegetation Performance Standards Summary Table and Appendix 2 for Vegetation Plot Photographs, Vegetation Condition Assessment Table, and Monitoring Plan View Map.



1.3.2 Vegetation Areas of Concern

Ring sprays consisting of glyphosate were conducted across the Site on May 5th, 2023 to reduce herbaceous competition. Soil amendments were applied in a localized manner around the base of trees May 10th and August 15th to support a higher nutrient content that aids in tree growth and survival. The contents used for the soil amendments were a blend of macronutrients, micronutrients, and ingredients that promote microbial and mycorrhizal community development. A Site wide invasive removal was conducted in July 2023 to target scattered populations of Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), sweetgum (*Liquidambar styraciflua*), and princess tree (*Paulownia tomentosa*). Soil amendments and removal of invasive species will continue to be implemented as necessary across the Site in MY5.

A supplemental planting occurred on October 19, 2022 to address low species diversity exhibited within some portions of the Site (see Figure 4). Vegetation plots 3, 6, and 7 are within supplementally planted areas. Vegetation plots 2 and 3 are not meeting the diversity requirement of at least four native tree or shrub species. Vegetation plot 2 contains only two species; however, a visual assessment found four species within the surrounding area, indicating that vegetation plot 2 may not be representative of its surrounding area. Vegetation plot three exhibited only three species. However, random vegetation plot data was collected for the Dry Creek Mitigation Site stream project in close proximity to vegetation plot 3, and revealed a diversity of five species. Species diversity will continue to be monitored during MY5, and remedial actions will be implemented as necessary.

Areas of persisting low species diversity, as well as newly discovered areas of low species diversity, will be supplementally planted during MY5 (see Figure 4). Wildlands is in the process of developing a supplemental planting plan. A memorandum will be sent to DMS and the NCDWR documenting areas supplementally planted and species utilized.

1.4 Monitoring Year 4 Summary

All seven vegetation plots are on track to meet the final success requirement of 260 stems per acre. Desirable volunteer species have been visually observed across the Site and have begun establishing in the vegetation plots. A dense herbaceous layer including wetland and pollinator species has established across the Site. Soil amendments and ring sprays were applied across the Site in the spring and summer of 2023 to promote tree growth and control herbaceous competition. Areas of persisting low species diversity were identified during MY4, and will be supplementally planted in MY5. 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: 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.

