MONITORING YEAR 5 ANNUAL REPORT

Final

BURNETTS CHAPEL BUFFER MITIGATION SITE
Guilford County, NC
NCDEQ Contract No. 003996
DMS ID No. 95009

Data Collection Period: July 2016
Final Submission Date: October 7, 2106

PREPARED FOR:

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

PREPARED BY:

1430 South Mint Street, Suite 104
Charlotte, NC 28203

Phone: 704.332.7754
Fax: 704.332.3306

EXECUTIVE SUMMARY

The Burnetts Chapel Buffer Mitigation Site, hereafter referred to as the Site, is located within the Randleman Regional Reservoir watershed of the Cape Fear River Basin (03030003). The Site is located in the Carolina Slate Belt of the Piedmont Physiographic Province (USGS, 1998) approximately three miles west of the Town of Pleasant Garden and four miles south of the City of Greensboro in Guilford County, NC. Directions and a map of the Site are provided in Figure 1 (Appendix 1). The Site has historically been forested or used for agricultural purposes. The project is surrounded by fields that are alternately used for cattle and crop production. A conservation easement has been recorded to protect 12 acres of riparian corridor resources in perpetuity. The project is being completed to provide 9.6 buffer mitigation units (BMUs) in the Cape Fear River Basin. The project includes 9.45 acres of buffer restoration and 1.59 acres of buffer preservation. Credits generated from buffer restoration on the Site are in accordance with the Randleman Lake Water Supply Watershed Rules, 15A NCAC 02B .0250 and .0252. The buffer preservation area was not originally included in the mitigation credit calculations for the project, but is now allowed under the consolidated buffer rule, 15A NCAC 02B .0295 (o)(1) for Retroactive Credit.

See Table 1 (Appendix 1) for a summary of project components and mitigation credits. A map of the conservation easement and project reaches is provided in Figure 2 (Appendix 1).

The goals of the Site address water quality improvements identified in the Cape Fear River Basin Restoration Priorities Report (RBRP) (NCEEP, 2009) and include the following:

- Remove harmful nutrients from creek flow;
- Reduce pollution of creek by excess sediment;
- Restore terrestrial habitat; and
- Improve aesthetics.

The following project objectives were established in the Burnetts Chapel Buffer Mitigation Site Mitigation Plan (2012) to meet the RBRP goals:

- Runoff will be filtered through buffer zones. Flood flows will be filtered through restored riparian areas, where flood flow will spread through native vegetation. Vegetation will be planted to uptake excess nutrients;
- Streambanks will be further stabilized by increased woody root mass in the banks. Storm flow containing grit and fine sediment will be filtered through restored riparian buffer areas, where flow will spread through native vegetation;
- The establishment and maintenance of riparian buffers will create long-term shading of the channel bed, reducing thermal heating and improving aquatic habitat; and
- Adjacent buffer and riparian habitats will be restored with native vegetation and invasive species will be treated as part of the project. Native vegetation will provide cover and food for terrestrial creatures.

Overall, the Site has met the required buffer mitigation success criteria for the fifth year of annual monitoring (MY5). Although one vegetation plot (6) did not meet the MY5 stem density criteria, the average stem density of the Site is greater than the required MY5 success criteria. There is a healthy development of volunteer species which increases the overall stem density of the site.

BURNETTS CHAPEL BUFFER MITIGATION SITE
Monitoring Year 5 Annual Report

TABLE OF CONTENTS

APPENDICES

Section 1: PROJECT OVERVIEW

The Burnetts Chapel Buffer Mitigation Site, hereafter referred to as the Site, is located within the Randleman Regional Reservoir watershed (North Carolina Division of Water Resources (NCDWR) Subbasin 03-06-08) of the Cape Fear River Basin (United States Geological Survey (USGS) Hydrologic Unit Code (HUC) 03030003010050). The Site is located in the Carolina Slate Belt of the Piedmont Physiographic Province (USGS, 1998) approximately three miles west of the Town of Pleasant Garden and four miles south of the City of Greensboro in Guilford County, NC. Directions and a map of the Site are provided in Figure 1 (Appendix 1).

The Site has historically been forested or used for agricultural purposes. The current property owner has confirmed that the Site has been farmed for more than 100 years and has included activities such as crop production, livestock pastures, and timber. The project is surrounded by fields that are alternately used for cattle and crop production. The Deep River is the primary river in this HUC which flows into the Randleman Reservoir. The reservoir is a regional water supply and stream buffer protection rules are in place throughout the watershed. The Site is comprised of two areas on one parcel of land along three perennial streams (Reaches A, B1, and B2) and four intermittent streams (Reaches B2, B3, B4, and B5) with upstream ephemeral channels that drain to the Randleman Reservoir. At the downstream limits of the project, the drainage area is 366 acres (0.6 square miles).

