



**MONITORING YEAR 2  
ANNUAL BUFFER REPORT  
FINAL**

**PERRY HILL MITIGATION SITE**

Orange County, NC  
NCDEQ Contract No. 7744  
DMS Project No. 100093  
NCDWR Project No. 2019-0157v2  
RFP No. 16-007576

Neuse River Basin  
HUC 03020201

Data Collection Period: September 2022  
Draft Submission Date: November 2022  
Final Submission Date: January 2023

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**PREPARED FOR:**



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



January 4, 2023

**Jeremiah Dow**

NC DEQ Division of Mitigation Services  
217 West Jones Street  
Raleigh, NC 27603

Subject: DMS Comments on Perry Hill Mitigation Site Monitoring Year 2 Report  
DMS Project Number 100093, DMS Contract 7744

Dear Mr. Dow,

We have reviewed the comments on the MY2 Report for the above referenced project dated December 22, 2022. Below are responses to each of the comments. For your convenience, the comments are reprinted with responses in italics.

1. In the stream report Table 1: Project Quantities and Credits, please break down the lost stream credits in the footnote or incorporate into the Table. 20 SMUs on Perry Branch Reach 4 and 5.17 SMUs on Perry Branch Reach 2.

*A footnote has been added to Stream report Table 1 to break down the credit reduction by stream reach.*

2. In the buffer report, please do the same on Table 1 as requested above for the stream report. Show in the footnote the actual square footage and amount of buffer credit lost by reach due to the water line.

*The original square footage and buffer credits have been added back into Table 1 to show credit reductions. A footnote has been added to break down the credit reduction by mitigation activity to match the way credits are broken out in Table 1.*

3. If UT1 does not meet minimum flow requirements in MY3, we recommend that Wildlands determine the linear extent of the channel that should be considered at-risk and include in the MY3 report.

*Wildlands has taken note of this comment for MY3.*

4. There is a typo in the flow plot summary table in appendix D digital submission, please fix this in next year's submission; one gauge was omitted due to another being reported twice. This typo was not present in the report version of the summary table.

*The original flow gauge on UT1 is labeled "UT1 Reach 1 – In-Stream Flow Gauge". The flow gauge that was installed upstream on UT1 months later to provide supplemental information is labeled "UT1 Reach 1 – In-Stream Flow Gauge B". The names are very*



*similar, but they are separate gauges. An updated copy of the excel workbook is included in the digital files again.*

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".

**Jason Lorch**, *Monitoring Coordinator*

PREPARED BY:

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

**PERRY HILL MITIGATION SITE**  
Monitoring Year 2 Buffer Report

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## Section 1: PROJECT OVERVIEW

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### 1.1 Project Summary

Wildlands Engineering, Inc. (Wildlands) implemented a full delivery project at the Perry Hill Mitigation Site (Site) for the North Carolina Department of Environmental Quality Division of Mitigation Services (DMS). The 26.88-acre Site encompasses portions of Perry Branch, three unnamed tributaries (UT1, UT2, and UT3) and two ephemeral channels (EC1 and EC3), all of which eventually drain to Falls Lake and the Neuse River. A total of 24.53 acres (1,068,625 ft<sup>2</sup>) of riparian buffer have been restored or enhanced and are expected to generate 868,212.512 riparian buffer credits, with potential to convert some buffer credits to nutrient offset credits dependent on the need. The Site is located approximately three miles northwest of Hillsborough, NC (Figure 1). The project resides within Hydrologic Unit Code 03020201030020 and North Carolina Department of Water Resources (NCDWR) Sub-basin 03-04-01. Three unnamed tributaries (UT1, UT2, and UT3) drain to Perry Branch, which drains to Corporation Lake water supply reservoir on the Eno River, and then Falls Lake.

Work at the Site was planned, designed, and constructed per the Perry Hill Mitigation Site – Riparian Buffer Mitigation Plan (Wildlands Engineering, 2020) and the Consolidated Buffer Mitigation Rule 15A NCAC 02B .0295 (effective November 1, 2015). The purpose of the riparian buffer restoration is to provide riparian buffer credits to compensate for buffer impacts within the Hydrologic Unit Code 03020201 and the Falls Lake Watershed. The service area for the riparian buffer credits is depicted in Figure 2.

### 1.2 Project Goals and Objectives

Prior to stream construction, the Perry Hill Site was cattle pasture and livestock had access to all streams, causing streambank erosion. Onsite streams and riparian buffers at the Site were restored and/or enhanced.

The major goals of the riparian restoration project are to provide ecological and water quality enhancements to the Neuse River Watershed within the Falls Lake Water Supply Watershed by creating a functional riparian corridor and restoring the riparian area. The project supports specific goals identified in the 2010 Neuse River Basin Restoration Priorities Plan (RBRP) for the Neuse River Targeted Local Watershed (TLW). This document highlights the importance of riparian buffers for stream restoration projects. Forested riparian areas immobilize and retain nutrients and suspended sediment. The RBRP also supports the Falls Lake watershed plan. Falls Lake is a receiving water supply water body downstream of the Site and is classified as WS-IV and NSW. Specific enhancements to water quality and ecological processes are outlined below:

- Exclude cattle from project streams – Fencing has been installed around project areas adjacent to cattle pastures.
- Restore and enhance native floodplain vegetation – Planted native tree species in riparian zone where tree growth was insufficient.
- Permanently protect the project Site from harmful uses – Established a conservation easement on the site.

The 26.88-acre Site is protected with a permanent conservation easement. However, in October 2021, waterlines were installed by the tenant farmer within the conservation easement, parallel to the internal crossings without consulting Wildlands. In an effort to find the most reasonable and least disruptive solution, it was decided the area containing the waterlines would be marked as a



maintenance area. This will allow for maintenance in the future and avoid any further easement encroachments.

Approximately 20 feet (or a total of 0.19 acres) was added alongside both internal crossings as a maintenance area. No credit is claimed in the maintenance area and project credits were reduced accordingly. Of the 26.88-acres, Neuse riparian buffer credits were generated by restoring 16.65 acres and enhancing 7.88 acres. No buffer credit will be generated from the remaining 2.35 acres. In general, riparian buffer restoration area widths on streams extend out to 50 feet from top of bank on each side of the stream channel. Figure 3 and Table 1 in Appendix 1 detail the buffer credit generation updated to include the maintenance area in Monitoring Year 2. Wildlands is working with a surveyor to mark the area.

### 1.3 Monitoring Year 2 Data Assessment

The Mitigation Plan (Wildlands Engineering, 2020) was submitted and accepted by DMS in July 2020. Construction activities by Main Stream Earthwork, Inc. and tree planting by Bruton Natural Systems, Inc. were completed in March and April 2021 respectively. The baseline as-built survey was completed by IPW Construction Group in April 2021. Refer to Appendix 1 for detailed project activity, history, contact information, and watershed/site background information.

