Annual Monitoring Report (MY3)

BOSEMAN BUFFER MITIGATION SITE

Edgecombe County, NC
NCDEQ Contract No. 7872
DMS ID No. 100119
DWR Project No. 2019-0800
RFP No. 16-007711

Prepared for:

Mitigation Services
ENVIRONMENTAL QUALITY

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

November 2022

ANNUAL MONITORING REPORT (MY3)

BOSEMAN BUFFER MITIGATION SITE

Edgecombe County, NC
NCDEQ Contract No. 7872
DMS ID No. 100119

Tar-Pamlico River Basin
HUC 03020101

Prepared For:

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

Prepared By:

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This Annual Monitoring Report has been written in conformance with the requirements of the following:

- 15A NCAC 02B.0295 Mitigation Program Requirements for Protection and Maintenance of Riparian Buffers.

These documents govern DMS operations and procedures for the delivery of compensatory mitigation.

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APPENDICES

1.0 Mitigation Project Summary

The Boseman Buffer Mitigation Site (Site) is a riparian buffer and adjacent riparian areas restoration project located approximately 2.5 miles southeast of the Town of Rocky Mount in Edgecombe County, NC. The Site is approximately 14.91 acres (649,889 ft^2) of a total 276 ac tract situated along two unnamed tributaries to the Tar River. The project is located in a targeted local watershed (TLW) within the Tar-Pamlico River basin hydrologic unit code (HUC) 03020101120030 and Subasin 03-03-02. The unnamed tributaries flow into the Tar River approximately one and half miles downstream of the project. According to the as-built survey and most recent DWR Buffer Mitigation Calculation Tool V.2 (Updated 1/17/20), the Site is expected to generate 617,518.702 riparian buffer mitigation units (BMU) (Appendix 1: Table 2).

1.1 Project Goals

The major goals of the proposed buffer restoration project are to address agricultural runoff, including nutrients and sediment, protect the project site in perpetuity, and restore terrestrial habitat. The Boseman Buffer Mitgation Site will help to reduce future sediment and nutrient loading into the unnamed tributaries and downstream Tar River. It will also improve terrestrial habitats along this stream by establishing a riparian corridor and allowing the land to convert to forested communities.

The project goals and objectives are consistent with those of the NCDMS, and the specific goals outlined in the 2018 Tar-Pamlico RBRP for the 14-digit TLW HUC. As proposed, the Maple Swamp Buffer Mitigation Project will further help NCDMS to meet these goals.

1.2 Existing Site Conditions

The buffer restoration project contains approximately 14.9 acres of former agricultural fields along two unnamed tributaries (hereinafter referred to as UT 1, and UT 2).

UT 1 enters the project site along the western property boundary and flows in an eastward direction. UT 1 meets the definition of at least intermittent per the NCDWR On-Site Determination for Applicability to the Tar-Pamlico Buffer Rules Letter dated July 9, 2019 (Appendix 1). UT 2 originates within the property boundary as an ephemeral channel (Reach 2a) and transitions to an intermittent channel (Reach 2b) prior to it's confluence with UT 1.

The project was successfully planted with appropriate trees and herbaceouse vegetation and is now at the end of the third (3rd) full growing season and early stages of successful buffer restoration. The project restored forested riparian buffers and adjacent riparian areas to a maximum of approximately 115 feet from the top of bank of the streams and removed rotating crops and fertilizer inputs.

2.0 Regulatory Considerations

Riparian buffer and adjacent riparian area restoration was accomplished in accordance with the Consolidated Buffer Mitigation Rule (15A NCAC 02B .0295) including the alternative mitigation option of restoration activities along ephemeral streams. Restoration was accomplished specifically by:

Buffer Restoraiton on Ephemeral Channels (15A NCAC 02B .0295(o)(7)):

a.) NCDWR conducted an on-site stream determination of subject streams and ephemeral channels on the property
b.) Ephemeral channels are directly connected to intermittent or perennial stream channels
c.) Total mitigation area of ephemeral channels is less than 25% of the total buffer mitigation area (Table 2, Appendix 1).

All areas within 115 ft of the top of bank of subject streams as measured from the top of bank landward, will be devoted to generating riparian buffer mitigation credits. Total mitigation area on ephemeral channels is 12.7% of total buffer mitigation area. Mitigaiton credits generated are found in Table 2 in Appendix 1 and are based upon the most recent DWR Buffer Mitigation Calculation Tool v 2 (Updated 1/17/20)(Appendix 1).