The NCDWR assigns best usage classifications to State Waters that reflect water quality conditions and potential resource usage. Deep River is classified as Class WS-IV; Critical Area (CA) waters. Class WS-IV waters are used as sources of water supply for drinking or food processing purposes where a more restrictive WS-I, WS-II, or WS-III classification is not feasible. These waters are also protected for Class C uses such as secondary recreation, fishing, wildlife, fish and aquatic life propagation and survival, and agriculture. WS-IV waters are generally in moderately to highly-developed watersheds or Protected Areas.

A conservation easement has been recorded to protect 12 acres of riparian corridor resources in perpetuity. The project is being completed to provide buffer mitigation units (BMUs) in the Cape Fear River Basin, and will include 9.6 BMUs in buffer restoration. See Table 1 (Appendix 1) for a summary of project components and mitigation credits. A map of the conservation easement and project reaches is provided in Figure 2 (Appendix 1).

1.1 Project Goals and Objectives

Prior to construction activities, the primary watershed stressor was the lack of a vegetated buffer and subsequent moderate stream incision from agricultural maintenance activities. Some reaches (A and B1) exhibited only moderate incision with stable bedform and stream banks throughout, while other reaches (B2) exhibited stable geomorphic conditions with no active bed incision or bank erosion. The riparian zones within these areas were maintained in the past and mowed on an annual basis resulting in varying buffer widths. The smaller intermittent channels with small upstream ephemeral channels are located entirely within existing open pasture. These reaches (B3, B4, and B5) entirely lacked suitable woody riparian species and were dominated by various grass and sedge species. As a result of the aforementioned land activities, the Site had poor water quality due to sediment and nutrient pollution and poor in-stream habitat due to lack of riparian vegetation and lack of in-stream bed diversity. The restored riparian buffer areas within the Site will filter harmful nutrients from runoff, reduce pollution of creek by excess sediment, restore the terrestrial habitat, and improve aesthetics.

As part of the site preparation, two small surface water impoundments, located on Reaches B4 and B5, were removed in order to allow for stable stream channels to be constructed and for these areas to qualify for buffer restoration credit. Riparian stream buffers were planted and restored to the dominant natural plant community that exists within the project watershed. This natural community within and adjacent to the project easement is classified as Piedmont Bottomland Forest and was determined based on existing canopy and herbaceous species (Schafale and Weakley, 1990). Plant and seed materials were installed on stream banks out to the project easement limits. These areas were planted with bare root trees and a seed mixture of permanent herbaceous vegetation ground cover. Tables 1-4 in Appendix 1 presents detailed information for pre and post restoration conditions.

The goals of the Site address water quality improvements identified in the Cape Fear River Basin Restoration Priorities Report (RBRP) (DMS, 2009) and include the following:

- Remove harmful nutrients from creek flow;
- Reduce pollution of creek by excess sediment;
- Restore terrestrial habitat; and
- Improve aesthetics.

The following project objectives were established in the Burnetts Chapel Buffer Mitigation Site Mitigation Plan (2012) to meet the RBRP goals:

- Riparian areas will be fenced off from adjacent agricultural activities and runoff will be filtered through buffer zones. Flood flows will be filtered through restored riparian areas, where flood flow will spread through native vegetation. Vegetation will be planted to uptake excess nutrients;
- Streambanks will be further stabilized by increased woody root mass in the banks. Storm flow containing grit and fine sediment will be filtered through restored riparian buffer areas, where flow will spread through native vegetation;
- The establishment and maintenance of riparian buffers will create long-term shading of the channel bed, reducing thermal heating and improving aquatic habitat; and
- Adjacent buffer and riparian habitats will be restored with native vegetation and invasive species will be treated as part of the project. Native vegetation will provide cover and food for terrestrial creatures.

1.2 Monitoring Year 5 Data Assessment

The final mitigation plan was submitted and accepted by the North Carolina Department of Mitigation Services (DMS) in February 2012. Grading activities were completed by the landowner in December 2011. Planting activities were completed by Bruton Natural Systems, Inc. in March 2012. The baseline monitoring and as-built survey were completed in April 2012. There were no significant deviations reported in the project elements in comparison to the design plans. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for this project.
The buffer restoration success criteria for the Site follows the criteria in 15A NCAC 02B .0250, .0252, and .0295.