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 buffer mitigation credits shall include a minimum of four native hardwood tree species, where no one species is greater than 50 percent of 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 monitoring to be completed and buffer credit 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 Vegetative Sampling Protocol (Lee et al., 2008) such that at least 2 percent of the Site is encompassed in monitoring plots. A total of fourteen fixed 100 square meter vegetation monitoring quadrants were established within the project easement boundaries. All planted stems were marked with flagging tape and a reference photograph was taken from the southwestern corner of each vegetation plot during vegetation assessments. Annually, trees will be re-marked and plot photos will be taken along with overview photographs of the Site. 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 MY2 vegetative survey was completed in September 2022. Vegetation monitoring resulted in an average planted stem density of 520 planted stems per acre across all vegetation plots, which is well above the final success criteria of 260 stems per acre required at MY5. All fourteen vegetation plots individually met the success criteria and planted stem densities for each plot range from 324 to 769 stems per acre. Plots have an average of 12 planted stems per plot and range from 4 to 10 different species. Additionally, desirable volunteer species are establishing themselves including green ash (*Fraxinus pennsylvanica*) and hickory species (*Carya spp.*). Refer to Appendix 2 for the vegetation condition assessment table, the monitoring plan view map, vegetation plot and overview photographs. Appendix 3 contains vegetation plot data and the vegetation performance summary table.



### 1.3.2 Vegetation Areas of Concern

As was discussed above, an additional 20 feet (a total of 0.19 acres) was added alongside both internal crossings as a maintenance area due to the installation of waterlines in October 2021. The affected area was seeded, and herbaceous vegetation has grown over the disturbance. The soil is stabilized, and Wildlands does not anticipate any future problems in these areas. Recent photographs showing vegetation cover are included in Vegetation Areas of Concern Updated Photographs in Appendix 2.

While planted trees are growing well, pasture grasses are still thick. To ensure planted trees remain competitive, herbicide ring sprays were applied around the base of trees where necessary in April 2022.

Additionally, follow up treatments were done on the intermittent Tree-of Heaven (*Ailanthus altissima*) stems via cut stump application of triclopyr in August 2022. Occasional resprouts of Chinese privet (*Ligustrum sinense*) and Japanese honeysuckle (*Lonicera japonica*) were also treated in March 2022 in the wooded areas along UT2, UT3, and Perry Branch.

Wildlands plans to re-apply herbicide in rings around planted trees in areas of thick herbaceous competition and treat aggressive blackberry growth as needed in spring of 2023. Additionally, native permanent seed will be spread as a cover crop in areas where agricultural weeds are still dominant. Wildlands will continue to monitor for resprouts of invasive species, and additional treatments will be applied as necessary.

## 1.4 Monitoring Year 2 Summary

Vegetation across the Site is exceeding performance standards and is on track to achieve the final requirement of 260 planted stems per acre. Monitoring Year 2 data shows an average density of 520 planted stems per acre across vegetation plots. Resprouts of sporadic invasive vegetation was treated in MY2 and follow up treatments will be scheduled as necessary. Additional ring sprays will be applied around the base of trees in areas of high competition with herbaceous vegetation in spring 2023. Wildlands is working with a surveyor to mark the maintenance area.

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, 2020) 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

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- Breeding, R. 2010. Neuse River Basin Restoration Priorities. North Carolina Ecosystem Enhancement Program. Accessed at:  
[https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed\\_Planning/Neuse\\_River\\_Basin/FINAL%20ORBRP%20Neuse%202010\\_%2020111207%20CORRECTED.pdf](https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed_Planning/Neuse_River_Basin/FINAL%20ORBRP%20Neuse%202010_%2020111207%20CORRECTED.pdf)
- Lee, M.T., Peet, R.K., Roberts, S.D., & Wentworth, T.R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2. Accessed at: <http://cvs.bio.unc.edu/protocol/cvs-eep-protocol-v4.2-lev1-2.pdf>
- Natural Resources Conservation Service (NRCS), 2011. Web Soil Survey. Accessed at:  
<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>
- 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 Accessed at:  
[https://files.nc.gov/ncdeq/Mitigation%20Services/Document%20Management%20Library/Guidance%20and%20Template%20Documents/RB\\_NO\\_Base\\_Mon\\_Template\\_2.0\\_2017\\_5.pdf](https://files.nc.gov/ncdeq/Mitigation%20Services/Document%20Management%20Library/Guidance%20and%20Template%20Documents/RB_NO_Base_Mon_Template_2.0_2017_5.pdf)
- North Carolina Department of Environmental Quality, Division of Water Resources (NCDWR). 2015. 15A NCAC 02B .0295 Mitigation Program Requirements for Protection and Maintenance of Riparian Buffers. Accessed at: <http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0295.pdf>
- North Carolina Department of Environmental Quality, Division of Water Resources (NCDWR). 2011. Surface Water Classifications. Accessed at: <https://deq.nc.gov/about/divisions/water-resources/planning/classification-standards/classifications#DWRPrimaryClassification>
- Wildlands Engineering, Inc. (2020). Perry Hill 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**