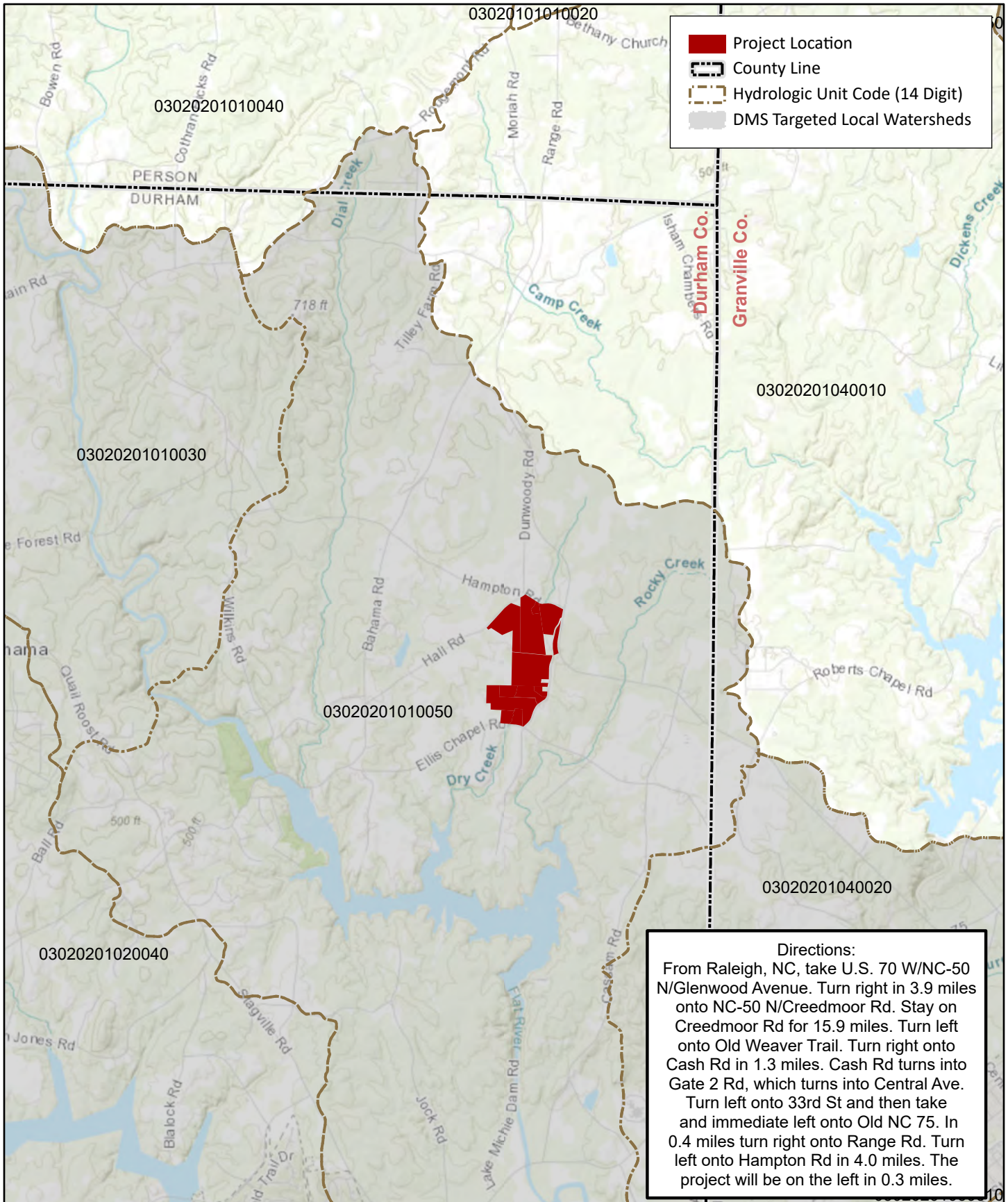
North Carolina Department of Environmental Quality, Division of Mitigation Services (NCDMS), 2017. Riparian Buffer and Nutrient Offset Buffer Baseline and Annual Monitoring Report Template version 2.0

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.

Wildlands Engineering, Inc. (2020). Dry Creek Mitigation Site – Monitoring Year 0 Annual Buffer Report. North Carolina Department of Environmental Quality, Division of Mitigation Services (NCDMS), Raleigh, NC.



APPENDIX 1. General Figures and Tables



- Project Location
- County Line
- Hydrologic Unit Code (14 Digit)
- DMS Targeted Local Watersheds

Directions:
 From Raleigh, NC, take U.S. 70 W/NC-50 N/Glenwood Avenue. Turn right in 3.9 miles onto NC-50 N/Creedmoor Rd. Stay on Creedmoor Rd for 15.9 miles. Turn left onto Old Weaver Trail. Turn right onto Cash Rd in 1.3 miles. Cash Rd turns into Gate 2 Rd, which turns into Central Ave. Turn left onto 33rd St and then take an immediate left onto Old NC 75. In 0.4 miles turn right onto Range Rd. Turn left onto Hampton Rd in 4.0 miles. The project will be on the left in 0.3 miles.