1.2.1 Vegetative Assessment

A total of 22 vegetation plots were established within the project easement area using standard 10 meter by 10 meter vegetation monitoring plots. Plots were randomly established within planted portions of the riparian buffer areas to capture the heterogeneity of the designed vegetative

communities. The plot corners have been marked and are recoverable either through field identification or with the use of a GPS unit. Reference photographs at the origin looking diagonally across the plot to the opposite corner were taken. The final vegetative success criteria will be the survival of 320 planted stems per acre in the buffer corridor at the end of year five (MY5) of the monitoring period. Along with the stem density requirement, the final planted vegetation community must also include at least two different planted species to be considered successful. The extent of invasive species coverage will also be monitored and controlled as necessary.

The MY5 annual vegetation monitoring resulted in an average stem density of 546 stems per acre, which is approximately 72% of the baseline (MY0) density recorded (763 stems per acre) in April 2012. There was an average of 14 stems per plot in MY5, as compared to 13 stems per plot in MY4. The overall MY5 stem density per acre averages 1,207 stems. The MY5 stem density requirement was met in all plots except vegetation plot 6.

- Vegetation in plot 6 has experienced low growth rates and vigor ratings throughout the entire monitoring period which is uncharacteristic of the rest of the Site. These results are likely due to the presence of a large black walnut tree (*Juglans nig*ra) in the adjacent preservation area, as there have been no other stressors identified in that area. The plot is on track to meet the final mitigation success requirements with the inclusion of volunteer species.
- To improve the stem density in plot 17 after MY4, supplemental planting was done in Reach B4, which increased the average stems for plot 17 for MY5.
- Overall all vegetation plots met stem density requirements for MY5

Limited invasive species were found on the site in MY5. The species identified include an occurrence of tree of heaven (*Ailanthus altissima*), multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*) and callery pear (*Pyrus calleryana*). Spot herbicide treatment of invasive plants, specifically tree of heaven, multiflora rose, and honeysuckle was done in 2015. No additional invasive treatment is planned on the site. Please refer to Appendix 2 for vegetation plot photographs and visual assessment data and Appendix 3 for vegetation plot data.

1.3 Monitoring Year 5 Summary

Overall, the Site has met the required buffer mitigation success criteria for MY5. Although one vegetation plot (6) did not meet the MY5 stem density criteria, the average stem density of the Site is greater than the required MY5 success criteria. Continual maintenance checks on the Site is planned for the remainder of the monitoring year.

Section 2: METHODOLOGY

Vegetation monitoring protocols followed the Carolina Vegetation Survey-NCEEP Level Two Protocol (Lee et al., 2008).

Section 3: REFERENCES

Lee, Michael T., Peet, Robert K., Steven D., Wentworth, Thomas R. 2008. CVS-EEP Protocol for Recording Vegetation Version 4.2. Retrieved from http://cvs.bio.unc.edu/protocol/cvs-eep-protocol-v4.2-lev1-5.pdf

North Carolina Ecosystem Enhancement Program. 2009. Cape Fear River Basin Restoration Priorities 2009. http://www.nceep.net/services/lwps/cape_fear/RBRP%20Cape%20Fear%

202008.pdf

North Carolina Ecosystem Enhancement Program. 2010. NCEEP Mitigation Plan Guidance (Version 2.0, 10/01/2010). http://portal.ncdenr.org/c/document_library/get_file?p_l_id=1169848&folderId=7135626&name=DLFE-53356.pdf

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina, 3rd approx. North Carolina Natural Heritage Program, Raleigh, North Carolina.

United States Department of Agriculture (USDA), 2009. Natural Resources Conservation Service, Soil Survey Geographic (SSURGO) database for Randolph County, North Carolina. http://SoilDataMart.nrcs.usda.gov