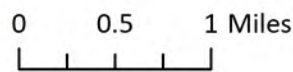
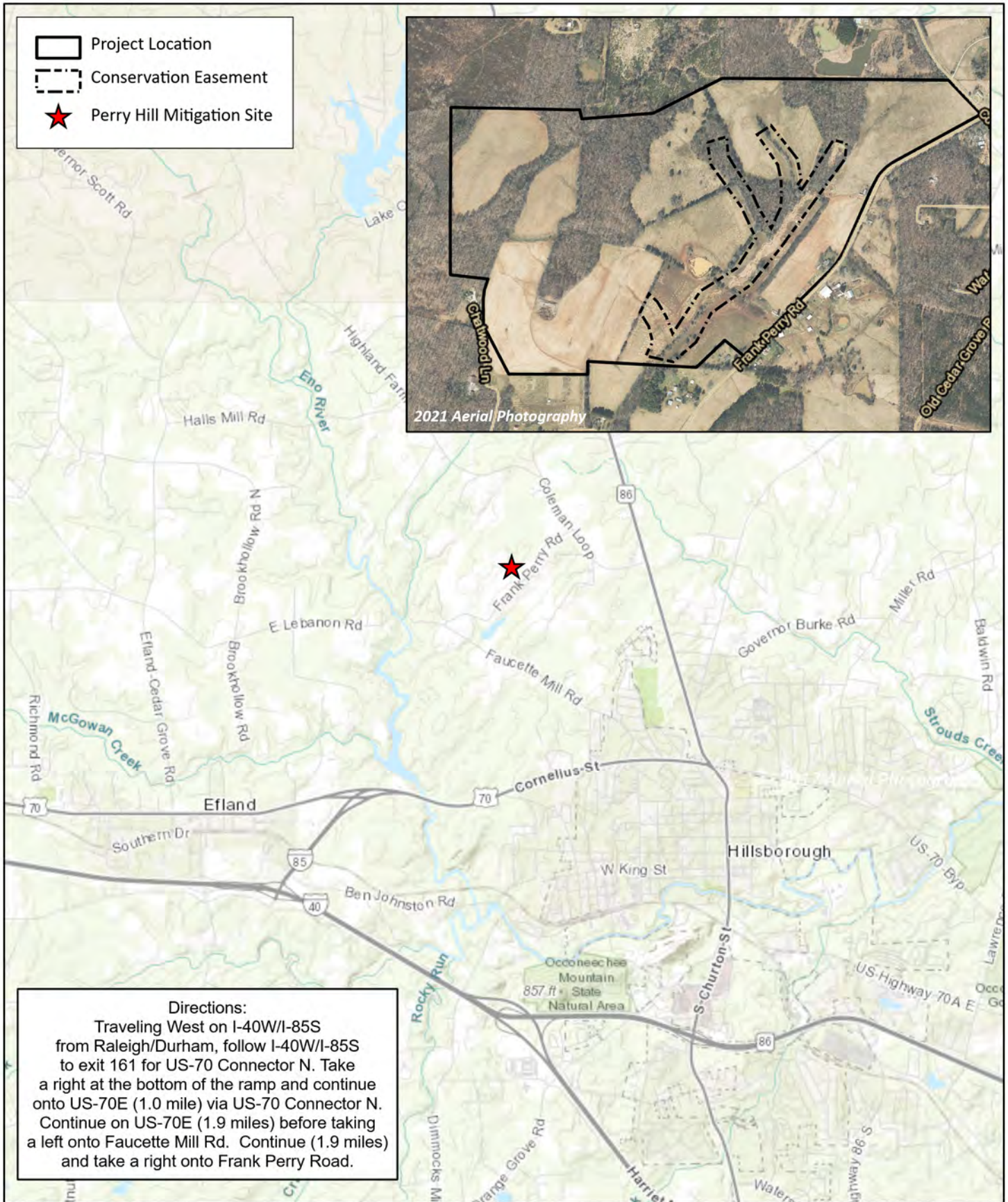


Figure 1. Project Vicinity Map  
 Perry Hill Mitigation Site  
 DMS Project No. 100093  
 Monitoring Year 2 - 2022

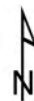
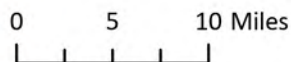
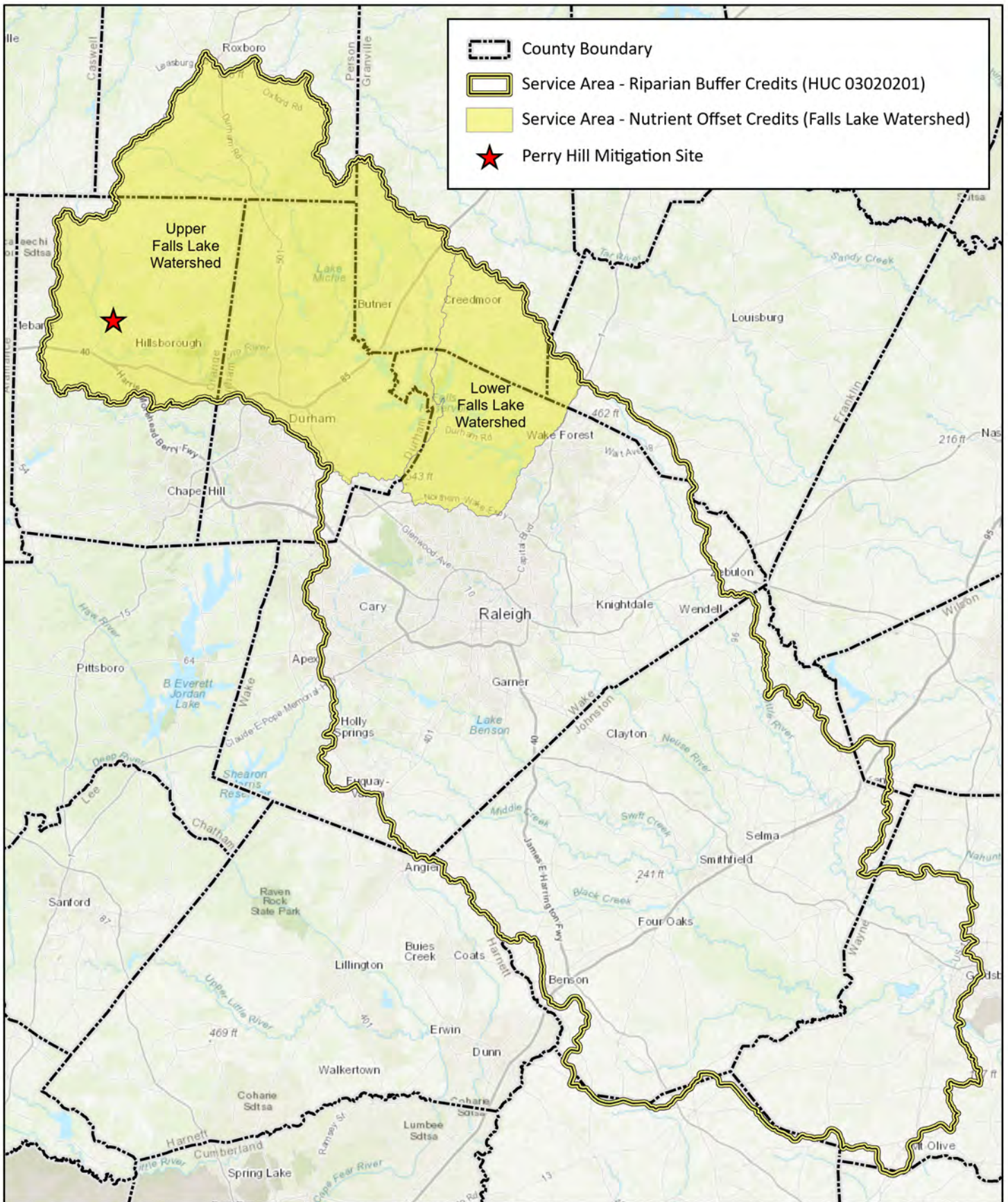


Figure 2. Service Area Map  
 Perry Hill Mitigation Site  
 DMS Project No. 100093  
 Monitoring Year 2 - 2022