3.0 Project Construction Summary

The project construction was completed in early March 2020, following mitigation plan approval. Eco Terra and supporting team members successfully planted and restored the proposed areas dedicated for riparian buffer and adjacent riparian area restoration with high quality native trees, shrubs, and herbaceous vegetation.

3.1 Riparian Area Restoration Activities

Restoration of the riparian areas involved planting bare root one to two-year-old trees and shrubs in designated planting zones based on soil wetness and in accordance with

the mitigation plan. Approximately 11,800 stems (791 stems/ac) were planted initially within the riparian areas designated for restoration.

4.0 Annual Monitoring and Performance Criteria

The Mitigation Program Requirements for Protection and Maintenance of Riparian Buffers (15A NCAC 02B .0295) and RFP 16-007711 set forth specific performance criteria for the successful development and close-out of the Boseman Buffer Mitigation Site. Performance criteria monitoring includes standardized vegetation plot establishment and annual monitoring for planted stems including individual plot photo documentation, overall site photo documentation, biannual visual assessments for project status and easement integrity including herbaceous and/or invasive species competition, stem mortality, stand health, incidental damage from agricultural equipment, and stem loss or damage from natural causes such as fire, disease, or animal predation. Figure 1 (Appendix 1) illustrates the location of project easement, permanent vegetation plots/photo points, as well as overall site photo points.

4.1 Vegetation

Twelve permanent vegetation plots were established according to the most recent Carolina Vegetation Survey (CVS) protocol within the restored buffer area. Representative vegetation plots were established at a minimum density of 2% of the planted area. Specifically, vegetation monitoring was obtained for all plots according to Level 1 protocols from the CVS-EEP Protocol for Recording Vegetation V4.2 (2008) manual. Monitoring year three (MY3) vegetation stem data is included in Appendix 3, Table 3. All vegetation plots meet criteria for stem densities and overall site density is 661 stems/ac. Overall tree vigor across the site is adequate for third (3rd) year survival and project success averaging 3.8 and overall tree height averaged 58.7 cm.

4.2 Photo Reference Stations

Individual plot photos taken at the southwest corner (origin) of each plot are included in this annual monitoring report. Additional Site reference photos were taken at designated points along the conservation easement boundary providing an overall view of the project success (Appendix 1: Figure 1). All photo points were located by survey and georeferenced for map production to provide a consistent means for photo replication annually and in the event a plot or photo location must be reestablished during the monitoirng period. Photo orientation (direction and bearing) were recorded as well as approximate vertical position for consistency in photo logging.

4.3 Visual Assessments

Additional observations were made of site conditions and vegetation conditions outside of monitoring plots. This biannual effort was made in order to appropriately monitor changing site conditions and address any issues to ensure Site success and performance criteria are met after the monitoring period. Any future Site problems will be noted and discussed in the annual reports and monitored biannually to ensure performance criteria are met following any remedial action.

4.4 Annual Reporting Performance Criteria

All monitoring reports, including this annual report, will be compiled and submitted to DMS annually in accordance with the Riparian Buffer and Nutrient Offset Buffer Baseline and Annual Monitoring Report Template Ver. 2.0 (May 2017). Annual monitoring will occur for a minum of five years or until performance criteria are met.

4.5 Maintenance and Contingency Plans

Any Site observations identified through vegetation plots or visual assessments, whereby the performance criteria is not met, will be noted and discussed in the annual reports and addressed with a contingency plan as necessary. DMS/NCDWR will be notified, and if necessary, collaborate with Eco Terra to develop a contingency plan with remedial action steps to correct the performance criteria deficiency. Any contingency plan and remedial actions will occur within an agreed timeframe and monitoring adjusted accordingly, if necessary. Site problem areas will be monitored biannually to ensure performance criteria are met following any remedial action.

5.0 References

15 NCAC 02B .0295 Mitigation Program Requirements for Protection and Maintenance of Riparian Buffers. 2015.

Lee, Michael T. Peet, Robert K., Steven D. Wentworth, Thomas R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2. http://cvs.bio.unc.edu/protocol/cvs-eep-protocol-v4.2-lev1-2.pdf

Natural Resources Conservation Service (NRCS). Web Soil Survey of Edgecombe County. 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.

