

**Baseline Monitoring Report**

**FINAL**

**CARRAWAY BLUFF MITIGATION PROJECT**

NCDMS Project #100186 (Contract #0402-07)

RFP #16-20200402

DWR Project #2014-0820 V5

Wayne County, North Carolina

Neuse River Basin

HUC 03020201



**Provided by:**



Resource Environmental Solutions, LLC  
*for* Environmental Banc & Exchange, LLC (EBX)

**Provided for:**

NC Department of Environmental Quality  
Division of Mitigation Services

**July 2023**



To: NCDEQ – Emily Dunnigan  
From: Hannah Gadai, RES  
Jamey McEachran, RES  
Subject: Task 4 Draft Baseline Monitoring Report Comments – Carraway Bluff Mitigation Site (DMS #100186) - Comment Response Memo  
Date: 7/10/2023  
CC: N/A

1. Soil testing was proposed to be completed in the mitigation plan, was that done? Were any soil amendments made? Please include any action/inaction in the narrative.  
[Soil amendments were deemed unnecessary for the site due to the site already having soil fertile for tree growth. This narrative is now included in section 3.1.](#)
2. As noted in the field a deer stand was left in the easement due to nesting owls. Please include DWR's approval to leave the deer stand in the easement within the narrative. Also, include it on the CCPV and as-built survey.  
[Language regarding the deer stand is now included in section 3.2. It can also be found on the CCPV and in the as-built survey.](#)
3. Update the Stem Count Total and Planted by Plot Species Table with the correct survey date of 3/16/2023.  
[The Stem Count Total and Planted by Plot Species Table was updated with the correct survey date of March 16<sup>th</sup>, 2023.](#)
4. There appear to be disparities between the asset table and the square feet of buffer generated in the attribute table with the digital data. Ex: Restoration 101-200 for Carraway Creek & BH1 (1998 cleared) asset table says 34,764 sqft, and the attribute table has 34,080 sqft. Please review the calculated square feet in the shapefile and revise the shapefile or asset table as necessary.  
[The disparities between the buffer shapefile and the asset table have been resolved and they now match. These disparities were due to some issues with exporting from Civil to SHP. A small update was made to the Plat and the new Plat is included. The new shapefile that matches the Plat is included in the digital files.](#)

Please find enclosed the revised final As-Built submission with changes as noted above. Do not hesitate to reach out with any question or comments. Jamey can be reached by email at [jmceachran@res.us](mailto:jmceachran@res.us) or by phone at 919-623-9889.

Thank you,

Hannah Gadai  
Ecologist

Jamey McEachran  
Project Manager

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### **Appendix A: Background Tables and Site Maps**

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Table 2: Goals, Performance, and Results
Table 3: Project Attributes
Table 4: Project Timeline and Contacts
Figure 1: Site Location Map
Figure 2: As-Built Map
Figure 3: Current Conditions Plan View Map

### **Appendix B: Vegetation Assessment Data**

Planted Species Summary
Stem Count Total and Planted by Plot Species
Vegetation Plot Mitigation Success Summary Table
Visual Vegetation Assessment Table

### **Appendix C: As-built Photos**

General Site Photos
Vegetation Plot Photos
Maintenance Completed Photos

# **1 Mitigation Project Summary**

## ***1.1 Project Location and Description***

Environmental Banc & Exchange, LLC (EBX), a wholly-owned subsidiary of Resource Environmental Solutions (RES), is pleased to provide the Carraway Bluff Mitigation Project (Project), a full-delivery buffer mitigation project for the Division of Mitigation Services (DMS) (DMS Project #100186). The Carraway Bluff Project is within the Neuse River Basin within the 8-digit HUC 03020201, 03020201170060 and DWR Sub-basin Number 03-04-12. The Project easement is located in Wayne County in Goldsboro, NC and can be accessed off of Highway 117 approximately five miles south of downtown Goldsboro (**Figure 1**). The coordinates are 35.3280007, -78.010718.

This buffer project provides riparian buffer mitigation credits for unavoidable impacts due to development within the Neuse River Basin, United States Geological Survey (USGS) 8-digit Cataloguing Unit 03020201 (Neuse 01), excluding Falls Lake Watershed (**Figure 1**). This Buffer Mitigation Plan is in accordance with the Consolidated Buffer Mitigation Rule 15A NCAC 02B .0295 and Nutrient Offset Credit Trading Rule 15A NCAC 02B .0703. The Carraway Bluff Project consists of a contiguous conservation easement that totals approximately 25.39 acres and includes the Neuse River, five stream features (Carraway Creek, BH1, BH2, BH3, and BH4) and one ditch feature (D4). Carraway Creek is a USGS-named stream that drains directly to the Neuse River onsite. Pre-existing land use within the Project was crop production and riparian forest. Water quality stressors previously affecting the Project included heavily manipulated/relocated and maintained stream channels, nutrient loadings from active crop production, and lack of forested riparian buffers.

The Carraway Bluff Project is comprised of two perennial stream channels; the Neuse River, and Carraway Creek; four intermittent stream channels; BH1, BH2, BH3 and BH4 and one ditch feature; D4. Carraway Creek is a named tributary of the Neuse River with a partially intact riparian buffer, while its tributaries, BH1, BH2, BH3 and BH4 are modified natural stream channels that lack any riparian buffer. Furthermore, the fifty-foot riparian buffers of BH1 and BH2 were determined to be subject to the Neuse buffer protection rules (“Subject”); the fifty-foot riparian buffers of BH3 and BH4 were determined to be not subject to the Neuse buffer protection rules (“Non-subject”). This Project was also codeveloped with a buffer mitigation and nutrient offset bank that extends riparian buffer areas associated with this Project’s streams as well as incorporate additional stream features on the property.

The goal of the Project is to restore and preserve ecological function to the existing streams and their associated riparian buffer areas by establishing appropriate plant communities while minimizing temporal and land disturbing impacts. This is being accomplished through the planting, establishment, and protection of a hardwood forest community. The result will be a riparian area that functions to mitigate nutrient and sediment inputs from the surrounding uplands. Buffer and surrounding riparian area improvements will filter runoff from agricultural fields, thereby reducing nutrient and sediment loads to Project channels and provide water quality benefit to the overall watershed. The Project will provide significant functional uplift to the watershed and will assist DMS with achieving its mitigation goals in the Neuse 01 watershed, excluding the Falls Lake Watershed.

## **2 Regulatory Considerations**

### ***2.1 Determination of Credits***

This Project has the potential to generate up to 641,711.542 ft<sup>2</sup> riparian buffer mitigation credits within a 25.39-acre conservation easement. These will be derived from buffer restoration and buffer preservation. The riparian buffer mitigation credits generated will service the Neuse 01 watershed, excluding the Falls Lake Watershed. The total potential buffer mitigation credits that the Carraway Bluff Mitigation Project

will generate are detailed in **Table 1, Appendix A**. Where viable, buffer mitigation credits can be converted to nutrient offset credit in accordance with the Nutrient Offset Credit Trading Rule, 15A NCAC 02B .0703.

## ***2.2 Asset Map***

See **Figure 2, Appendix A**.