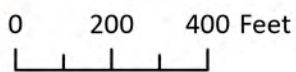
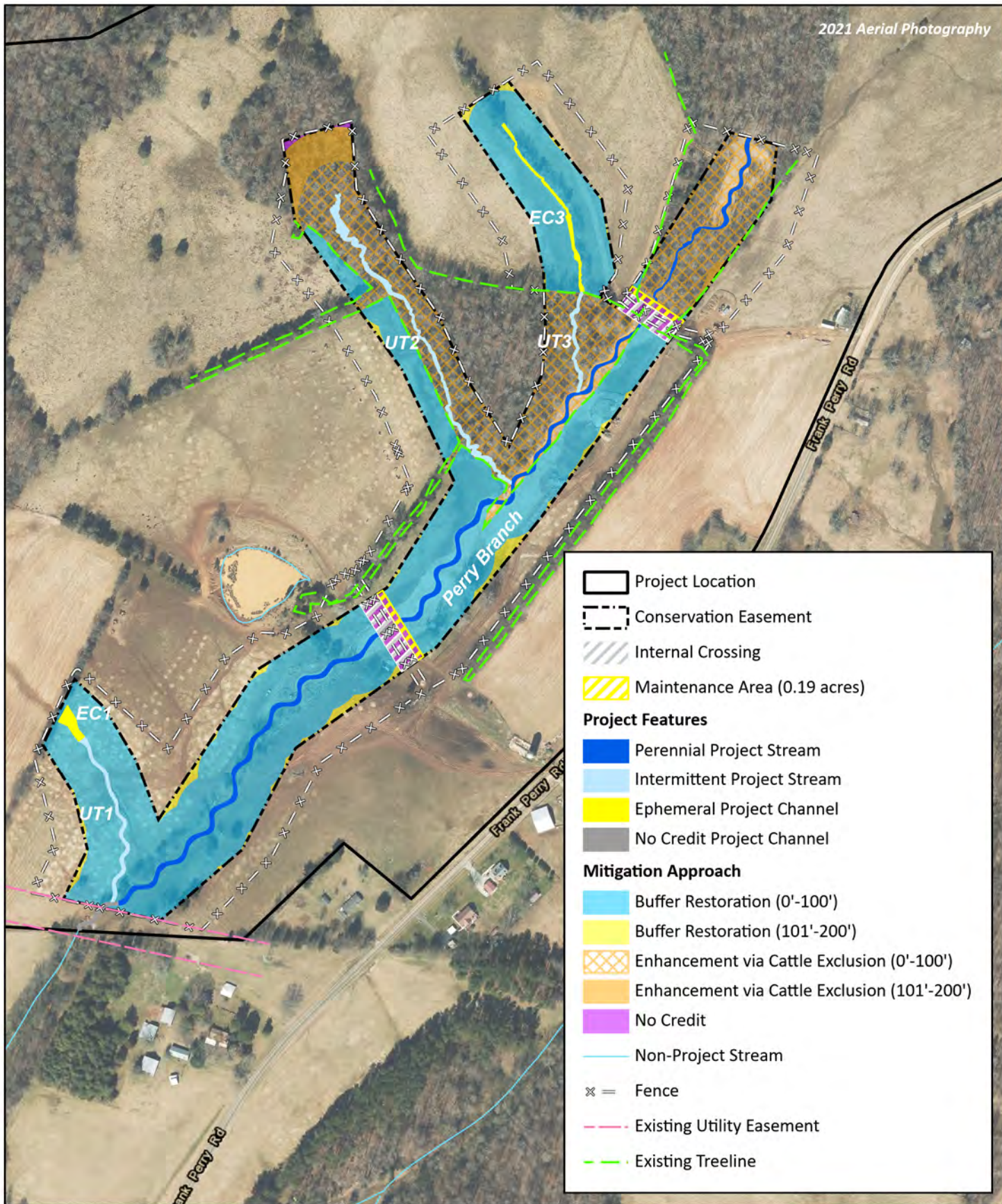


Figure 3. Project Component/Asset Map  
 Perry Hill Mitigation Site  
 DMS Project No. 100093  
 Monitoring Year 2 - 2022

**Table 1. Buffer Project Areas and Assets**

Perry Hill Mitigation Site  
 DMS Project No. 100093  
 Monitoring Year 2 - 2022

Neuse 03020201 - Upper Falls Lake				Project Area												
19.16394				N Credit Conversion Ratio (ft <sup>2</sup> /pound)												
297.54099				P Credit Conversion Ratio (ft <sup>2</sup> /pound)												
Credit Type	Location	Subject? (enter NO if ephemeral or ditch <sup>1</sup> )	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (ft <sup>2</sup> )	Total (Creditable) Area of Buffer Mitigation (ft <sup>2</sup> )	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Convertible to Riparian Buffer?	Riparian Buffer Credits	Convertible to Nutrient Offset?	Delivered Nutrient Offset: N (lbs)	Delivered Nutrient Offset: P (lbs)
Buffer	Rural	Yes	I / P	Restoration	0-100	Perry Branch	<del>408,293</del> 403,389	<del>408,293</del> 403,389	1	100%	1.00000	Yes	<del>408,293.000</del> 403,389.000	Yes	21,049.377	1,355.743
Buffer	Rural	Yes	I / P	Restoration	101-200	Perry Branch	<del>22,411</del> 22,131	<del>22,411</del> 22,131	1	33%	3.03030	Yes	<del>7,395.637</del> 7,303.237	Yes	1,154.825	74.380
Buffer	Rural	Yes	I / P	Enhancement via Cattle Exclusion	0-100	Perry Branch	<del>157,953</del> 155,190	<del>157,953</del> 155,190	2	100%	2.00000	Yes	<del>78,976.500</del> 77,595.000	No	—	—
Buffer	Rural	Yes	I / P	Enhancement via Cattle Exclusion	101-200	Perry Branch	1,903	1,903	2	33%	6.06061	Yes	313.995	No	—	—
Buffer	Rural	Yes	I / P	Restoration	0-100	UT1	92,839	92,839	1	100%	1.00000	Yes	92,839.000	Yes	4,844.447	312.020
Buffer	Rural	Yes	I / P	Restoration	101-200	UT1	2,558	2,558	1	33%	3.03030	Yes	844.141	Yes	133.487	8.598
Buffer	Rural	No	I / P	Restoration	0-100	UT2	58,526	58,526	1	100%	1.00000	Yes	58,526.000	Yes	3,053.947	196.698
Buffer	Rural	No	I / P	Restoration	101-200	UT2	1,007	1,007	1	33%	3.03030	Yes	332.310	Yes	52.529	3.383
Buffer	Rural	No	I / P	Enhancement via Cattle Exclusion	0-100	UT2	124,130	124,130	2	100%	2.00000	Yes	62,065.000	No	—	—
Buffer	Rural	No	I / P	Enhancement via Cattle Exclusion	101-200	UT2	24,834	24,834	2	33%	6.06061	Yes	4,097.607	No	—	—
Buffer	Rural	No	I / P	Enhancement via Cattle Exclusion	0-100	UT3	37,195	37,195	2	100%	2.00000	Yes	18,597.500	No	—	—
Buffer	Rural	No	I / P	Enhancement via Cattle Exclusion	101-200	UT3	24	24	2	33%	6.06061	Yes	3.960	No	—	—
Buffer	Rural	No	Ephemeral	Restoration	0-100	EC1	15,423	15,423	1	100%	1.00000	Yes	15,423.000	Yes	804.795	51.835
Buffer	Rural	No	Ephemeral	Restoration	101-200	EC1	0	0	1	33%		Yes	—	Yes	0.000	0.000
Buffer	Rural	No	Ephemeral	Restoration	0-100	EC3	125,605	125,605	1	100%	1.00000	Yes	125,605.000	Yes	6,554.216	422.142
Buffer	Rural	No	Ephemeral	Restoration	101-200	EC3	3,872	3,872	1	33%	3.03030	Yes	1,277.761	Yes	202.050	13.014
<b>Totals:</b>							1,068,625	1,068,625								