North Carolina Department of Environmental Quality. Division of Mitigation Services (NCDMS). 2018. Tar-Pamlico River Basin Restoration Priorities.

APPENDIX 1

PROJECT DATA

Legend

- Vegetation Plot (N=12)
- Photo Points
- Conservation Easement 14.9 acres
- UT 1 (At Least Intermittent)
- UT 2 Reach 2a (Ephemeral)
- UT 2 Reach 2b (At Least Intermittent)
- Buffer Restoration (0-100') UT 1
- Buffer Restoration (101-200') UT 1
- Buffer Restoration (0-100') UT 2 Reach 2a (Ephemeral)
- Buffer Restoration (101-200') UT 2 Reach 2a (Ephemeral)
- Buffer Restoration (0-100') UT 2 Reach 2b
- Buffer Restoration (101-200') UT 2 Reach 2b

Origin Latitude/Longitude (Decimal Degrees)		
Plot Number	Y Coordinate	X Coordinate
1	35.96294899	-77.70073591
2	35.96341822	-77.70147906
3	35.96396443	-77.70243013
4	35.964284	-77.70433461
5	35.96448024	-77.70544498
6	35.96394198	-77.70670793
7	35.96322236	-77.7070397
8	35.96440173	-77.70664643
9	35.96480553	-77.70528385
10	35.96433174	-77.70271205
11	35.96408549	-77.70191544
12	35.9635377	-77.70111746

Note: Vegetation Plot photos are from the origin of the vegetation plot. The origin is located in the southwest corner of each plot.

Pp 8 Pp 9 Pp 10 Pp 11 Pp 4 Pp 3 Pp 2 Pp 12 Pp 7 Pp 5 Pp 6 Pp 1

8 9 5 4 10 11 6 3 12 2 7 1

NC Center for Geographic Information & Analysis

Current Condition Monitoring Plan View
Boseman Buffer Mitigation Site
Annual Monitoring Report (MY2)
Tar-Pamlico 03020101
Edgecombe County, North Carolina
December 2021

2017 Aerial from NCOneMap

N

200 100 0 200
Feet

Figure 3

Table 1: Buffer Project Attributes
Boseman Buffer Mitigation Site
DMS ID No. 100119
DWR Project No. 2019-0800
Monitoring Year 3 – 2022

Project Name	Boseman Buffer Mitigation Site
Hydrologic Unit Code	03020101
River Basin	Tar-Pamlico
Geographic Location (decimal degrees)	35.96451, -77.705926
Site Protection Instrument (BK, PG)	1707/675
Total Credits (BMU)	617,518.702
Types of Credits	Riparian Buffer
Mitigation Plan Date	January 2020
Initial Planting Date	March 2020
Baseline Report Date	May 2020
MY1 Report Date	December 2020
Supplemental Planting Date	February 2021
MY2 Report Date	December 2021
MY3 Report Date	December 2022
MY 4 Report Date	December 2023
MY 5 Report Date	December 2024
Close out Report Date/Visit	May 2025

Table 2: Buffer Project Components and Assets

Boseman Buffer Mitigation Site

DMS ID No. 100119

DWR Project No. 2019-0800

Monitoring Year 3 – 2022

BOSEMAN BUFFER MITIGATION SITE, PROJECT NO. 2019-0800, 617,518.702 CREDITS

Tar-Pamlico 03020101	**Project Area**
19.16394	**N Credit Conversion Ratio (ft^2/pound)**
297.54099	**P Credit Conversion Ratio (ft^2/pound)**

Credit Type	Location	Subject? (enter NO if ephemeral or ditch [1])	Feature Type	Mitigation Activity	Min-Max Buffer Width (ft)	Feature Name	Total Area (ft^2)	Total (Creditable) Area of Buffer Mitigation (ft^2)	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	UT1	484,072	484,072	1	100%	1.00000	Yes	484,072.000	N/A	0.000	0.000
Buffer	Rural	Yes	I / P	Restoration	101-200	UT1	6,496	6,496	1	33%	3.03030	Yes	2,143.682	N/A	0.000	0.000
Buffer	Rural	No	Ephemeral	Restoration	0-100	UT2 (Reach 2a)	78,631	78,631	1	100%	1.00000	Yes	78,631.000	N/A	0.000	0.000
Buffer	Rural	No	Ephemeral	Restoration	101-200	UT2 (Reach 2a)	82	82	1	33%	3.03030	Yes	27.060	N/A	0.000	0.000
Buffer	Rural	Yes	I / P	Restoration	0-100	UT2 (Reach 2b)	52,641	52,641	1	100%	1.00000	Yes	52,641.000	N/A	0.000	0.000
Buffer	Rural	Yes	I / P	Restoration	101-200	UT2 (Reach 2b)	12	12	1	33%	3.03030	Yes	3.960	N/A	0.000	0.000
						Totals:	621,934	621,934								