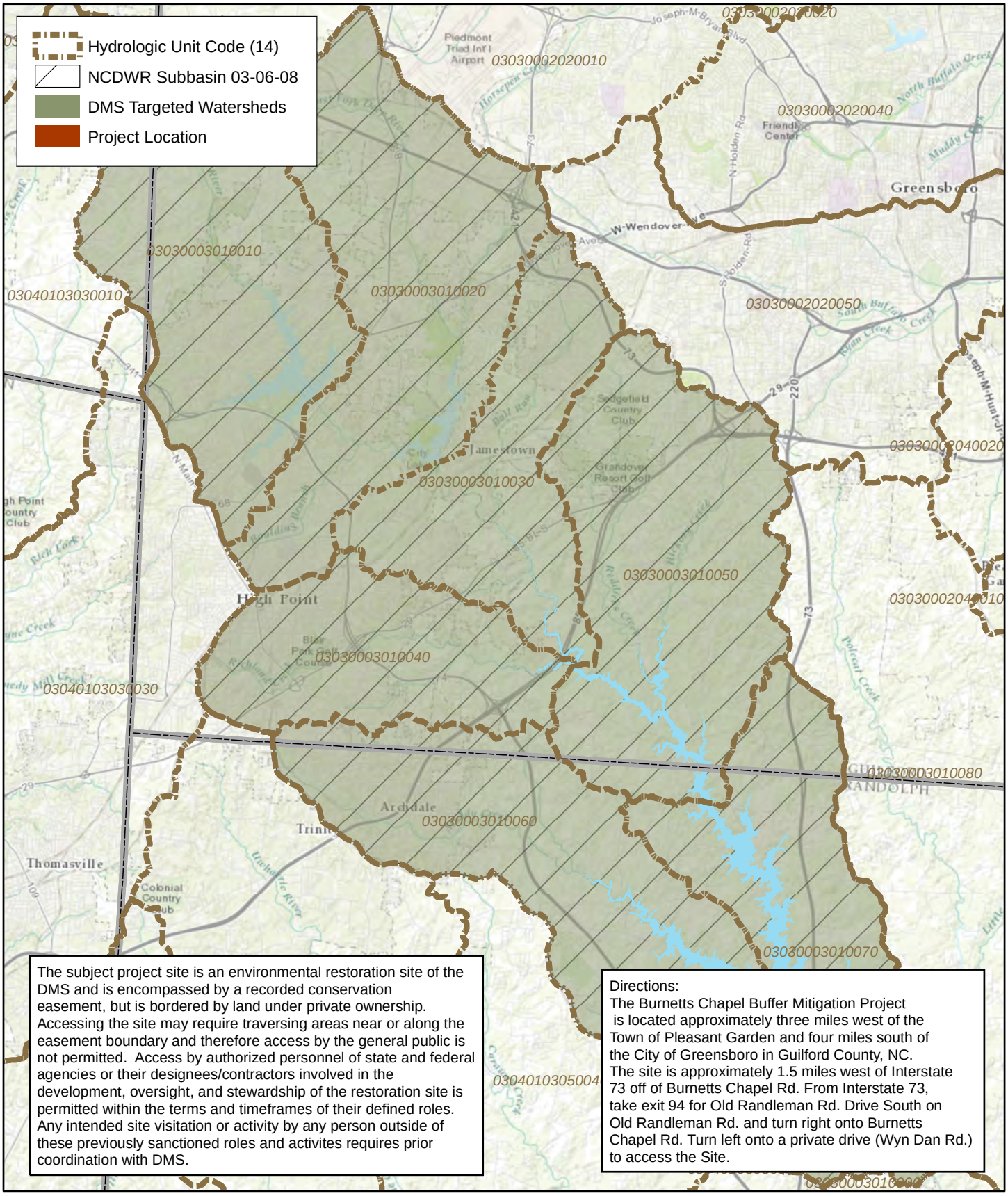
United States Geological Survey (USGS), 1998. North Carolina Geology. http://www.geology.enr.state.nc.us/usgs/carolina.htm

Weakley, A.S. 2010. *Flora of the Carolinas, Virginia, Georgia, Northern Florida, and Surrounding Areas* University of North Carolina at Chapel Hill: Chapel Hill, NC.

Wildlands Engineering, Inc. 2012. Burnetts Chapel Buffer Mitigation Site Mitigation Plan. DMS, Raleigh, NC.

Wildlands Engineering, Inc. 2012. Burnetts Chapel Buffer Mitigation Site Baseline Monitoring Document and As-Built Baseline Report. DMS, Raleigh, NC.

APPENDIX 1. General Tables and Figures



The subject project site is an environmental restoration site of the DMS and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight, and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activites requires prior coordination with DMS.

Directions:
The Burnetts Chapel Buffer Mitigation Project is located approximately three miles west of the Town of Pleasant Garden and four miles south of the City of Greensboro in Guilford County, NC. The site is approximately 1.5 miles west of Interstate 73 off of Burnetts Chapel Rd. From Interstate 73, take exit 94 for Old Randleman Rd. Drive South on Old Randleman Rd. and turn right onto Burnetts Chapel Rd. Turn left onto a private drive (Wyn Dan Rd.) to access the Site.