**Enter Preservation Credits Below**

								Eligible for Preservation (ft <sup>2</sup> ):		356,208		
Credit Type	Location	Subject?	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (sf)	Total (Creditable) Area for Buffer Mitigation (ft <sup>2</sup> )	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits
Buffer				Preservation								—
<b>Preservation Area Subtotal (ft<sup>2</sup>):</b>								0				
<b>Preservation as % Total Area of Buffer Mitigation:</b>								0.0%				
<b>Ephemeral Reaches as % Total Area of Buffer Mitigation:</b>								13.6%				

TOTAL AREA OF BUFFER MITIGATION (TABM)		
Mitigation Totals	Square Feet	Credits
<b>Restoration:</b>	<del>730,532</del> 725,349	<del>710,535.850</del> 705,539.450
<b>Enhancement:</b>	<del>346,039</del> 343,276	<del>164,054.562</del> 162,673.062
<b>Preservation:</b>	0	0.000
<b>Total Riparian Buffer:</b>	<del>1,076,572</del> 1,068,625	<del>874,590.412</del> 868,212.512
TOTAL NUTRIENT OFFSET MITIGATION		
Mitigation Totals	Square Feet	Credits
<b>Nutrient Offset:</b>		
<b>Nitrogen:</b>	0	0.000
<b>Phosphorus:</b>		0.000

\*Credits updated in Monitoring Year 2 to reflect the addition of the maintenance areas and resulting reduction in credits. Buffer credits along Perry Branch were reduced as follows: Restoration from 0-100 feet was reduced by 4,904 square feet and 4,904.000 credits, Restoration from 101-200 feet by 280 square feet and 92.400 credits, and Enhancement via Cattle Exclusion from 0-100 feet by 2,763 square feet and 1,381.500 credits.

**Table 2. Project Activity and Reporting History**

Perry Hill Mitigation Site  
DMS Project No. 100093  
**Monitoring Year 2 - 2022**

Activity or Report	Data Collection Complete	Completion or Scheduled Delivery
Mitigation Plan	July 2020	July 2020
Final Design - Construction Plans	September 2020	September 2020
Invasive Vegetation Treatment		November 2020
Construction	January-March 2021	March 2021
Temporary S&E mix applied to entire project area <sup>1</sup>	March 2021	March 2021
Permanent seed mix applied to reach/segments <sup>1</sup>	March 2021	March 2021
Soils ripped to a depth of 15-18 inches	March-April 2021	April 2021
Bare root and live stake plantings for reach/segments	April 2021	April 2021
Competitive Vegetation Treatment <sup>2</sup>		April 2021
Baseline Monitoring Document (Year 0)	April 2021	May 2021
Invasive Vegetation Treatment		October 2021
Easement Encroachment		October 2021
Year 1 Monitoring	October 2021	December 2021
Competitive Vegetation Treatment <sup>2</sup>		April 2022
Invasive Vegetation Treatment		March and August 2022
Maintenance Area Marked		TBD
Year 2 Monitoring	September 2022	December 2022
Year 3 Monitoring	2023	December 2023
Year 4 Monitoring	2024	December 2024
Year 5 Monitoring	2025	December 2025

<sup>1</sup>Seed and mulch is added as each section of construction is completed.

<sup>2</sup>Herbicide ring sprays around the base of planted stems.

**Table 3. Project Contact Table**

Perry Hill Mitigation Site  
DMS Project No. 100093  
**Monitoring Year 2 - 2022**

<b>Designer</b> Geoff Smith, PE	<b>Wildlands Engineering, Inc.</b> 497 Bramson Ct, Suite 104 Mt. Pleasant, SC 29464 843.277.6221
<b>Construction Contractor</b>	<b>Main Stream Earthwork, Inc.</b> 631 Camp Dan Valley Rd Reidsville, NC 27320
<b>Planting Contractor</b>	<b>Bruton Natural Systems, Inc</b> P.O. Box 1197 Fremont, NC 27830
<b>Seeding Contractor</b>	<b>Main Stream Earthwork, Inc.</b> 631 Camp Dan Valley Rd Reidsville, NC 27320
<b>Seed Mix Sources</b>	<b>Green Resources</b> 5204 Highgreen Court Colfax, NC 27235
<b>Nursery Stock Suppliers</b> <b>Bare Roots</b>	<b>Dykes and Sons Nursery and Greenhouse</b> 825 Maude Etter Rd McMinnville, TN 37110
<b>Live Stakes</b>	<b>Bruton Natural Systems, Inc</b>
	<b>Foggy Mountain Nursery</b> 797 Helton Creek Rd Lansing, NC 28643
<b>Monitoring Performers</b> Monitoring, POC	<b>Wildlands Engineering, Inc.</b> Jason Lorch 919.851.9986

**Table 4. Project Information and Attributes**

Perry Hill Mitigation Site  
 DMS Project No. 100093  
**Monitoring Year 2 - 2022**

PROJECT INFORMATION	
Project Name	Perry Hill Mitigation Site
County	Orange County
Project Coordinates (latitude and longitude)	36° 06' 25.81" N, 79° 07' 46.66" W
Project Area (acres)	26.88
Planted Acreage (acres of woody stems planted)	20.53
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	03020201030020
DWR Sub-basin	03-04-01
Project Drainage Area (acres)	174
Project Drainage Area Percentage of Impervious Area	<1%
CGIA Land Use Classification	68% managed herbaceous cover/pasture, 22% forested, 5% shrub, 3% grassland/herbaceous, 2% residential area, <1% impervious

**Table 5. Adjacent Forested Areas Existing Tree and Shrub Species**

Perry Hill Mitigation Site  
 DMS Project No. 100093  
**Monitoring Year 2 - 2022**

Common Name	Scientific Name	Wetland Indicator Status
American elm	<i>Ulmus americana</i>	FACW
American hornbeam	<i>Carpinus caroliniana</i>	FAC
Eastern Red Cedar	<i>Juniperus virginiana</i>	FACU
Green Ash	<i>Fraxinus pennsylvanica</i>	FACW
Red Maple	<i>Acer rubrum</i>	FAC
Shagbark Hickory	<i>Carya ovata</i>	FACU
Sugarberry	<i>Celtis laevigata</i>	FACW
Sweet Gum	<i>Liquidambar styraciflua</i>	FAC