Enter Preservation Credits Below

Eligible for Preservation (ft^2): 207,311

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^2)	Initial Credit Ratio (x:1)	% Full Credit	Final Credit Ratio (x:1)	Riparian Buffer Credits
Buffer				Preservation								–
												–

Preservation Area Subtotal (ft^2):	0
Preservation as % Total Area of Buffer Mitigation:	0.0%
Ephemeral Reaches as % Total Area of Buffer Mitigation:	12.7%

TOTAL AREA OF BUFFER MITIGATION (TABM)		
Mitigation Totals	**Square Feet**	**Credits**
Restoration:	621,934	617,518.702
Enhancement:	0	0.000
Preservation:	0	0.000
Total Riparian Buffer:	621,934	617,518.702
TOTAL NUTRIENT OFFSET MITIGATION		
Mitigation Totals	**Square Feet**	**Credits**
Nutrient Offset: Nitrogen:	0	0.000
Nutrient Offset: Phosphorus:		0.000

1. The Randleman Lake buffer rules allow some ditches to be classified as subject according to 15A NCAC 02B .0250 (5)(a).

last updated 01/17/2020

APPENDIX 2

SITE PHOTO-POINTS

Photo-Points

Boseman Buffer Mitigation Site

DMS ID No. 100119

DWR Project No. 2019-0800

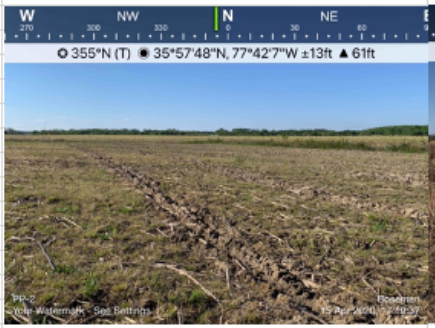
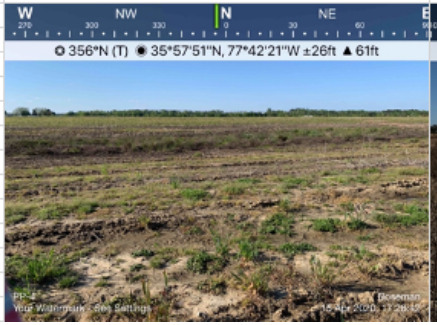
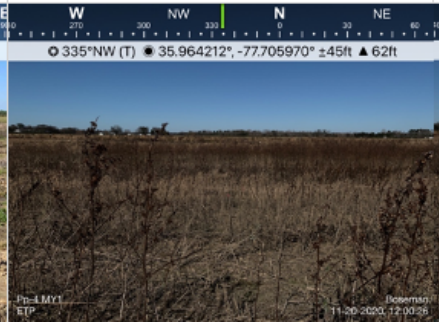
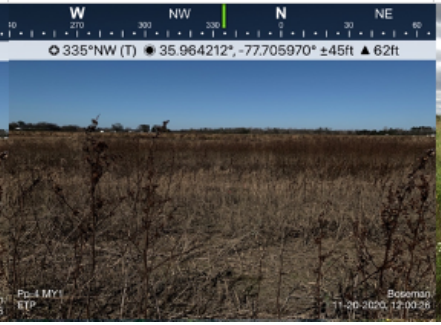
Photo Location	Baseline 2020	MY1 2020	MY2 2021	MY3 2022
Pp1				
Pp2				
Pp3				
Pp4				