## **3 Baseline**

### ***3.1 Planting***

The initial planting of bare root trees occurred on March 15<sup>th</sup>, 2023. All riparian restoration areas are planted from top of bank back at least 50 feet from streams with bare root tree seedlings on a nine by six-foot spacing to achieve an initial density of approximately 800 trees per acre. In addition, these areas were seeded with an herbaceous seed mix to provide rapid herbaceous cover and promote immediate buffer effectiveness as well as habitat for pollinators and other wildlife. The seed blend contains both temporary and permanent seed and includes taproot species. The seed was sown utilizing broadcast seeding. Soil amendments were not done throughout the site due to the site already having fertile soil suitable for herbaceous and tree growth. Additionally, the site was ripped to encourage tree growth. Planting occurred in all areas proposed for riparian buffer restoration and meets the performance standards outlined in Rule 15A NCAC 02B .0295. This includes treating invasive species and planting of at least four species of native hardwood bare root trees. Mixed-Mesic Hardwood Forest (Coastal Plain subtype) (Schafale 2012) is the target community type and was used for all areas within the Project. This community composition is highly diverse and is suitable given the Project's soil and landscape characteristics and will provide water quality and ecological benefits. The list of planted bare root tree species and their percentage of total species composition can be found in **Appendix B**. Wherever possible, mature vegetation has been preserved and incorporated into the buffer.

### ***3.2 Other Activities***

Other activities involved with the Project included bank stabilization efforts, including grading, matting, and live staking where culverts were removed. It was determined that the most stable approach for the crossing outside the easement at BH2 was a culvert instead of the timber mat bridge. Seeding and livestaking occurred in the locations where the existing culverts are removed. All culvert removal activities were discussed with the USACE and NCDWR to confirm no buffer authorization nor nationwide permit was required for these construction activities as they were activities were exempt or deemed allowable and additionally where well under the threshold for Notification. A deer stand was left inside Carraway Bluff Phase II easement with approval of NCDWR due to nesting owls residing inside. Construction activities are called out in **Figure 3**.

## **4 Annual Monitoring**

### ***4.1 Methods***

Annual vegetation monitoring and visual assessments will be conducted. Monitoring plots were installed a minimum of 100 meters squared in size and cover at least two percent of the planted mitigation area. These plots were randomly placed throughout the planted riparian buffer mitigation area (16.25 acres) and are representative of the riparian restoration conditions. The following data is recorded for all trees in the plots: species, height, planting date (or volunteer), and grid location. All stems in plots are flagged with flagging

tape. Data is processed using the “Vegetation Table Shiny Tool” made available by DMS in December 2021 and is reported in accordance with the most recent DMS requirements and templates. In the field, the four corners of each plot were permanently marked with PVC at the origin and metal conduit at the other corners. There are 14 fixed vegetation monitoring plots (**Figure 3**). These plots were planted and monitored in conjunction with plots 15-41 of the Carraway Bluff Phase II project site.

Photos are to be taken at all vegetation plot origins each monitoring year and be provided in the annual reports. Visual inspections and photos will be taken to ensure that areas are being maintained and compliant. The measures of vegetative success for the Project are the survival of at least four native hardwood tree species, where no one species is greater than 50 percent of stems, at a density of at least 260 stems per acre at the end of Year 5. Native volunteer species may be included to meet the performance standards as determined by NC Division of Water Resources (DWR).

A visual assessment of the conservation easement is also performed each year to confirm:

- Easement boundary markers/signage are in good condition throughout the site;
- No encroachment has occurred;
- No invasive species in areas where invasive species were treated;
- Diffuse flow is being maintained in the conservation easement areas; and
- There has not been any cutting, clearing, filling, grading, or similar activities that would negatively affect the functioning of the buffer.

Component/ Feature	Monitoring	Maintenance through project close-out
Vegetation	Annual vegetation monitoring	Vegetation shall be maintained to ensure the health and vigor of the targeted plant community. Routine vegetation maintenance and repair activities may include supplemental planting, pruning, mulching, and fertilizing. Exotic invasive plant species shall be treated by mechanical and/or chemical methods. Any vegetation requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations. Vegetation maintenance activities will be documented and reported in annual monitoring reports. Vegetation maintenance will continue through the monitoring period.
Invasive and Nuisance Vegetation	Visual Assessment	Invasive and noxious species will be monitored and treated so that none become dominant or alter the desired community structure of the Project. Locations of invasive and nuisance vegetation will be mapped.
Project Boundary	Visual Assessment	Project boundaries shall be identified in the field to ensure clear distinction between the mitigation project and adjacent properties. Boundaries are marked with signs identifying the property as a mitigation project and will include the name of the long-term steward and a contact number. Boundaries may be identified by fence, marker, bollard, post, tree-blazing, or other means as allowed by Project conditions and/or conservation easement. Boundary markers disturbed, damaged, or destroyed will be repaired and/or replaced on an as-needed basis. Easement monitoring and staking/signage maintenance will continue in perpetuity as a stewardship activity.

#### **4.2 Vegetation Assessment Tables**

See **Appendix B**.

#### **4.3 Results and Discussion**

Establishment and monitoring of 14 fixed vegetation plots was completed on March 16<sup>th</sup> and 21<sup>st</sup>, 2023. Vegetation tables are in **Appendix B** and associated photos are in **Appendix C**. MY0 monitoring data indicates that all plots are exceeding the interim performance of 260 planted stems per acre. Planted stem densities ranged from 567 to 931 planted stems per acre with a mean of 772 planted stems per acre across

all plots. A total of 10 species were documented within the plots. Volunteer species were not noted at baseline monitoring but are expected to establish in upcoming years. The average tree height observed was 1.3 feet.

Visual assessment of vegetation outside of the monitoring plots indicates that the herbaceous vegetation is becoming well established throughout the project. Some invasives have been observed and treated as necessary. Easement boundary markers and signs are clearly visible and in good condition. Additionally, there were no signs of encroachment or undocumented concentrated flow in the easement area.

#### ***4.4 Maintenance and Management***

Supplemental planting along the top of bank of BH1 and BH2 was completed on May 30<sup>th</sup> and June 22<sup>nd</sup>. To maintain diffuse flow throughout the conservation easement two engineered sediment packs were installed on the erosional features on BH2, and Carraway Creek. Coir mat logs and additional planting will also be implemented around the erosional features to promote diffuse flow. The engineered sediment packs were completed on June 15<sup>th</sup> and 23<sup>rd</sup>. Associated photos are included in **Appendix C**.

Project boundary will continue to be monitored for encroachment and conservation easement markings will be replaced if damaged. Invasive and noxious species will be monitored and treated so that none become dominant or alter the desired community structure of the Project.

## **5 References**

NC Environmental Management Commission. 2014. Rule 15A NCAC 02B.0295 - Mitigation Program Requirements for the Protection and Maintenance of Riparian Buffers.

NC Environmental Management Commission. 2020. Rule 15A NCAC 02B.0714 – Neuse River Basin: Nutrient Sensitive Waters Management Strategy: Protection and Maintenance of Existing Riparian Buffers.