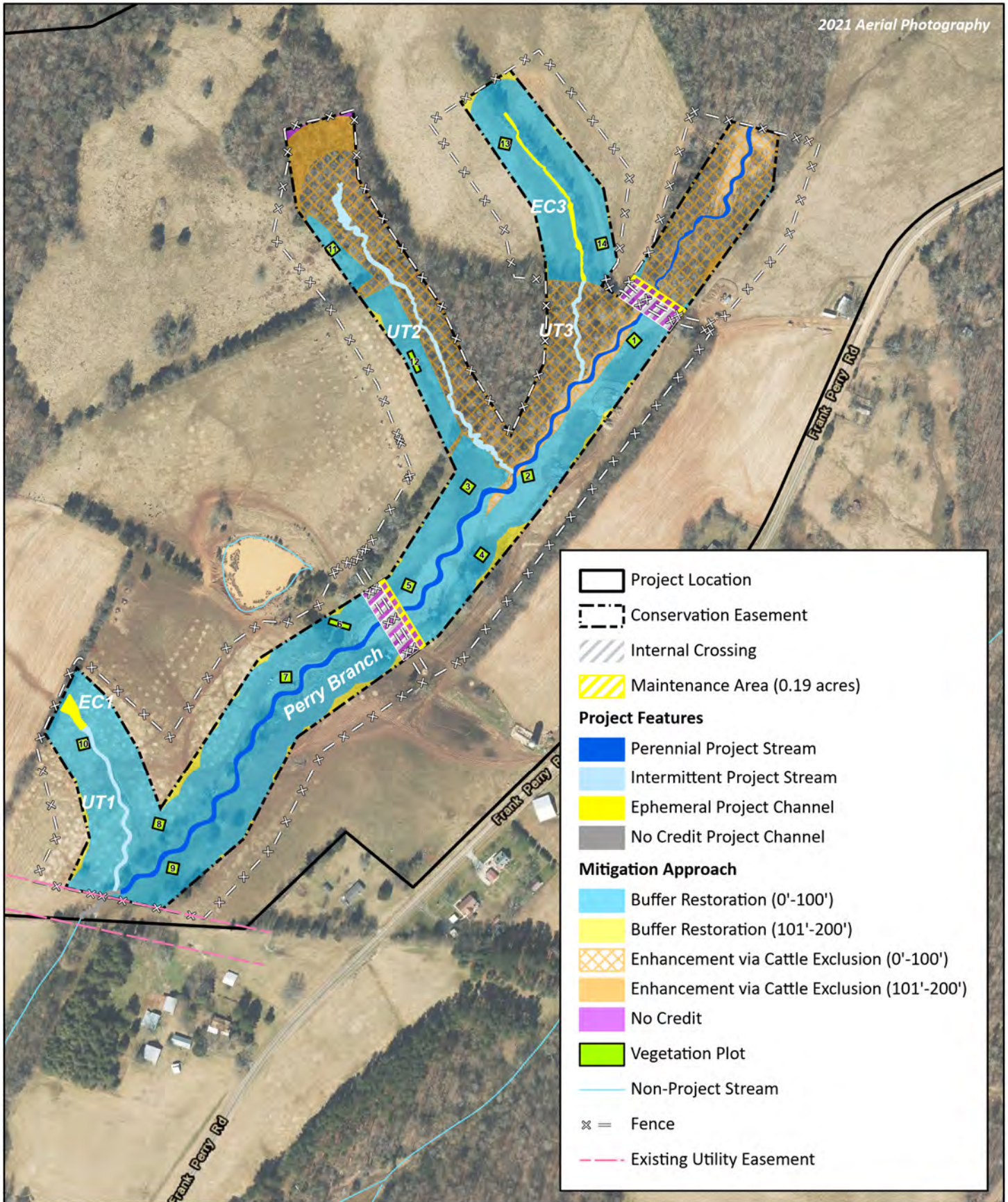


**Table 6. Planted Tree Species**

Perry Hill Mitigation Site  
DMS Project No. 100093  
**Monitoring Year 2 - 2022**

Common Name	Scientific Name	Number Planted	% of Total
<b>Bare Roots</b>			
American sycamore	<i>Platanus occidentalis</i>	2,209	18.7%
River birch	<i>Betula nigra</i>	1,869	15.8%
American persimmon	<i>Diospyros virginiana</i>	1,141	9.6%
Eastern cottonwood	<i>Populus deltoides</i>	1,048	8.9%
Cherrybark oak	<i>Quercus pagoda</i>	1,017	8.6%
Boxelder	<i>Acer negundo</i>	960	8.1%
American elm	<i>Ulmus americana</i>	559	4.7%
Northern red oak	<i>Quercus rubra</i>	545	4.6%
Willow oak	<i>Quercus phellos</i>	468	4.0%
Pawpaw	<i>Asimina triloba</i>	468	4.0%
Southern sugar maple	<i>Acer floridanum</i>	266	2.2%
Black gum	<i>Nyssa sylvatica</i>	203	1.7%
White oak	<i>Quercus alba</i>	203	1.7%
Winged elm	<i>Ulmus alata</i>	203	1.7%
Blackhaw viburnum	<i>Viburnum prunifolium</i>	179	1.5%
Southern red oak	<i>Quercus falcata</i>	102	0.9%
Sourwood	<i>Oxydendrum arboreum</i>	102	0.9%
Overcup oak	<i>Quercus lyrata</i>	96	0.8%
Silky dogwood	<i>Cornus amomum</i>	93	0.8%
Arrowwood viburnum	<i>Viburnum dentatum</i>	31	0.3%
American beech	<i>Fagus grandifolia</i>	25	0.2%
Flowering dogwood	<i>Cornus florida</i>	20	0.2%
Sugarberry	<i>Celtis laevigata</i>	12	0.1%
Ironwood	<i>Carpinus caroliniana</i>	10	0.1%
<b>Live Stakes</b>			
Buttonbush	<i>Cephalanthus occidentalis</i>	248	
Silky dogwood	<i>Cornus amomum</i>	650	
Silky willow	<i>Salix sericea</i>	788	
Black willow	<i>Salix nigra</i>	123	
Elderberry	<i>Sambucus canadensis</i>	263	

## **APPENDIX 2. Visual Assessment Data**



**Table 7. Vegetation Condition Assessment Table**

Perry Hill Mitigation Site  
 DMS Project No. 100093  
 Monitoring Year 2 - 2022

**Planted Acreage 20.53**

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Planted Acreage
<b>Bare Areas</b>	Very limited cover of both woody and herbaceous material.	0.10	0	0%
<b>Low Stem Density Areas</b>	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10	0	0%
<b>Total</b>			<b>0</b>	<b>0%</b>
<b>Areas of Poor Growth Rates</b>	Planted areas where average height is not meeting current MY Performance Standard.	0.10	0	0%
<b>Cumulative Total</b>			<b>0.0</b>	<b>0%</b>

Visual assessment was completed October 19, 2022.