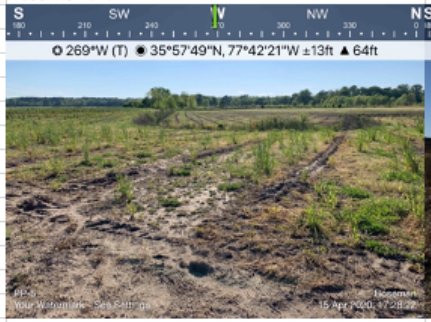
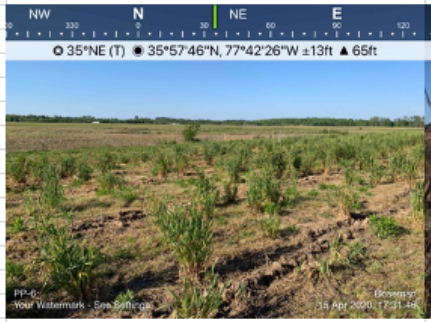
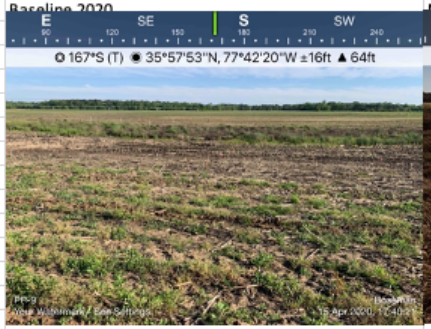
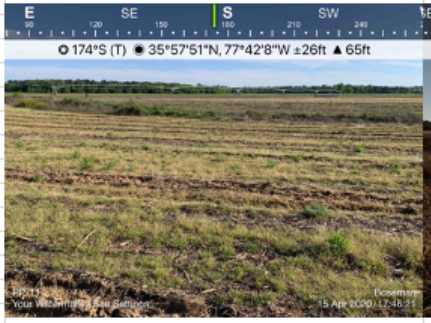
Photo Location	Baseline 2020	MY1 2020	MY2 2021	MY2 2021
Pp5				
Pp6				
Pp7				
Pp8				

Photo Location	Baseline 2020	MY1 2020	MY2 2021	MY3 2021
Pp9				
Pp10				
Pp11				
Pp12				

APPENDIX 3

VEGETATION PLOT DATA
VEGETATION PLOT PHOTOGRAPHS

Monitoring Plots

Boseman Buffer Mitigation Site

DMS ID No. 100119

DWR Project No. 2019-0800

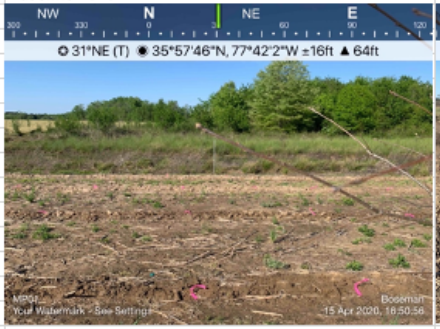
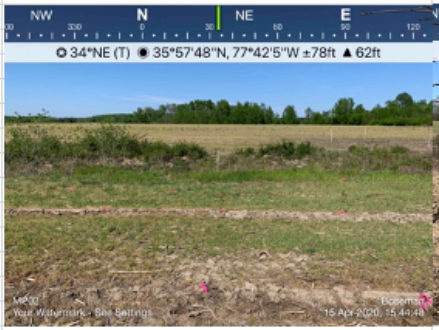
Photo Location	Baseline 2020	MY1 2020	MY2 2021	MY3 2022
MP1				
MP2				
MP3				
MP4				

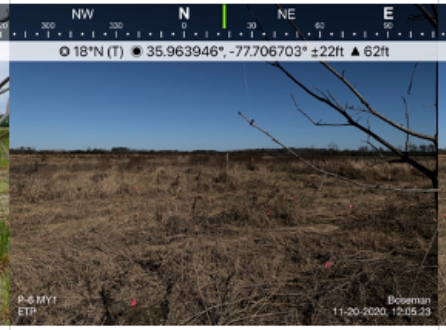
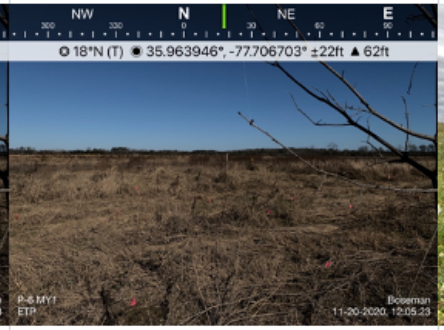
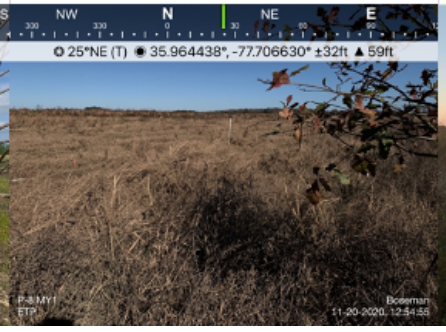
Photo Location	Baseline 2020	MY1 2020	MY2 2021	MY2 2021
MP5				
MP6				
MP7				
MP8				