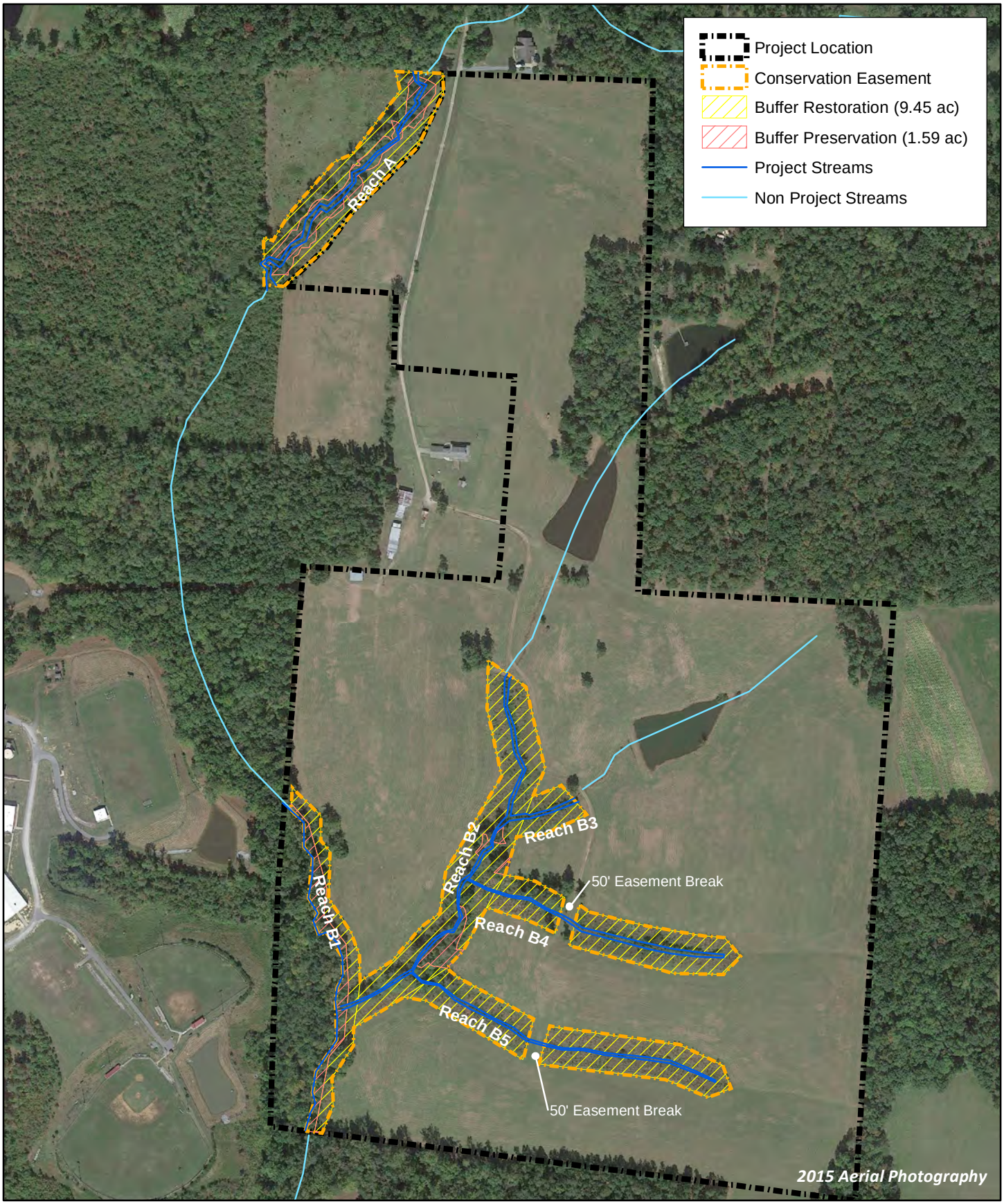
WILDLANDS ENGINEERING

0 1 2 Miles

N

Figure 1 Project Vicinity Map
Burnetts Chapel Buffer Mitigation Site
DMS Project No. 95009
Monitoring Year 5

Guilford County, NC



WILDLANDS ENGINEERING

0 200 400 Feet

N

Figure 2 Project Component/Asset Map
Burnetts Chapel Buffer Mitigation Site
DMS Project Number 95009
Monitoring Year 5

Guilford County, NC

Table 1. Project Components and Mitigation Credits

Burnetts Chapel Buffer Mitigation Site

DMS Project No.95009

Monitoring Year 5 - 2016

MITIGATION CREDITS			
	Buffer Mitigation Units (BMU)	**Nitrogen Nutrient Offet**	**Phosphorous Nutrient Offset**
Totals	418,528	N/A	N/A