**Easement Acreage 26.88**

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Easement Acreage
<b>Invasive Areas of Concern</b>	Invasives may occur outside of planted areas and within the easement and will therefore be calculated against the total easement acreage. Include species with the potential to directly outcompete native, young, woody stems in the short-term or community structure for existing communities. Invasive species included in summation above should be identified in report summary.	0.10	0	0%
<b>Easement Encroachment Areas</b>	Encroachment may be point, line, or polygon. Encroachment to be mapped consists of any violation of restrictions specified in the conservation easement. Common encroachments are mowing, cattle access, vehicular access. Encroachment has no threshold value as will need to be addressed regardless of impact area.	none	0 Encroachments Noted / 0.0 ac	

Visual assessment was completed October 19, 2022.

**VEGETATION PLOT PHOTOGRAPHS**



**VEG PLOT 1 (9/27/2022)**



**VEG PLOT 2 (9/27/2022)**



**VEG PLOT 3 (9/27/2022)**



**VEG PLOT 4 (9/27/2022)**



**VEG PLOT 5 (9/27/2022)**



**VEG PLOT 6 (9/27/2022)**





**VEG PLOT 7** (9/27/2022)



**VEG PLOT 8** (9/27/2022)



**VEG PLOT 9** (9/27/2022)



**VEG PLOT 10** (9/27/2022)



**VEG PLOT 11** (9/27/2022)



**VEG PLOT 12** (9/27/2022)





**VEG PLOT 13** (9/27/2022)



**VEG PLOT 14** (9/27/2022)





## OVERVIEW PHOTOGRAPHS



**Perry Hill Mitigation Site**

Appendix 2: Visual Assessment Data – Overview Photographs



**Perry Hill Mitigation Site**

Appendix 2: Visual Assessment Data – Overview Photographs



**Perry Hill Mitigation Site**

Appendix 2: Visual Assessment Data – Overview Photographs



**VEGETATION AREAS OF CONCERN UPDATED PHOTOGRAPHS**  
**Conservation Easement Encroachment**

Perry Branch R2 – CE Encroachment Seeded and Stabilized (10/19/2022)



Perry Branch R4 – CE Encroachment Seeded and Stabilized (10/19/2022)





### **APPENDIX 3. Vegetation Plot Data**

**Table 8. Vegetation Plot Criteria Attainment Table**

Perry Hill Mitigation Site

DMS Project No. 100093

**Monitoring Year 2 - 2022**

Plot	Success Criteria Met*	Tract Mean
1	Yes	100%
2	Yes	
3	Yes	
4	Yes	
5	Yes	
6	Yes	
7	Yes	
8	Yes	
9	Yes	
10	Yes	
11	Yes	
12	Yes	
13	Yes	
14	Yes	

\*Based on the target stem density for MY5 of 260 stems per acre.

**Table 9. Vegetation Plot Data**

Perry Hill Mitigation Site  
 DMS Project No. 100093  
**Monitoring Year 2 - 2022**

Planted Acreage	20.53
Date of Initial Plant	2021-04-04
Date of Current Survey	2022-09-27
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		Veg Plot 5 F		Veg Plot 6 F		
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	
Species Included in Approved Mitigation Plan	<i>Acer floridanum</i>	southern sugar maple	Tree														
	<i>Acer negundo</i>	boxelder	Tree	FAC	1	1	1	1	1	1					1	1	
	<i>Asimina triloba</i>	pawpaw	Tree	FAC													
	<i>Betula nigra</i>	river birch	Tree	FACW	3	3	2	2	1	1	4	4	2	2	3	3	
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW	1	1											
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC					2	2			1	1			
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC													
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	2	2	4	4	1	1	3	3	2	2	6	6	
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC			2	2	1	1			1	1			
	<i>Quercus alba</i>	white oak	Tree	FACU													
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL	1	1					1	1			3	3	
	<i>Quercus pagoda</i>	cherrybark oak	Tree	FACW	1	1			1	1	1	1	2	2	1	1	
	<i>Quercus phellos</i>	willow oak	Tree	FAC									1	1			
	<i>Quercus rubra</i>	northern red oak	Tree	FACU			2	2									
<i>Ulmus alata</i>	winged elm	Tree	FACU														
<i>Ulmus americana</i>	American elm	Tree	FACW					2	2			1	1	2	2		
<i>Ulmus sp.</i>							1										
<i>Viburnum prunifolium</i>	blackhaw	Tree	FACU									1	1				
Sum	Performance Standard				9	9	11	12	9	9	9	9	11	11	16	16	
Post Mitigation Plan Species	<b><i>Acer rubrum</i></b>	<b>red maple</b>	Tree	FAC									1				
	<i>Carya glabra</i>	pignut hickory	Tree	FACU													
	<b><i>Carya tomentosa</i></b>	<b>mockernut hickory</b>	Tree														
	<i>Celtis occidentalis</i>	common hackberry	Tree	FACU				1									
	<b><i>Fraxinus pennsylvanica</i></b>	<b>green ash</b>	Tree	FACW		3											
	<i>Juglans nigra</i>	black walnut	Tree	FACU													
	<b><i>Liquidambar styraciflua</i></b>	<b>sweetgum</b>	Tree	FAC						2							
Sum	Proposed Standard				9	12	11	13	9	11	9	9	11	12	16	16	
Mitigation Plan Performance Standard	Current Year Stem Count					9		12		9		9		11		16	
	Stems/Acre					364		486		364		364		445		648	
	Species Count					6		6		7		4		8		6	
	Dominant Species Composition (%)					33		33		22		44		18		38	
	Average Plot Height (ft.)					5		5		4		4		4		6	
	% Invasives					0		0		0		0		0		0	
Post Mitigation Plan Performance Standard	Current Year Stem Count					12		13		11		9		12		16	
	Stems/Acre					486		526		445		364		486		648	
	Species Count					7		7		8		4		9		6	
	Dominant Species Composition (%)					33		33		22		44		18		38	
	Average Plot Height (ft.)					5		5		4		4		4		6	
	% Invasives					0		0		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**