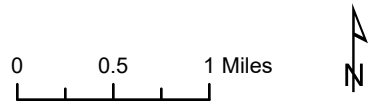


Figure 1. Project Vicinity Map
 Dry Creek Mitigation Site
 Monitoring Year 4 Report (MY4)
 Neuse River Basin (03020201)

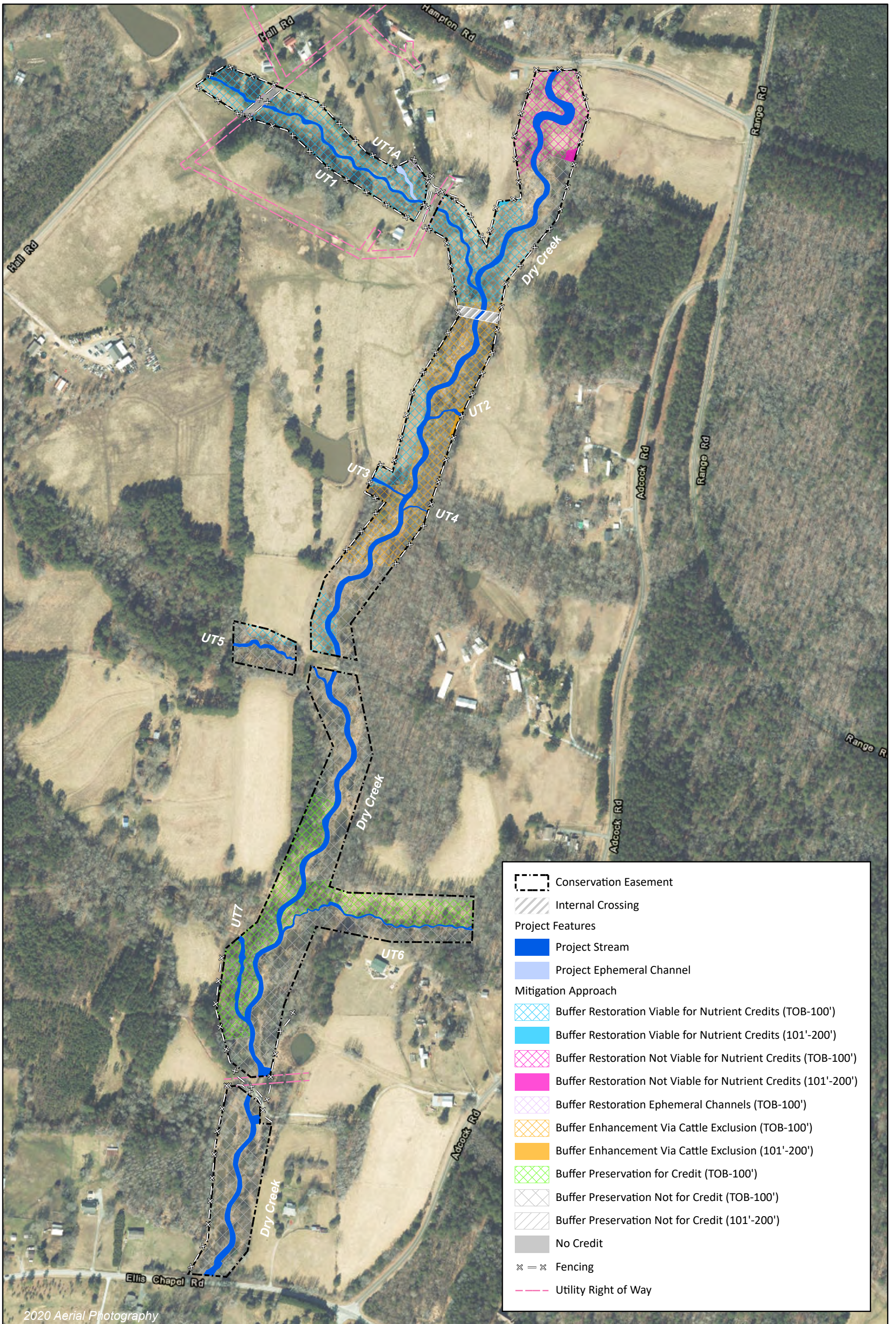


Table 1a. Buffer Project Area and Assets: Riparian Buffer Credits

Dry Creek Mitigation Site
Monitoring Year 4 - 2023

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	1.00	1	345,454.000	7.93
	Subject		I/P	Dry Creek, UT1, UT3, UT5	101-200	0.06	2,516.00	0.06	1	0.33	3.03	830.281	0.02
	Not Subject		Ephemeral Channel	UT1a	0-100	0.03	1,489.00	0.03	1	1.00	1	1,489.000	0.03
	Subject		Ephemeral Channel	UT1a	101-201	0	0.00	0.00	1	0.33	3.03	0.000	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	76,985.000	1.77
				Dry Creek, UT3, UT4	101-200	0.04	1,692.00	0.04	2	0.33	6.06	279.180	0.01
Rural	Subject	Preservation	I/P	Dry Creek	0-100	14.04	611,691.00	3.87	10	1.00	10	16,837.370	0.39
Rural	Subject	Preservation		Dry Creek	101-200	0.24	10,342.00	0.00	10	0.33	30.3	0.000	0.00
Total:												441,874.831	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 4 - 2023