PROJECT COMPONENTS					
PROJECT COMPONENTS	**Exisitng Buffer (SF)**	**Creditable Buffer (SF)**	**Restoration Level**	**Mitigation Ratio (X:1)**	**Riparian Buffer Mitigation Credits (BMU)**
Reach A	0	66,139	R	1	66,139
Reach B1	0	33,111	R	1	33,111
Reach B2	0	127,293	R	1	127,293
Reach B3	0	16,452	R	1	16,452
Reach B4	0	72,874	R	1	72,874
Reach B5	0	95,762	R	1	95,762
TOTAL RESTORATION		411,631			411,631
Reach A (TOB-100')	29,172	29,172	R	10	2,917
Reach B1 (TOB-100')	26,190	26,190	P	10	2,619
Reach B2 (TOB-100')	13,607	13,607	P	10	1,361
TOTAL PRESERVATION		68,969			6,897
SUM TOTAL		**480,600**			**418,528**

BMU=Buffer Mitigation Unit; SF=Square Feet

*areas were updated from previous monitoring years to reflect as-built restoration and additional preservation areas

**Credits generated from restoration are in accordance with Randleman Lake Water Supply Watershed and 15A and NCAC 02B.02

Credits generated from preservation areas are in accordance with consididated buffer rules NCAC 02B .0295

Table 2. Project Activity and Reporting History

Burnetts Chapel Buffer Mitigation Site
DMS Project No.95009
Monitoring Year 5 - 2016

Activity or Report	Date Collection Complete	Completion or Delivery
Mitigation Plan	December 2011	February 2012
Final Design - Construction Plans	December 2011	February 2012
Construction*	January 2012	January 2012
Temporary S&E mix applied to entire project area**	January 2012	January 2012
Permanent seed mix applied to reach/segments	January 2012	
Containerized and B&B plantings for reach/segments	March 2012	March 2012
Baseline Monitoring Document (Year 0 Monitoring - baseline)	April 2012	June 2012
Year 1 Monitoring	September 2012	December 2012
Year 2 Monitoring	June 2013	August 2013
Year 3 Monitoring	July 2014	December 2014
Year 4 Monitoring	July 2015	December 2015
Year 5 Monitoring	July 2016	August 2016

*Grading of existing ponds was completed in January
**Seed and mulch is added as each section of construction is completed.

Table 3. Project Contacts Table

Burnetts Chapel Buffer Mitigation Site
DMS Project No.95009
Monitoring Year 5 - 2016

Designer Daniel Taylor	**Wildlands Engineering, Inc.** 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986
Construction Contractor Richard L. Ingram	**Landowner** 1323 Burnetts Chapel Road Greensboro, NC 27403
Planting Contractor Charlie Bruton	**Bruton Natural Systems, Inc.** PO Box 1197 Freemont, NC 27830 919.242.6555
Seeding Contractor Charlie Bruton	**Bruton Natural Systems, Inc.** PO Box 1197 Freemont, NC 27830 919.242.6555
Seed Mix Sources	**Mellow Marsh Farm**
Nursery Stock Suppliers	**Arborgen** **Dykes and Son Nursery** **NC Forestry Service, Claridge Nursery**
Monitoring Performers Vegetation Monitoring, POC	**Wildlands Engineering, Inc.** Kirsten Y. Gimbert 704.332.7754, ext. 110