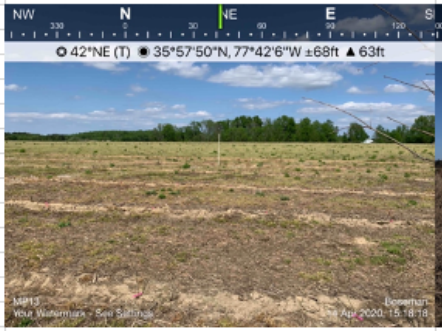
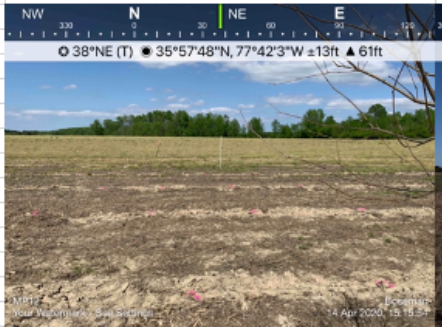
Photo Location	Baseline 2020	MY1 2020	MY2 2021	MY2 2021
MP9				
MP10				
MP11				
MP12				

Table 3: Planted and Total Stems

Boseman Buffer Mitigation Site
DMS ID No. 100119
DWR Project No. 2019-0800
Monitoring Year 3 – 2022

			Current Plot Data (MY3-2022)												Annual Summary			
Scientific Name	Common Name	Species Type	MP1	MP2	MP3	MP4	MP5	MP6	MP7	MP8	MP9	MP10	MP11	MP12	MY3 2022	MY2 2021	MY1 2020	MY0 2020
Betula nigra	river birch	Tree	1		2	2	2	3			1	1	1	1	14	22	2	
Cornus amomum	silky dogwood	Tree		6					4	1					11	12	14	24
Diospyros virginiana	persimmon	Tree	1	1	1			3	2			1	1	4	14	17	2	
Fraxinus pennsylvanica	green ash	Tree								1	2				3	4	4	4
Nyssa aquatica	swamp blackgum	Tree				1	3								4	7	5	10
Platanus occidentalis	sycamore	Tree	1		2			2	1	3	1	1	1		12	31	2	
Quercus laurifolia	laurel oak	Tree	1	2				2	1			1		1	8	6	17	19
Quercus lyrata	overcup oak	Tree				8	4		5	3		1			21	21	23	25
Quercus nigra	water oak	Tree	2	2	2			2	1		3	5	4	1	22	27	24	34
Quercus pagoda	cherry bark oak	Tree	1	2	1			2	2	1		1	1	3	14	17	2	
Quercus phellos	willow oak	Tree	1	2		2		10	5	3	2	5	8	10	48	49	59	75
Quercus shuardii	shumard oak	Tree	1	2	2	1	2	2	2	3	1			1	17	21	5	
Taxodium distichum	bald-cypress	Tree				4	2			1	1				8	11	1	
Cephalanthus occidentalis	buttonbush	Shrub																
		Stem count	9	17	10	18	13	26	23	16	11	16	16	21	196	245	160	191
		size (ares)	1	1	1	1	1	1	1	1	1	1	1	1	12	12	12	12
		Size (acres)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.30	0.30	0.30	0.30
		Species count	8	7	6	6	5	8	9	8	7	8	6	7	13	14	9	7
		Vigor	3.1	3.4	3.4	3.2	4	4	4	4	4	4	4	4	3.8	3.6	2.8	3.8
		Height (cm)	60.7	49.6	63.0	49.3	63.0	59.8	59.8	59.8	59.8	59.8	59.8	59.8	58.7	74.1	42.1	47.0
		Stems/acre	364	688	405	728	526	1052	931	647	445	647	647	850	661	826	540	644

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

Boseman Buffer Mitigation Site Aerial – MY3 (November 2022)

West View

Boseman Buffer Mitigation Site Aerial – MY3 (November 2022)

East View