NC Department of Environmental Quality, Division of Mitigation Services. 2021. Vegetation Table Shiny Tool. [https://ncdms.shinyapps.io/Veg\\_Table\\_Tool/](https://ncdms.shinyapps.io/Veg_Table_Tool/).

Resource Environmental Solutions, LLC (2022). Carraway Bluff Mitigation Project. Final Mitigation Plan.

Schafale, M.P. 2012. Classification of the Natural Communities of North Carolina, Fourth Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, NCDENR, Raleigh, NC.

# **Appendix A**

## **Background Tables & Site Maps**



**Table 1. Carraway Bluff, DMS Project #100186, Project Credits.**

Neuse 03020201 - Outside Falls Lake		Project Area															
19.16394		N Credit Conversion Ratio (ft <sup>2</sup> /pound)															
N/A		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	Carraway Creek, Neuse River, BH1, BH2	203,342	203,342	1	100%	1.00000	Yes	203,342.000	Yes	10,610.657	—	
Buffer	Rural	Yes	I / P	Restoration	101-200	Carraway Creek, Neuse River, BH1, BH2	98	98	1	33%	3.03030	Yes	32.340	Yes	5.114	—	
Buffer	Rural	Yes	I / P	Restoration	0-100	Carraway Creek, BH1 (1998 Cleared)	370,511	370,511	1	100%	1.00000	Yes	370,511.000	No	—	—	
Buffer	Rural	Yes	I / P	Restoration	101-200	Carraway Creek, BH1 (1998 Cleared)	34,783	34,783	1	33%	3.03030	Yes	11,478.401	No	—	—	
Buffer	Rural	No	I / P	Restoration	0-100	BH3	12,497	12,497	1	100%	1.00000	Yes	12,497.000	Yes	652.110	—	
Buffer	Rural	No	I / P	Restoration	0-100	BH3 (1998 Cleared)	8,551	8,551	1	100%	1.00000	Yes	8,551.000	No	—	—	
Buffer	Rural	No	Ditch	Restoration	0-50	D4	29,258	29,258	1	100%	1.00000	Yes	29,258.000	Yes	1,526.722	—	
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<b>Totals (ft<sup>2</sup>):</b>							<b>659,040</b>	<b>659,040</b>									
<b>Total Buffer (ft<sup>2</sup>):</b>							<b>659,040</b>	<b>659,040</b>						<b>635,669.742</b>		<b>12,794.603</b>	<b>0.000</b>
<b>Total Nutrient Offset (ft<sup>2</sup>):</b>							<b>0</b>	<b>N/A</b>									

<b>Total Ephemeral Area (ft<sup>2</sup>) for Credit:</b>	<b>0</b>	<b>0</b>	<b>Ephemeral Reaches as % TABM</b>
<b>Total Eligible Ephemeral Area (ft<sup>2</sup>):</b>	<b>179,865</b>	<b>0.0%</b>	
<b>Total Eligible for Preservation (ft<sup>2</sup>):</b>	<b>219,680</b>	<b>6.9%</b>	

Enter Preservation Credits Below

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
	Rural	Yes	I / P		0-100	Carraway Creek	60,418	60,418	10	100%	10.00000	6,041.800
												—
												—
												—
<b>Preservation Area Subtotals (ft<sup>2</sup>):</b>							<b>60,418</b>	<b>60,418</b>				

TOTAL AREA OF BUFFER MITIGATION (TABM)		
Mitigation Totals	Square Feet	Credits
<b>Restoration:</b>	659,040	635,669.742
<b>Enhancement:</b>	0	0.000
<b>Preservation:</b>	60,418	6,041.800
<b>Total Riparian Buffer:</b>	719,458	641,711.542
TOTAL NUTRIENT OFFSET MITIGATION		
Mitigation Totals	Square Feet	Credits
<b>Nutrient Offset:</b>	<b>Nitrogen:</b>	0
	<b>Phosphorus:</b>	0.000

**Table 2: Summary: Goals, Performance and Results**

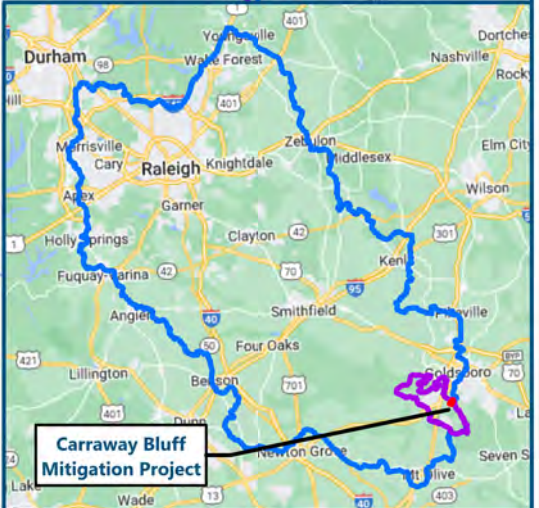
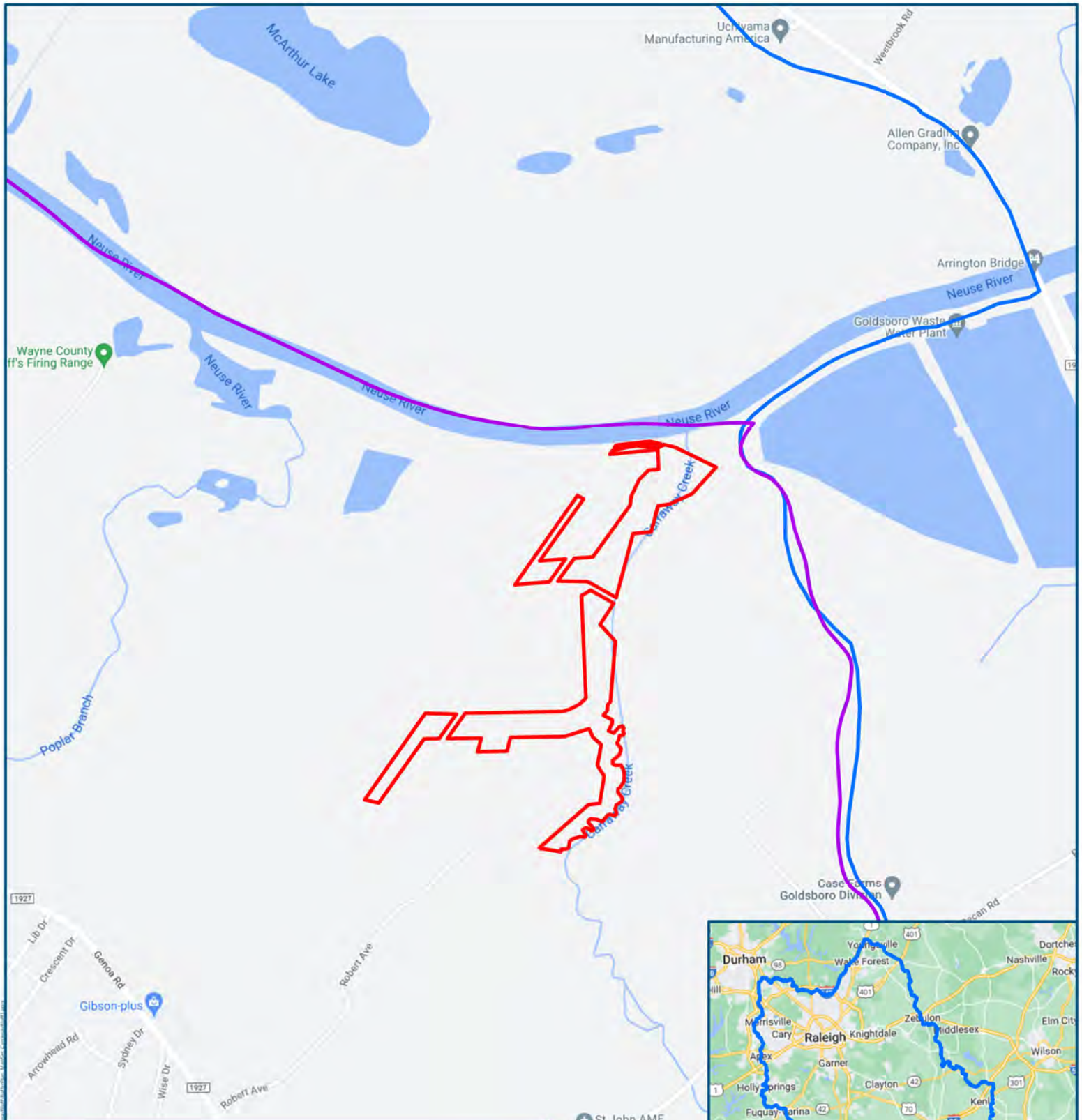
Goal	Objective/Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Restore and preserve native vegetation.	Established and increased forested riparian buffers to 50 feet and greater along both sides of the channel along the project reaches with a hardwood riparian plant community;	Reduction in floodplain sediment inputs from runoff, increased bank stability, increased LWD, and increased organic material in streams	Survival of at least four native hardwood tree species, where no one species is greater than 50 percent of stems, at a density of at least 260 stems per acre at the end of MY5	14 fixed vegetation plots	All plots passed with 10 species found across the site and mean of 772 planted stems per acre across all plots.