Table 4. Project Baseline Information and Attributes

Burnetts Chapel Buffer Mitigation Site

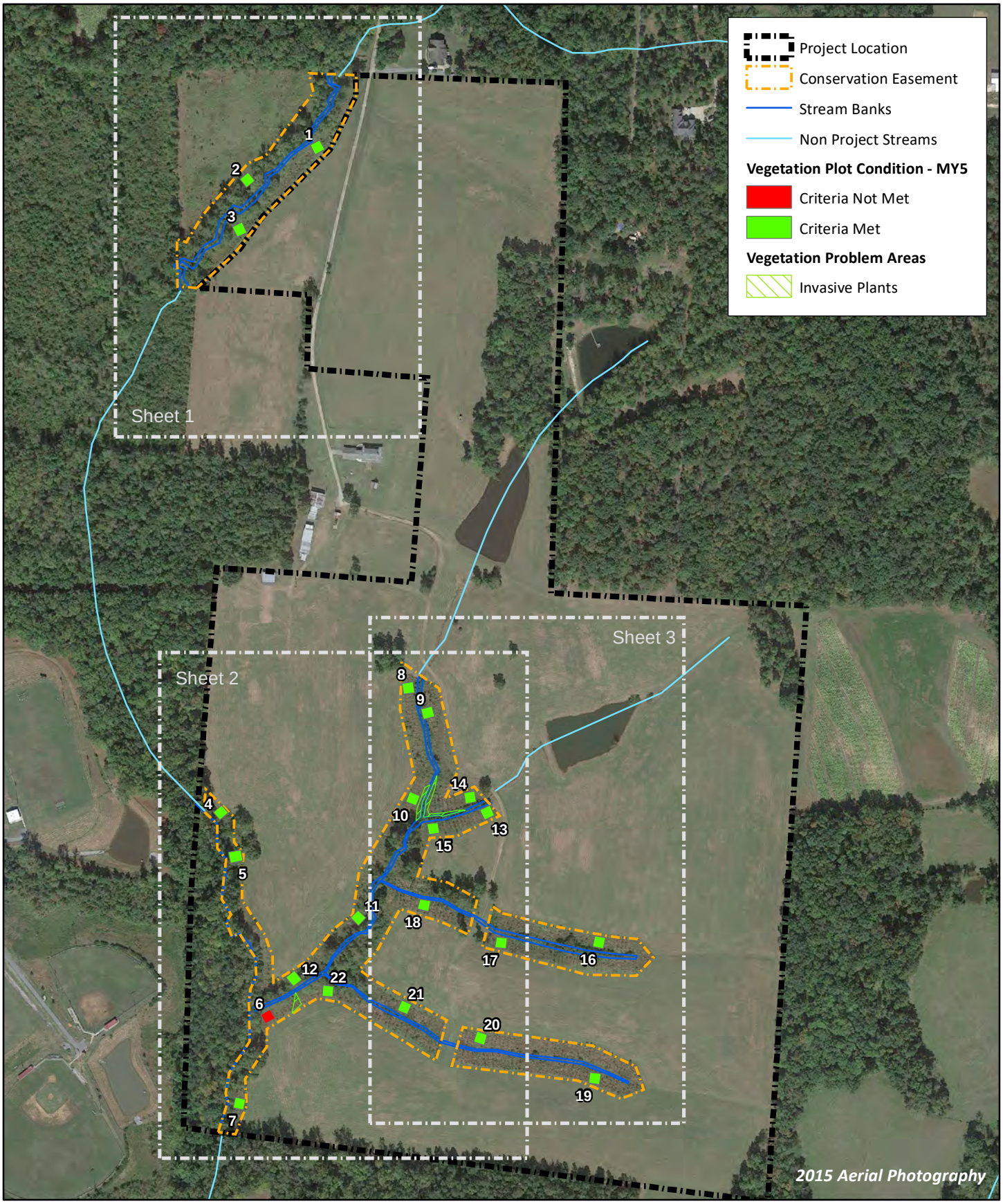
DMS Project No.95009

Monitoring Year 5 - 2016

PROJECT INFORMATION						
Project Name	Burnetts Chapel Buffer Mitigation Site					
County	Guilford					
Project Area (acres)	12					
Project Coordinates (latitude and longitude)	35° 56' 46.0"N, 79° 50' 44.2"W					
PROJECT WATERSHED SUMMARY INFORMATION						
Physiographic Province	Carolina Slate Belt of the Piedmont					
River Basin	Cape Fear					
USGS Hydrologic Unit 8-digit	03030003					
USGS Hydrologic Unit 14-digit	03030003010050					
DWQ Sub-basin	03-06-08					
Project Drainiage Area (acres)	366					
Project Drainage Area Percentage of Impervious Area	3%					
CGIA Land Use Classification	52% Forest Land, 41% Cultivated Land, 7% Institutional					
REACH SUMMARY INFORMATION						
Parameters	**Reach A**	**Reach B1**	**Reach B2**	**Reach B3**	**Reach B4**	**Reach B5**
Length of reach (linear feet) - Post-Restoration	699	1,025	1,653	768	475	800
Drainage area (acres)	94	366	99	33	12	10
NCDWR stream identification score	31	41	24.25/	23.25	19.75	22.75
NCDWR Water Quality Classification	WS-IV; CA, C					
Morphological Desription (stream type)	Perennial	Perennial	Int./Per.	Intermittent	Int./ Ephem.	Int./ Ephem.
Evolutionary trend (Simon's Model) - Pre- Restoration	N/A	N/A	N/A	N/A	N/A	N/A
Underlying mapped soils	Ch	HeC	HeC	VaD	HeC	EnB
Drainage class	Poorly-drained	Mod. well-drained	Mod. well-drained	Well-drained	Mod. well-drained	Well-drained
Soil Hydric status	Yes	No	No	No	No	Yes
Slope	0-2%	6-10%	6-10%	10-15%	6-10%	2-6%
FEMA classification	no regulated floodplain					
Native vegetation community	Piedmont Bottom-land forest					
Percent composition of exotic invasive vegetation - Post-Restoration	0%					