Perry Hill Mitigation Site  
 DMS Project No. 100093  
 Monitoring Year 2 - 2022

Planted Acreage	20.53
Date of Initial Plant	2021-04-04
Date of Current Survey	2022-09-27
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 F		Veg Plot 11 F		Veg Plot 12 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Acer floridanum</i>	southern sugar maple	Tree													
	<i>Acer negundo</i>	boxelder	Tree	FAC	1	1	1	1	3	3					1	1
	<i>Asimina triloba</i>	pawpaw	Tree	FAC			1	1			1	1			1	1
	<i>Betula nigra</i>	river birch	Tree	FACW	1	1	3	3	2	2			2	2	2	2
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW												
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC	1	1	3	3	1	1	1	1	4	4	2	4
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC									1	1		
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	2	3	2	2	3	3	2	2	4	4	4	4
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC	1	1	2	2	1	1	1	1			1	1
	<i>Quercus alba</i>	white oak	Tree	FACU									1	1		
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL												
	<i>Quercus pagoda</i>	cherrybark oak	Tree	FACW	1	1	2	2	1	1	2	2			1	1
	<i>Quercus phellos</i>	willow oak	Tree	FAC	1	1					1	1				
	<i>Quercus rubra</i>	northern red oak	Tree	FACU	2	2							1	1	1	1
	<i>Ulmus alata</i>	winged elm	Tree	FACU				1					1	1		
<i>Ulmus americana</i>	American elm	Tree	FACW			4	4	1	1							
<i>Ulmus sp.</i>					1											
<i>Viburnum prunifolium</i>	blackhaw	Tree	FACU	1	1			1	1							
Sum	Performance Standard				11	13	18	19	13	13	8	8	14	14	13	15
Post Mitigation Plan Species	<b><i>Acer rubrum</i></b>	<b>red maple</b>	<b>Tree</b>	<b>FAC</b>												
	<b><i>Carya glabra</i></b>	<b>pignut hickory</b>	<b>Tree</b>	<b>FACU</b>			1									
	<b><i>Carya tomentosa</i></b>	<b>mockernut hickory</b>	<b>Tree</b>	<b>FACU</b>												
	<b><i>Celtis occidentalis</i></b>	<b>common hackberry</b>	<b>Tree</b>	<b>FACU</b>									1			
	<b><i>Fraxinus pennsylvanica</i></b>	<b>green ash</b>	<b>Tree</b>	<b>FACW</b>												
	<b><i>Juglans nigra</i></b>	<b>black walnut</b>	<b>Tree</b>	<b>FACU</b>											2	
Sum	Proposed Standard				11	13	18	21	13	13	8	8	14	17	13	17
Mitigation Plan Performance Standard	Current Year Stem Count					13		19		13		8		14		15
	Stems/Acre					526		769		526		324		567		607
	Species Count					10		9		8		6		7		8
	Dominant Species Composition (%)					23		21		23		25		29		27
	Average Plot Height (ft.)					3		5		4		4		4		5
Post Mitigation Plan Performance Standard	Current Year Stem Count					13		21		13		8		17		17
	Stems/Acre					526		850		526		324		688		688
	Species Count					10		11		8		6		9		9
	Dominant Species Composition (%)					23		21		23		25		29		27
	Average Plot Height (ft.)					3		5		4		4		4		5
% Invasives					0		0		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**

Perry Hill Mitigation Site  
DMS Project No. 100093  
**Monitoring Year 2 - 2022**

Planted Acreage	20.53
Date of Initial Plant	2021-04-04
Date of Current Survey	2022-09-27
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 13 F		Veg Plot 14 F	
					Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Acer floridanum</i>	southern sugar maple	Tree		1	1	1	1
	<i>Acer negundo</i>	boxelder	Tree	FAC	3	3	1	1
	<i>Asimina triloba</i>	pawpaw	Tree	FAC			1	1
	<i>Betula nigra</i>	river birch	Tree	FACW	3	3	2	2
	<i>Cornus amomum</i>	silky dogwood	Shrub	FACW				
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC				
	<i>Nyssa sylvatica</i>	blackgum	Tree	FAC				
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	3	3	3	3
	<i>Populus deltoides</i>	eastern cottonwood	Tree	FAC			2	2
	<i>Quercus alba</i>	white oak	Tree	FACU				
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL				
	<i>Quercus pagoda</i>	cherrybark oak	Tree	FACW	2	2	1	1
	<i>Quercus phellos</i>	willow oak	Tree	FAC	1	1		
	<i>Quercus rubra</i>	northern red oak	Tree	FACU			1	1
	<i>Ulmus alata</i>	winged elm	Tree	FACU		4		
<i>Ulmus americana</i>	American elm	Tree	FACW			2	2	
<i>Ulmus sp.</i>								
<i>Viburnum prunifolium</i>	blackhaw	Tree	FACU			1	1	
Sum	Performance Standard				13	17	15	15
Post Mitigation Plan Species	<i>Acer rubrum</i>	red maple	Tree	FAC				
	<i>Carya glabra</i>	pignut hickory	Tree	FACU				
	<i>Carya tomentosa</i>	mockernut hickory	Tree			1		
	<i>Celtis occidentalis</i>	common hackberry	Tree	FACU				
	<i>Fraxinus pennsylvanica</i>	green ash	Tree	FACW				
	<i>Juglans nigra</i>	black walnut	Tree	FACU				1
	<i>Liquidambar styraciflua</i>	sweetgum	Tree	FAC		2		
Sum	Proposed Standard				13	20	15	16
Mitigation Plan Performance Standard	Current Year Stem Count					17		15
	Stems/Acre					688		607
	Species Count					7		10
	Dominant Species Composition (%)					24		20
	Average Plot Height (ft.)					3		3
	% Invasives					0		0
Post Mitigation Plan Performance Standard	Current Year Stem Count					20		16
	Stems/Acre					810		648
	Species Count					9		11
	Dominant Species Composition (%)					24		20
	Average Plot Height (ft.)					3		3
	% Invasives					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**

Perry Hill Mitigation Site

DMS Project No. 100093

Monitoring Year 2 - 2022

	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												
Monitoring Year 3												
Monitoring Year 2	364	5	6	0	486	5	6	0	364	4	7	0
Monitoring Year 1	607	2	6	0	486	3	6	0	405	3	7	0
Monitoring Year 0	607	2	6	0	486	2	6	0	486	2	8	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												
Monitoring Year 3												
Monitoring Year 2	364	4	4	0	445	4	8	0	648	6	6	0
Monitoring Year 1	567	2	6	0	445	3	8	0	648	4	6	0
Monitoring Year 0	607	2	6	0	486	2	9	0	688	2	6	0
	Veg Plot 7 F				Veg Plot 8 F				Veg Plot 9 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												
Monitoring Year 3												
Monitoring Year 2	526	3	10	0	769	5	9	0	526	4	8	0
Monitoring Year 1	486	2	9	0	729	3	8	0	526	3	8	0
Monitoring Year 0	486	2	9	0	729	2	8	0	526	2	8	0
	Veg Plot 10 F				Veg Plot 11 F				Veg Plot 12 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												
Monitoring Year 3												
Monitoring Year 2	324	4	6	0	567	4	7	0	607	5	8	0
Monitoring Year 1	567	2	8	0	567	3	7	0	607	3	8	0
Monitoring Year 0	648	2	8	0	607	2	7	0	607	2	8	0
	Veg Plot 13 F				Veg Plot 14 F							
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives				
Monitoring Year 5												
Monitoring Year 4												
Monitoring Year 3												
Monitoring Year 2	688	3	7	0	607	3	10	0				
Monitoring Year 1	567	2	6	0	607	2	10	0				
Monitoring Year 0	567	2	6	0	607	2	10	0				