<b>Table 3. Project Attribute Table</b>			
Project Name	Carraway Bluff Mitigation Project		
County	Wayne		
Project Area (acres)	25.39		
Planted Area (acres)	16.25		
Project Coordinates (latitude and longitude decimal degrees)	35.3280007, -78.010718		
<b>Project Watershed Summary Information</b>			
Physiographic Province	Rolling Coastal Plain		
River Basin	Neuse		
USGS Hydrologic Unit 8-digit	3020201		
DWR Sub-basin	03-04-12		
<b>Regulatory Considerations</b>			
Parameters	Applicable?	Resolved?	Supporting Docs?
Water of the United States - Section 404	No	N/A	N/A
Water of the United States - Section 401	No	N/A	N/A
Buffer Authorization - Neuse Riparian Buffer Protection Rules	Yes	Yes	N/A
Endangered Species Act	Yes	Yes	Categorical Exclusion
Historic Preservation Act	Yes	Yes	Categorical Exclusion
Coastal Zone Management Act (CZMA or CAMA)	No	N/A	N/A
Essential Fisheries Habitat	No	N/A	N/A




**Table 4. Project Timeline and Contacts**

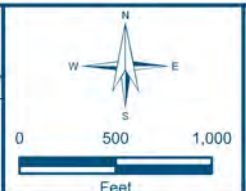
<b>Activity or Deliverable</b>	<b>Data Collection Complete</b>	<b>Task Completion or Deliverable Submission</b>
Project Instituted	N/A	Dec-20
Mitigation Plan Approved	N/A	Dec-22
Construction (Grading) Completed	N/A	Mar-23
Planting Completed	N/A	Mar-23
As-built Survey Completed	Mar-23	Apr-23
MY-0 Baseline Report	Mar-23	May-23
MY1+ Monitoring Reports		
Remediation Items (e.g. beaver removal, supplements, repairs etc.)		
Encroachment		

<b>Carraway Bluff #100186</b>	
<b>Provider</b>	RES / 3600 Glenwood Ave., Suite 100, Raleigh, NC 27612
Mitigation Provider POC	Jamey Mceachran (919) 623-9889
<b>Designer</b>	RES / 3600 Glenwood Ave., Suite 100, Raleigh, NC 27612
Primary project design POC	Frasier Mullen, PE (919) 412-3866
<b>Construction Contractor</b>	RES / 3600 Glenwood Ave., Suite 100, Raleigh, NC 27612
Construction contractor POC	Vic Vanover



**Legend**

-  Recorded Easement
-  Neuse River Basin - 03020201 (Excluding Falls Lake Watershed)
-  14-Digit HUC (03020201170060)



**Figure 1 - Site Location**

**Carraway Bluff Mitigation Project**

Wayne County, North Carolina

Date: 5/18/2023

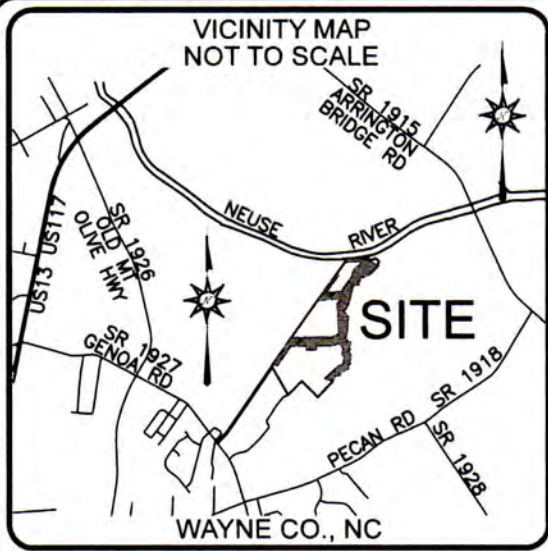
Drawn by: MDE

Checked by: JRM

1:12,000

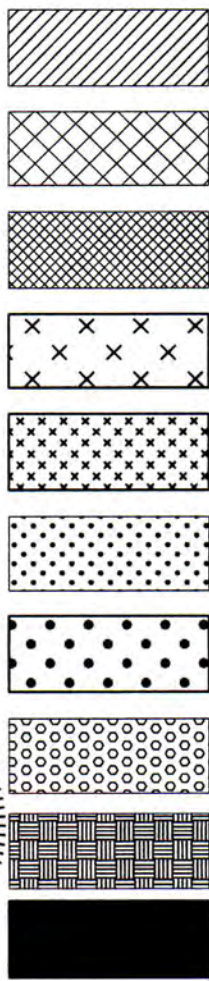


CARRAWAY BLUFF MITIGATION SITE



I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, CERTIFY THAT THIS BUFFER MAP WAS DRAWN UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, THAT THE EASEMENT BOUNDARY IS BASED ON PLAT BOOK SEE , PG NOTES RECORDED IN WAYNE COUNTY REGISTER OF DEEDS OFFICE, AND THAT THE BUFFER AREAS SHOWN ARE CALCULATED FROM AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 7th DAY OF JULY, 2023.