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	14460.750	932.890
				101-200	0.01	647.00	0.01	Yes	33.770	2.180
			Dry Creek Fescue Lawn	0-100	1.57	68,386.00	1.57	No	0.000	0.000
				101-200	0.04	1,869.00	0.04	No	0.000	0.000
			UT1a	0-100	0.03	1,489.00	0.03	Yes	93.370	5.010
				101-200	0	0.00	0	Yes	0.000	0.000
Rural	Subject	Enhancement via Cattle Exclusion	Dry Creek, UT3, UT4	0-100	3.53	153,970.00	3.53	No	0.000	0.000
				101-200	0.04	1,692.00	0.04	No	0.000	0.000
Rural	Subject	Preservation	Dry Creek	0-100	14.04	611,691.00	3.87	No	0.000	0.000
				101-200	0.024	10,342.00	0	No	0.000	0.000
Total:									14587.890	940.080

*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 4 - 2023

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	September 14, 2022	December 2022
Supplemental Planting		October 19, 2022
Year 4 Monitoring	October 20, 2023	December 2023
Ring Sprays		May 5, 2023
Soil Amendments		May 10 & August 15, 2023
Year 5 Monitoring	2024	December 2024

¹Seed and mulch is added as each section of construction is completed.**Table 3. Project Contact Table**

Dry Creek Mitigation Site

Monitoring Year 4 - 2023

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 4 - 2023

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 4 - 2023

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

Table 6. Planted Tree Species

Dry Creek Mitigation Site

Monitoring Year 4 - 2023

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

APPENDIX 2. Visual Assessment Data

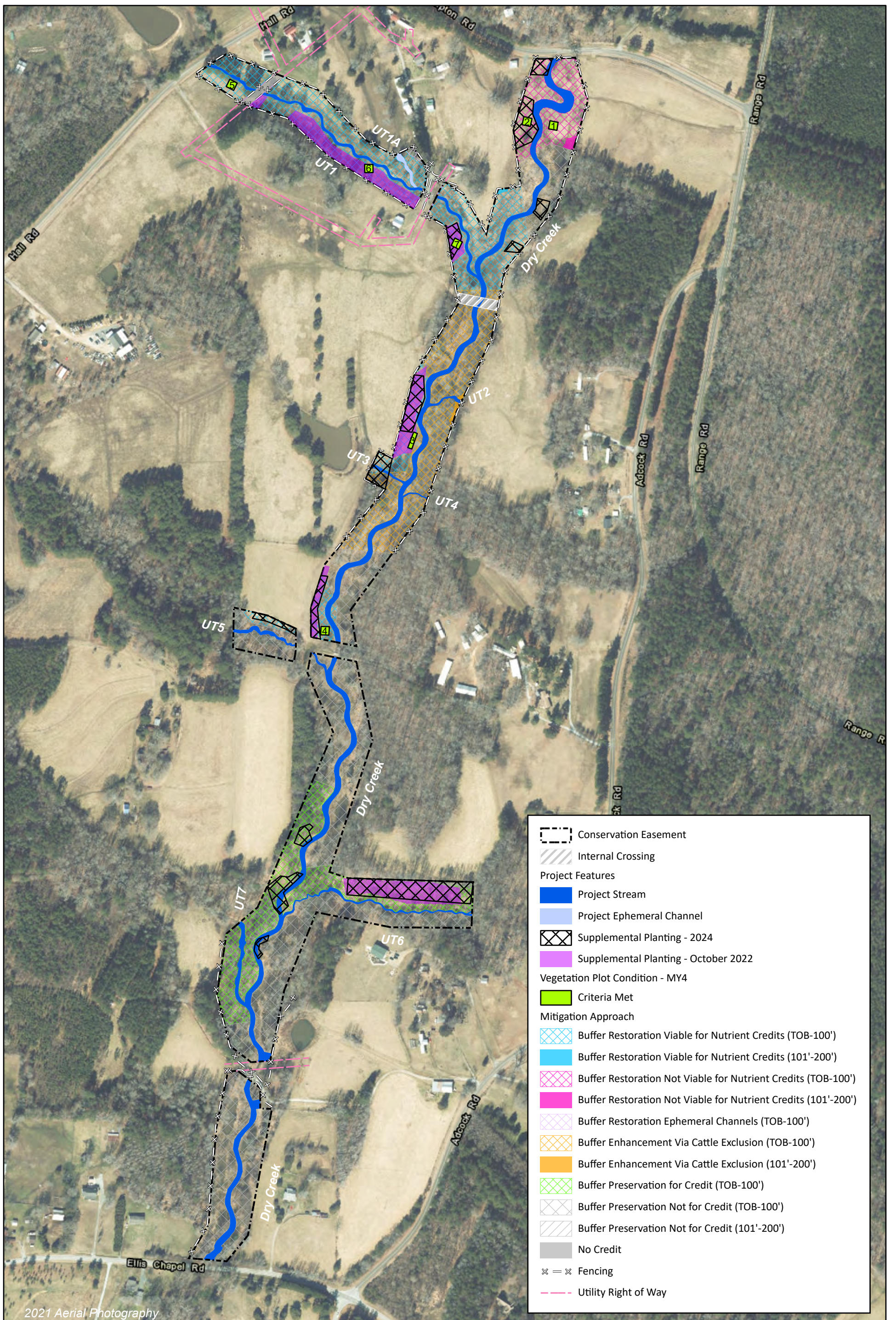


Table 7. Vegetation Condition Assessment Table

Dry Creek Mitigation Site

Monitoring Year 4 - 2023

Planted Acreage 14.03

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	13	3*	19%
Total			13	3	19%
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			13	3	19%

*Supplemental planting is planned to take place in MY5.

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 (10/12/2023)



VEG PLOT 2 (10/12/2023)



VEG PLOT 3 (10/12/2023)



VEG PLOT 4 (10/12/2023)



VEG PLOT 5 (10/12/2023)



VEG PLOT 6 (10/12/2023)





VEG PLOT 7 (10/12/2023)



APPENDIX 3. Vegetation Plot Data

Table 8. Vegetation Plot Criteria Attainment Table

Dry Creek Mitigation Site

Monitoring Year 4 - 2023

Plot	Success Criteria Met *	Tract Mean
Vegetation Plot 1	Yes	100%
Vegetation Plot 2	Yes	
Vegetation Plot 3	Yes	
Vegetation Plot 4	Yes	
Vegetation Plot 5	Yes	
Vegetation Plot 6	Yes	
Vegetation Plot 7	Yes	