*Elisabeth G. Turner*  
 ELISABETH G. TURNER, P.L.S. #L-4440

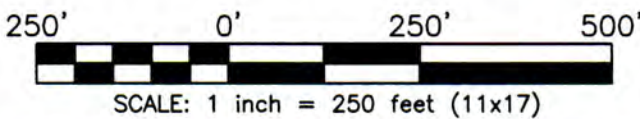
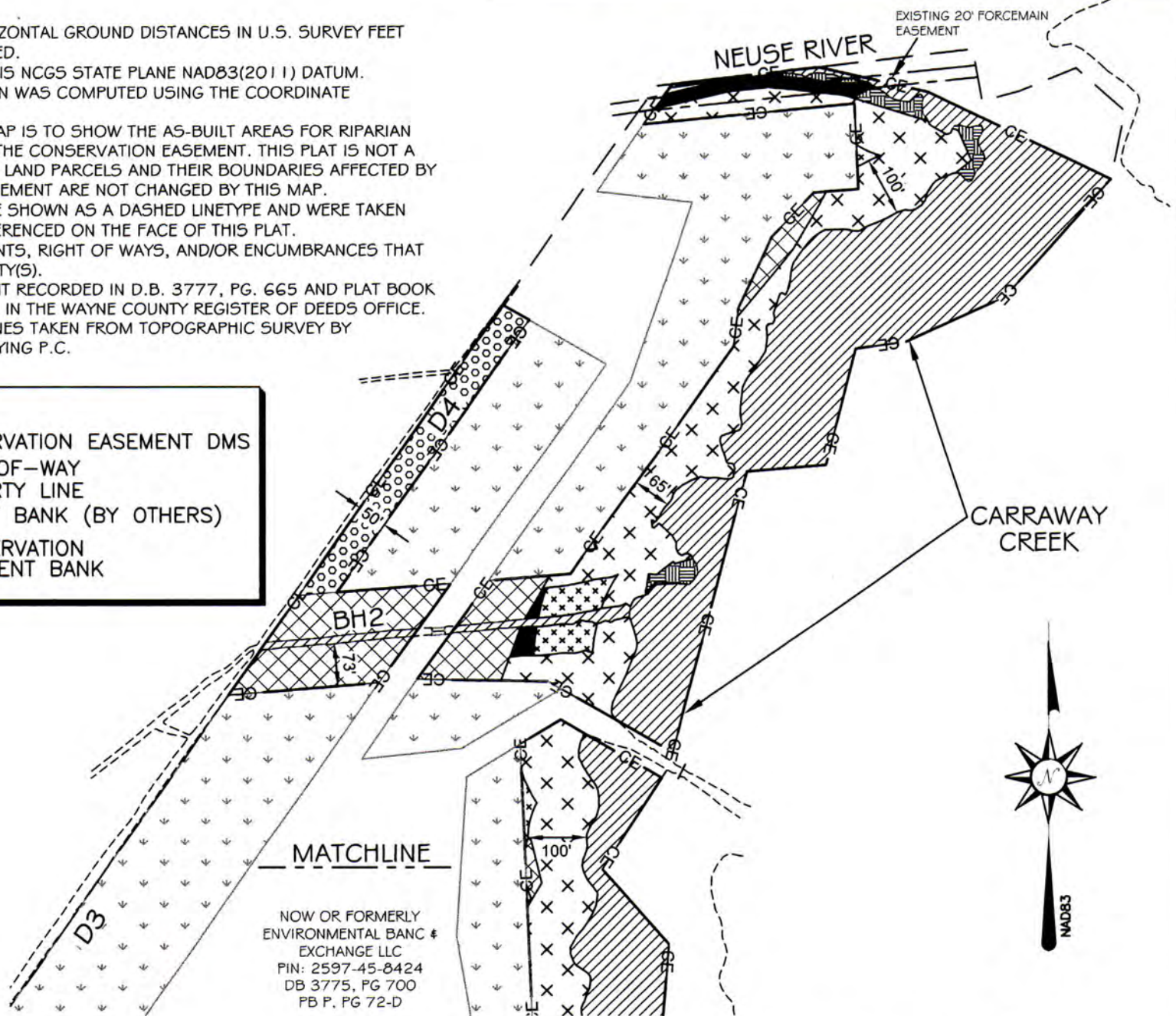
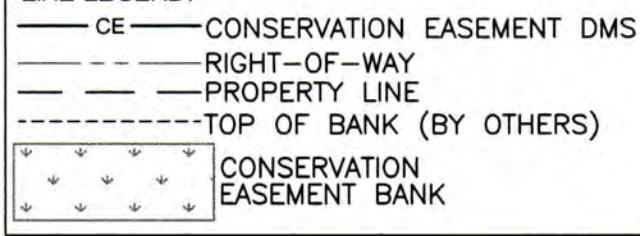


Riparian Buffer Credit:	SQ. FT.	Acres
Streams & Ditches	331,974	7.621
Riparian Restoration 0'-100'	203,342	4.668
Riparian Restoration 101'-200'	98	0.002
Riparian Restoration 0'-100' (1998 cleared)	370,511	8.506
Riparian Restoration 101'-200' (1998 cleared)	34,783	0.799
Riparian Restoration (BH3) 0'-100' (Non-Subject)	12,497	0.287
Riparian Restoration (BH3) 0'-100' (Non-Subject 1998 cleared)	8,551	0.196
Riparian Restoration (D4) 0'-50' (Non-Subject)	29,258	0.672
Riparian Preservation 0'-100'	60,418	1.387
No Credit	54,862	1.259
<b>Total CE Area</b>	<b>1,106,294</b>	<b>25.397</b>

GENERAL NOTES:

1. ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED.
2. THE BASIS OF BEARINGS IS NCGS STATE PLANE NAD83(2011) DATUM.
3. THE AREA SHOWN HEREON WAS COMPUTED USING THE COORDINATE COMPUTATION METHOD.
4. THE PURPOSE OF THIS MAP IS TO SHOW THE AS-BUILT AREAS FOR RIPARIAN BUFFER CREDITS WITHIN THE CONSERVATION EASEMENT. THIS PLAT IS NOT A BOUNDARY SURVEY. THE LAND PARCELS AND THEIR BOUNDARIES AFFECTED BY THIS CONSERVATION EASEMENT ARE NOT CHANGED BY THIS MAP.
5. LINES NOT SURVEYED ARE SHOWN AS A DASHED LINETYPE AND WERE TAKEN FROM INFORMATION REFERENCED ON THE FACE OF THIS PLAT.
6. SUBJECT TO ALL EASEMENTS, RIGHT OF WAYS, AND/OR ENCUMBRANCES THAT MAY AFFECT THE PROPERTY(S).
7. CONSERVATION EASEMENT RECORDED IN D.B. 3777, PG. 665 AND PLAT BOOK P, PG. 72-F (SHEETS 1-3) IN THE WAYNE COUNTY REGISTER OF DEEDS OFFICE.
8. STREAM TOP OF BANK LINES TAKEN FROM TOPOGRAPHIC SURVEY BY ASCENSION LAND SURVEYING P.C.