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

Table 9. Vegetation Plot Data

Dry Creek Mitigation Site
Monitoring Year 4 - 2023

Planted Acreage	14.04
Date of Initial Plant	2020-04-24
Date(s) of Supplemental Plant(s)	2022-10-19
Date of Current Survey	2023-10-12
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Betula nigra</i>	river birch	Tree	FACW	6	6	2	2				
	<i>Fraxinus pennsylvanica</i>	green ash	Tree	FACW					2	2	1	1
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	1	4	5	5	5	8	2	3
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC	2	2						
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL								
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW					2	2	4	4
	<i>Quercus pagoda</i>	cherrybark oak	Tree	FACW								
	<i>Quercus phellos</i>	willow oak	Tree	FAC								
	<i>Salix nigra</i>	black willow	Tree	OBL		3						2
Sum	Performance Standard				9	15	7	7	9	12	7	10
Post Mitigation Plan Species	<i>Acer negundo</i>	Boxelder	Tree	FAC								
	<i>Acer rubrum</i>	red maple	Tree	FAC								
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC								
	<i>Liquidambar styraciflua</i>	sweetgum	Tree	FAC								1
	<i>Pinus taeda</i>	loblolly pine	Tree	FAC				1				
	<i>Quercus nigra</i>	water oak	Tree	FAC								
	<i>Quercus shumardii</i>	Shumard's oak	Tree	FAC								
		<i>Ulmus alata</i>	winged elm	Tree	FACU							
Sum	Proposed Standard				9	15	7	7	9	12	7	10
Mitigation Plan Performance Standard	Current Year Stem Count					15		7		12		10
	Stems/Acre					607		283		486		405
	Species Count					4		2		3		4
	Dominant Species Composition (%)					40		62		67		36
	Average Plot Height (ft.)					8		4		3		6
	% Invasives					0		0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					15		7		12		10
	Stems/Acre					607		283		486		405
	Species Count					4		2		3		4
	Dominant Species Composition (%)					40		62		67		36
	Average Plot Height (ft.)					8		4		3		6
	% Invasives					0		0		0		0

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded), species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 9. Vegetation Plot Data

Dry Creek Mitigation Site
Monitoring Year 4 - 2023

Planted Acreage	14.04
Date of Initial Plant	2020-04-24
Date(s) of Supplemental Plant(s)	2022-10-19
Date of Current Survey	2023-10-12
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 5 F		Veg Plot 6 F		Veg Plot 7 F	
					Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Betula nigra</i>	river birch	Tree	FACW	3	3	2	2		
	<i>Fraxinus pennsylvanica</i>	green ash	Tree	FACW	1	1	1	1		
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW			2	5	3	3
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC			1	1		
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL	2	2				
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW					3	3
	<i>Quercus pagoda</i>	cherrybark oak	Tree	FACW						
	<i>Quercus phellos</i>	willow oak	Tree	FAC						
	<i>Salix nigra</i>	black willow	Tree	OBL						
Sum	Performance Standard				6	6	6	9	6	6
Post Mitigation Plan Species	<i>Acer negundo</i>	Boxelder	Tree	FAC		2				
	<i>Acer rubrum</i>	red maple	Tree	FAC						
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC			2	2		
	<i>Liquidambar styraciflua</i>	sweetgum	Tree	FAC						
	<i>Pinus taeda</i>	loblolly pine	Tree	FAC						
	<i>Quercus nigra</i>	water oak	Tree	FAC						
	<i>Quercus shumardii</i>	Shumard's oak	Tree	FAC					1	1
	<i>Ulmus alata</i>	winged elm	Tree	FACU					1	3
Sum	Proposed Standard				6	8	8	11	8	10
Mitigation Plan Performance Standard	Current Year Stem Count					6		9		6
	Stems/Acre					243		364		243
	Species Count					3		4		2
	Dominant Species Composition (%)					50		45		30
	Average Plot Height (ft.)					3		8		5
	% Invasives					0		0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					8		11		10
	Stems/Acre					324		445		405
	Species Count					4		5		4
	Dominant Species Composition (%)					25		45		30
	Average Plot Height (ft.)					3		7		4
	% Invasives					0		0		0

- 1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
- 2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded), species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
- 3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 10. Vegetation Performance Standards Summary Table