LINE LEGEND:



SCALE: 1 inch = 250 feet (11x17)

THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.

SHEET 1 OF 2	SCALE: 1" = 250'	FILE: CARRAWAY BLUFF DMS BUFFER AB (REV)	RES PROJECT: 102907	REVIEWED BY: EGT	DRAWN BY: EGT	SURVEYED BY: SEE NOTE #8	DATE: 7/17/2023	AS-BUILT SURVEY OF BUFFER AREAS FOR		REVISIONS, DATE AND INITIAL:	
								CARRAWAY BLUFF MITIGATION SITE		res	
NC DMS PROJ. # 100186 NEUSE RIVER BASIN BROGDEN TOWNSHIP WAYNE COUNTY NORTH CAROLINA								P.O. BOX 148 SWANNANOVA, NC 28778 (919) 829-9909 www.res.us F-1428			

# CARRAWAY BLUFF MITIGATION SITE



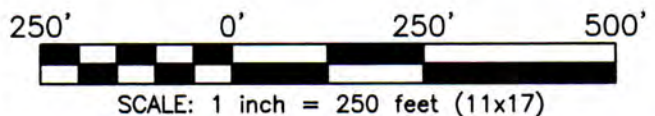
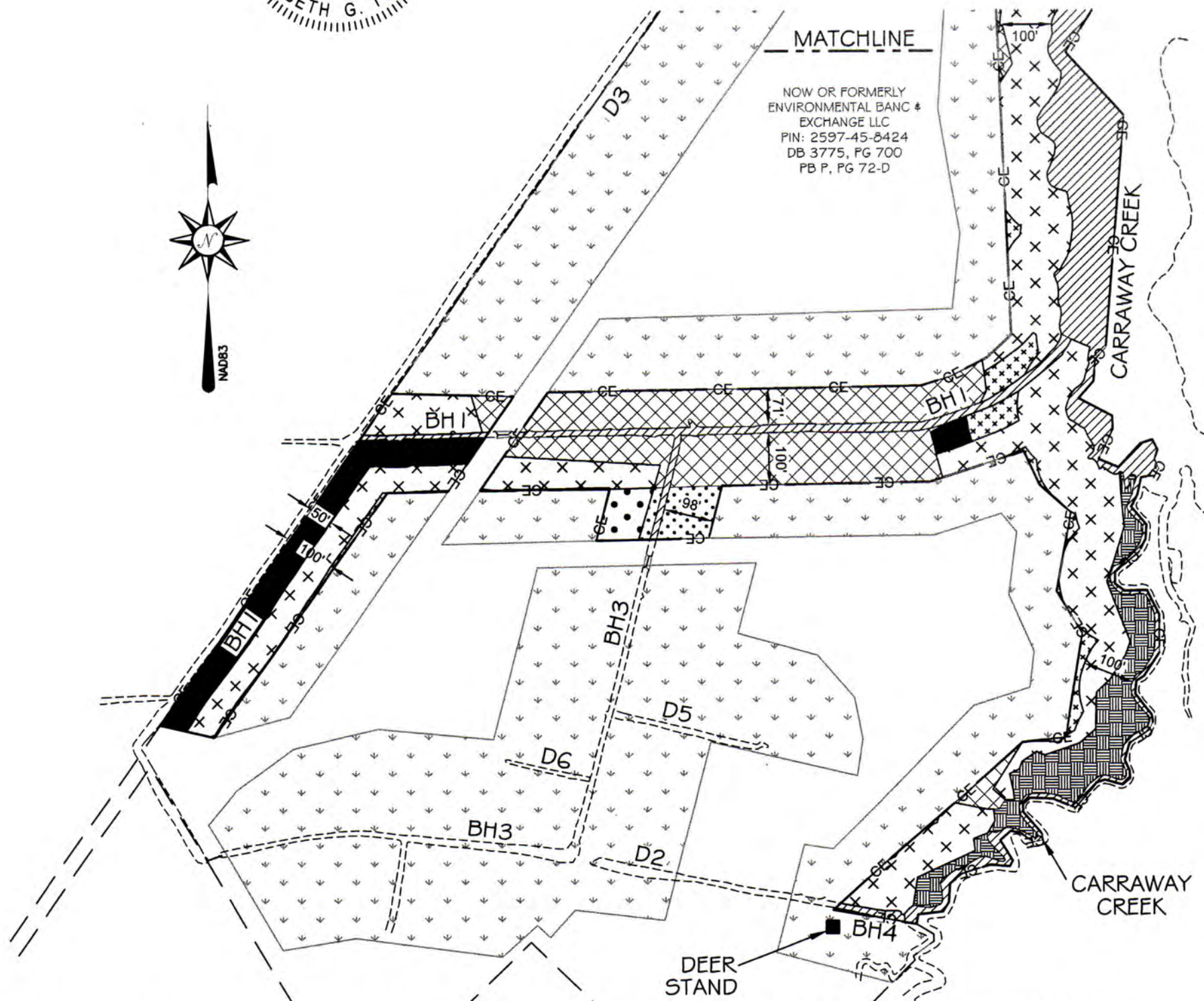
**NOTES:**  
 1. SEE SHEET 1 FOR BUFFER AREA SUMMARY AND GENERAL NOTES.

I, ELISABETH G. TURNER, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, CERTIFY THAT THIS BUFFER MAP WAS DRAWN UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, THAT THE EASEMENT BOUNDARY IS BASED ON PLAT BOOK SEE, PG NOTES RECORDED IN WAYNE COUNTY REGISTER OF DEEDS OFFICE, AND THAT THE BUFFER AREAS SHOWN ARE CALCULATED FROM AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 7th DAY OF JULY, 2023.