Dry Creek Mitigation Site

Monitoring Year 4 - 2023

	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 5												
Monitoring Year 4	607	8	4	0	283	4	2	0	486	3	3	0
Monitoring Year 3	607	6	4	0	324	4	3	0	567	3	3	0
Monitoring Year 2	364	3	3	0	405	3	4	0	405	2	3	0
Monitoring Year 1	486	2	5	0	486	2	4	0	607	2	5	0
Monitoring Year 0	526	2	5	0	486	3	4	0	648	2	6	0
	Veg Plot 4 F				Veg Plot 5 F				Veg Plot 6 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 5												
Monitoring Year 4	405	6	4	0	324	3	4	0	445	8	5	0
Monitoring Year 3	445	4	4	0	243	3	3	0	364	6	4	0
Monitoring Year 2	405	3	5	0	243	2	3	0	202	4	3	0
Monitoring Year 1	445	3	6	0	364	2	5	0	283	2	4	0
Monitoring Year 0	567	3	7	0	486	2	6	0	486	2	5	0
	Veg Plot 7 F											
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives								
Monitoring Year 5												
Monitoring Year 4	405	5	4	0								
Monitoring Year 3	283	5	2	0								
Monitoring Year 2	243	4	3	0								
Monitoring Year 1	364	3	5	0								
Monitoring Year 0	486	2	6	0								

Table 11. Vegetation Height Data

Dry Creek Mitigation Site

DMS Project No. 97082

Monitoring Year 4 - 2023

Plot	Scientific Name	Common Name	X	Y	Height (Ft)	Vigor
1	<i>Betula nigra</i>	river birch	0.3	0.3	7.1	4
1	<i>Platanus occidentalis</i>	American sycamore	7.6	0.2	11.5	4
1	<i>Betula nigra</i>	river birch	5.3	3.4	2.7	4
1	<i>Betula nigra</i>	river birch	3.1	3.2	3.7	4
1	<i>Populus deltoides</i>	eastern cottonwood	1	2.6	6.0	4
1	<i>Populus deltoides</i>	eastern cottonwood	2	7.3	7.9	4
1	<i>Betula nigra</i>	river birch	2	7.3	11.2	4
1	<i>Betula nigra</i>	river birch	4.1	7.2	11.5	4
1	<i>Betula nigra</i>	river birch	6.5	7.2	10.5	4

Table 11. Vegetation Height Data

Dry Creek Mitigation Site

DMS Project No. 97082

Monitoring Year 4 - 2023

Plot	Scientific Name	Common Name	X	Y	Height (Ft)	Vigor
2	<i>Platanus occidentalis</i>	American sycamore	0.5	1.3	5.1	3
2	<i>Quercus pagoda</i>	cherrybark oak	6.2	0.8	Missing	M
2	<i>Platanus occidentalis</i>	American sycamore	7	4.3	5.0	3
2	<i>Platanus occidentalis</i>	American sycamore	3.4	5.7	3.1	2
2	<i>Platanus occidentalis</i>	American sycamore	1.8	9.3	1.5	2
2	<i>Betula nigra</i>	river birch	3.8	9.6	6.6	4
2	<i>Betula nigra</i>	river birch	5.5	8.4	5.6	4
2	<i>Platanus occidentalis</i>	American sycamore	9.4	7.4	2.3	4

Table 11. Vegetation Height Data

Dry Creek Mitigation Site

DMS Project No. 97082

Monitoring Year 4 - 2023

Plot	Scientific Name	Common Name	X	Y	Height (Ft)	Vigor
3	<i>Fraxinus pennsylvanica</i>	green ash	0.7	0.7	2.1	4
3	<i>Quercus michauxii</i>	swamp chestnut oak	2.5	0.7	4.4	4
3	<i>Platanus occidentalis</i>	American sycamore	1.9	4.4	3.2	4
3	<i>Platanus occidentalis</i>	American sycamore	2.8	7.4	3.8	4
3	<i>Platanus occidentalis</i>	American sycamore	4.8	7.4	5.0	4
3	<i>Fraxinus pennsylvanica</i>	green ash	10.8	4.2	Missing	M
3	<i>Fraxinus pennsylvanica</i>	green ash	4.9	16	3.3	4
3	<i>Quercus michauxii</i>	swamp chestnut oak	4	17	2.4	4
3	<i>Platanus occidentalis</i>	American sycamore	2.2	18	3.0	4
3	<i>Platanus occidentalis</i>	American sycamore	0.2	18	1.8	4