*Elisabeth G. Turner*  
 ELISABETH G. TURNER, P.L.S. #L-4440

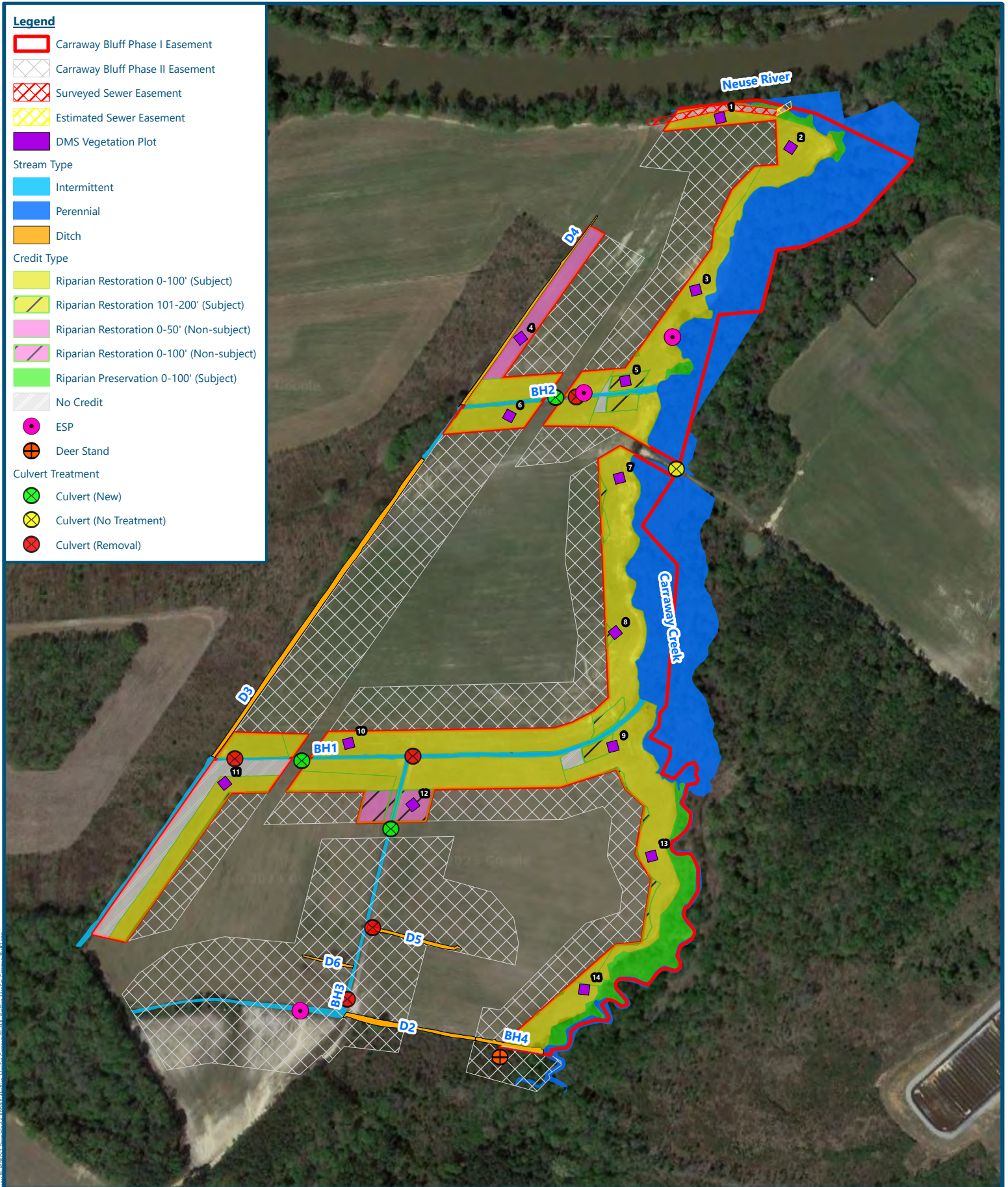


LINE LEGEND:	
	CE — CONSERVATION EASEMENT DMS
	— RIGHT-OF-WAY
	— PROPERTY LINE
	— TOP OF BANK (BY OTHERS)
	CONSERVATION EASEMENT BANK

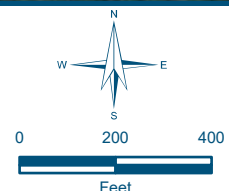
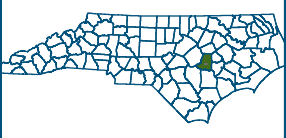


THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.

SHEET <b>2 of 2</b>	SCALE: 1" = 250'	FILE: CARRAWAY BLUFF DMS BUFFER_06.rvt	RES PROJECT: 102907	REVIEWED BY: EGT	DRAWN BY: EGT	SURVEYED BY: SEE NOTE #8	DATE: 7/7/2023	<b>AS-BUILT SURVEY OF BUFFER AREAS FOR                  CARRAWAY BLUFF MITIGATION SITE</b> NC DMS PROJ. # 100186      NEUSE RIVER BASIN BROGDEN TOWNSHIP      WAYNE COUNTY      NORTH CAROLINA	REVISIONS, DATE AND INITIAL: 	P.O. BOX 148 SWANNANOVA, NC 28778 (919) 829-9909 www.res.us F-1428
	THIS MAP IS NOT FOR RECORDATION, SALES, OR CONVEYANCES AND DOES NOT COMPLY WITH G.S. 47-30 MAPPING REQUIREMENTS.								REVISIONS, DATE AND INITIAL:	P.O. BOX 148 SWANNANOVA, NC 28778 (919) 829-9909 www.res.us F-1428



- Legend**
- Carraway Bluff Phase I Easement
  - Carraway Bluff Phase II Easement
  - Surveyed Sewer Easement
  - Estimated Sewer Easement
  - DMS Vegetation Plot
- Stream Type**
- Intermittent
  - Perennial
  - Ditch
- Credit Type**
- Riparian Restoration 0-100' (Subject)
  - Riparian Restoration 101-200' (Subject)
  - Riparian Restoration 0-50' (Non-subject)
  - Riparian Restoration 0-100' (Non-subject)
  - Riparian Preservation 0-100' (Subject)
  - No Credit
- Culvert Treatment**
- Culvert (New)
  - Culvert (No Treatment)
  - Culvert (Removal)
- Other Symbols**
- ESP
  - Deer Stand



**Figure 3 - CCPV MY0**  
**Carraway Bluff Mitigation Project**

Wayne County, North Carolina

Date: 6/23/2023
Drawn by: HRG
Checked by: JRM
1 in = 400 ft





# **Appendix B**

## Vegetation Assessment Data

**Planted Species Summary.**

<b>Common Name</b>	<b>Species</b>	<b>% of Total Species - Proposed</b>	<b>% of Total Species - Actual</b>	<b>Planted Amount</b>
<b>River Birch</b>	<i>Betula nigra</i>	15%	16%	2,080
<b>Buttonbush</b>	<i>Cephalanthus occidentalis</i>	5%	6%	780
<b>Persimmon</b>	<i>Diospyros virginiana</i>	5%	5%	650
<b>American Sycamore</b>	<i>Platanus occidentalis</i>	15%	15%	1,950
<b>Overcup Oak</b>	<i>Quercus lyrata</i>	10%	11%	1,430
<b>Swamp Chestnut Oak</b>	<i>Quercus michauxii</i>	10%	9%	1,170
<b>Water Oak</b>	<i>Quercus nigra</i>	10%	8%	1,040
<b>Willow Oak</b>	<i>Quercus phellos</i>	10%	8%	1,040
<b>Northern Red Oak</b>	<i>Quercus rubra</i>	10%	8%	1,040
<b>Shumard's Oak</b>	<i>Quercus shumardii</i>	10%	14%	1,820
<b>Total:</b>				<b>13,000</b>