Table 11. Vegetation Height Data

Dry Creek Mitigation Site

DMS Project No. 97082

Monitoring Year 4 - 2023

Plot	Scientific Name	Common Name	X	Y	Height (Ft)	Vigor
4	<i>Platanus occidentalis</i>	American sycamore	1.7	1.2	11.8	4
4	<i>Quercus michauxii</i>	swamp chestnut oak	7	5.1	Missing	M
4	<i>Quercus michauxii</i>	swamp chestnut oak	3.5	5.1	4.6	4
4	<i>Quercus michauxii</i>	swamp chestnut oak	1.7	4.7	4.0	4
4	<i>Quercus michauxii</i>	swamp chestnut oak	0	5.1	2.6	4
4	<i>Quercus michauxii</i>	swamp chestnut oak	0.6	9.8	5.2	4
4	<i>Fraxinus pennsylvanica</i>	green ash	2.7	9.1	2.4	4
4	<i>Platanus occidentalis</i>	American sycamore	4.8	9.8	7.9	4

Table 11. Vegetation Height Data

Dry Creek Mitigation Site

DMS Project No. 97082

Monitoring Year 4 - 2023

Plot	Scientific Name	Common Name	X	Y	Height (Ft)	Vigor
5	<i>Quercus lyrata</i>	overcup oak	1.5	1	1.7	3
5	<i>Betula nigra</i>	river birch	6.2	3.2	2.7	3
5	<i>Betula nigra</i>	river birch	2.5	4	2.4	3
5	<i>Betula nigra</i>	river birch	0.8	4.2	3.4	3
5	<i>Quercus lyrata</i>	overcup oak	1	7.6	4.6	4
5	<i>Fraxinus pennsylvanica</i>	green ash	7.1	7.6	4.6	3

Table 11. Vegetation Height Data

Dry Creek Mitigation Site

DMS Project No. 97082

Monitoring Year 4 - 2023

Plot	Scientific Name	Common Name	X	Y	Height (Ft)	Vigor
6	<i>Betula nigra</i>	river birch	9.2	0.2	10.3	4
6	<i>Fraxinus pennsylvanica</i>	green ash	3.2	3.7	10.5	4
6	<i>Betula nigra</i>	river birch	1	2.5	8.2	4
6	<i>Populus deltoides</i>	eastern cottonwood	0.3	6.7	6.5	4
6	<i>Platanus occidentalis</i>	American sycamore	6.5	8.3	10.0	4
6	<i>Platanus occidentalis</i>	American sycamore	8.8	8.8	7.2	4
6	<i>other</i>	other	3.4	8.5	Missing	M
6	<i>other</i>	other	8	0.5	Missing	M
6	<i>Diospyros virginiana</i>	common persimmon	6.5	3	1.9	4
6	<i>Juniperus virginiana</i>	eastern redcedar	0.6	8	Missing	M
6	<i>Diospyros virginiana</i>	common persimmon	9.1	3.2	2.1	4

Table 11. Vegetation Height Data

Dry Creek Mitigation Site

DMS Project No. 97082

Monitoring Year 4 - 2023

Plot	Scientific Name	Common Name	X	Y	Height (Ft)	Vigor
7	<i>Platanus occidentalis</i>	American sycamore	5	0.4	3.8	4
7	<i>Platanus occidentalis</i>	American sycamore	6.7	1.3	7.2	3
7	<i>Quercus michauxii</i>	swamp chestnut oak	9.1	5.3	4.6	4
7	<i>Quercus michauxii</i>	swamp chestnut oak	5.7	8.7	5.4	3
7	<i>Platanus occidentalis</i>	American sycamore	7.8	9.1	8.9	3
7	<i>Quercus shumardii</i>	Shumard's oak	5	3.8	1.6	4
7	<i>Quercus phellos</i>	willow oak	2.6	9.5	Missing	M
7	<i>Morus rubra</i>	red mulberry	2.4	9.2	Missing	M
7	<i>Quercus michauxii</i>	swamp chestnut oak	1.2	1.5	1.2	4
7	<i>Ulmus alata</i>	winged elm	5	5	2.9	4

APPENDIX 4. Overview Photographs



10/24/2023



10/24/2023





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10/24/2023