Planted Acreage	16.25
Date of Initial Plant	2023-03-15
Date(s) of Supplemental Plant(s)	NA
Date(s) Mowing	NA
Date of Current Survey	2023-03-16
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		Veg Plot 7 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	<i>Betula nigra</i>	river birch	Tree	FACW	4	4	3	3	2	2	1	1						
	<i>Cephalanthus occidentalis</i>	common buttonbush	Shrub	OBL			1	1	1	1			4	4	1	1		4
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC	2	2			2	2	2	2						
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	2	2	4	4	1	1			1	1	4	4		3
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL	2	2	1	1	3	3	2	2	1	1				
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW					2	2	5	5	2	2				1
	<i>Quercus nigra</i>	water oak	Tree	FAC	1	1	4	4	2	2	2	2	1	1	3	3	3	1
	<i>Quercus phellos</i>	willow oak	Tree	FACW	1	1	4	4	3	3	3	3	4	4	2	2	3	3
	<i>Quercus rubra</i>	northern red oak	Tree	FACU	2	2	1	1	1	1	2	2	2	2	6	6	3	3
	<i>Quercus shumardii</i>	Shumard's oak	Tree	FAC	2	2	2	2	2	2	1	1	3	3	2	2	2	2
Sum	Performance Standard				16	16	20	20	19	19	18	18	18	18	24	24	17	17
Mitigation Plan Performance Standard	Current Year Stem Count					16	20	19	19	18	18	18	18	24	24	17	17	
	Stems/Acre					648	810	769	769	729	729	729	729	972	972	688	688	
	Species Count					8	8	10	10	8	8	8	8	25	25	7	7	
	Dominant Species Composition (%)					25	20	16	16	28	28	22	22	25	25	24	24	
	Average Plot Height (ft.)					2	2	2	2	2	2	1	1	1	1	1	1	
% Invasives					0	0	0	0	0	0	0	0	0	0	0	0		
Post Mitigation Plan Performance Standard	Current Year Stem Count					16	20	19	19	18	18	18	18	24	24	17	17	
	Stems/Acre					648	810	769	769	729	729	729	729	972	972	688	688	
	Species Count					8	8	10	10	8	8	8	8	25	25	7	7	
	Dominant Species Composition (%)					25	20	16	16	28	28	22	22	25	25	24	24	
	Average Plot Height (ft.)					2	2	2	2	2	1	1	1	1	1	1	1	
% Invasives					0	0	0	0	0	0	0	0	0	0	0	0		
Species Included in Approved Mitigation Plan	<i>Betula nigra</i>	river birch	Tree	FACW	4	4	1	1	2	2	3	3	4	4			7	7
	<i>Cephalanthus occidentalis</i>	common buttonbush	Shrub	OBL	1	1			2	2					1	1	2	2
	<i>Diospyros virginiana</i>	common persimmon	Tree	FAC	1	1	2	2									7	7
	<i>Platanus occidentalis</i>	American sycamore	Tree	FACW	3	3	8	8	5	5	4	4	5	5	4	4	7	7
	<i>Quercus lyrata</i>	overcup oak	Tree	OBL	4	4	2	2			3	3			1	1	2	2
	<i>Quercus michauxii</i>	swamp chestnut oak	Tree	FACW			3	3	5	5			2	2	4	4	1	1
	<i>Quercus nigra</i>	water oak	Tree	FAC	1	1	1	1	3	3	1	1	1	1	2	2	1	1
	<i>Quercus phellos</i>	willow oak	Tree	FACW	5	5	1	1					3	3	5	5	2	2
	<i>Quercus rubra</i>	northern red oak	Tree	FACU							6	6			2	2		
	<i>Quercus shumardii</i>	Shumard's oak	Tree	FAC	1	1	4	4	2	2	1	1	8	8	4	4	1	1
Sum	Performance Standard				20	20	22	22	19	19	18	18	23	23	23	23	23	23
Mitigation Plan Performance Standard	Current Year Stem Count					20	22	19	19	18	18	18	18	23	23	23	23	
	Stems/Acre					810	891	769	769	729	729	729	729	931	931	931	931	
	Species Count					8	8	8	8	6	6	6	6	22	22	8	8	
	Dominant Species Composition (%)					25	36	26	26	33	33	35	35	22	22	30	30	
	Average Plot Height (ft.)					1	1	1	1	1	1	1	1	1	1	1	1	
% Invasives					0	0	0	0	0	0	0	0	0	0	0	0		
Post Mitigation Plan Performance Standard	Current Year Stem Count					20	22	19	19	18	18	18	18	23	23	23	23	
	Stems/Acre					810	891	769	769	729	729	729	729	931	931	931	931	
	Species Count					8	8	8	8	6	6	6	6	22	22	8	8	
	Dominant Species Composition (%)					25	36	26	26	33	33	35	35	22	22	30	30	
	Average Plot Height (ft.)					1	1	1	1	1	1	1	1	1	1	1	1	
% Invasives					0	0	0	0	0	0	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.

Vegetation Performance Standards Summary Table												
	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 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	648	2	8	0	810	2	8	0	769	2	10	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 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	729	1	8	0	729	1	8	0	972	1	7	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 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	688	1	7	0	810	1	8	0	891	1	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 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	769	1	6	0	729	1	6	0	931	1	6	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 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	931	1	8	0	931	1	8	0				

\*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

**Visual Vegetation Assessment****Planted acreage****16.25**

<b>Vegetation Category</b>	<b>Definitions</b>	<b>Mapping Threshold</b>	<b>Combined Acreage</b>	<b>% of Planted Acreage</b>
Bare Areas	Very limited cover of both woody and herbaceous material.	0.10 acres	0.00	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10acres	0.00	0.0%
<b>Total</b>			<b>0.00</b>	<b>0.0%</b>
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10 acres	0.00	0.0%
<b>Cumulative Total</b>			<b>0.00</b>	<b>0.0%</b>

**Easement Acreage****50**

<b>Vegetation Category</b>	<b>Definitions</b>	<b>Mapping Threshold</b>	<b>Combined Acreage</b>	<b>% of Easement Acreage</b>
Invasive Areas of Concern	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. Species included in summation above should be identified in report summary.	0.10 acres	0.00	0.0%
Easement Encroachment Areas	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	# Encroachments noted	

# **Appendix C**

## **As-built Photos**

**Carroway Bluff Phase I General Site Photos MY0 2023**



Culvert removal (3/1/2023)



Culvert installation (2/28/2023)



Basal treatment on Chinese privet (3/1/2023)



Basal treatment on Bradford pear (3/1/2023)



Easement marker posts and signs installed (4/12/2023)



Easement Marker Replacement (4/12/2023)



**Carroway Bluff Phase I MY0 Vegetation Monitoring Plot Photos**



Vegetation Plot 1 (3/16/2023)



Vegetation Plot 2 (3/16/2023)



Vegetation Plot 3 (3/16/2023)



Vegetation Plot 4 (3/16/2023)



Vegetation Plot 5 (3/16/2023)



Vegetation Plot 6 (3/16/2023)



Vegetation Plot 7 (3/16/2023)



Vegetation Plot 8 (3/16/2023)



Vegetation Plot 9 (3/16/2023)



Vegetation Plot 10 (3/16/2023)



Vegetation Plot 11 (3/16/2023)



Vegetation Plot 12 (3/21/2023)



Vegetation Plot 13 (3/21/2023)



Vegetation Plot 14 (3/21/2023)

**Carraway Bluff Phase I MY0 Maintenance Photos**



Carraway Creek ESP (6/15/2023)



BH2 ESP (6/23/2023)



Supplemental planting along BH2 TOB (5/30/2023)



Supplemental planting along BH1 TOB (6/22/2023)