REGULATORY CONSIDERATIONS			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	X	X	Burnetts Chapel Buffer Mitigation Plan; USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3689
Waters of the United States - Section 401	X	X	
Division of Land Quality (Dam Safety)	N/A	N/A	N/A
Endangered Species Act	X	X	Burnetts Chapel Buffer Mitigation Plan; studies found "no effect" (letter from USFWS)
Historic Preservation Act	X	X	Burnetts Chapel Buffer Mitigation Plan; No historic resources were found to be impacted (letter from SHPO)
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	N/A	N/A	N/A
FEMA Floodplain Compliance	N/A	N/A	N/A
Essential Fisheries Habitat	N/A	N/A	N/A

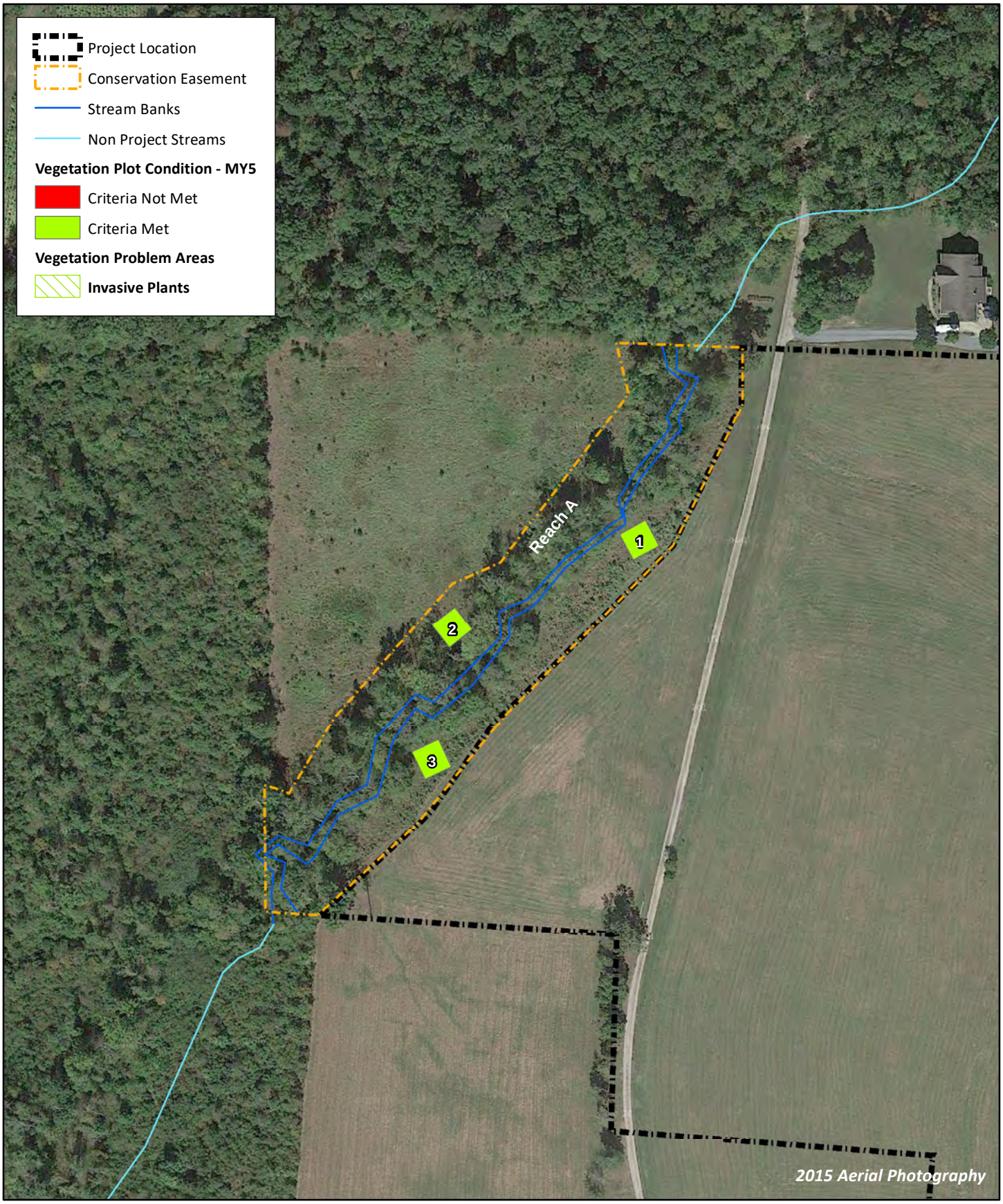
APPENDIX 2. Visual Assessment Data



0 200 400 Feet

N

Figure 3.0 Integrated Current Condition Plan View (Key)
Burnetts Chapel Buffer Mitigation Site
DMS Project No. 95009
Monitoring Year 5
Guilford County, NC

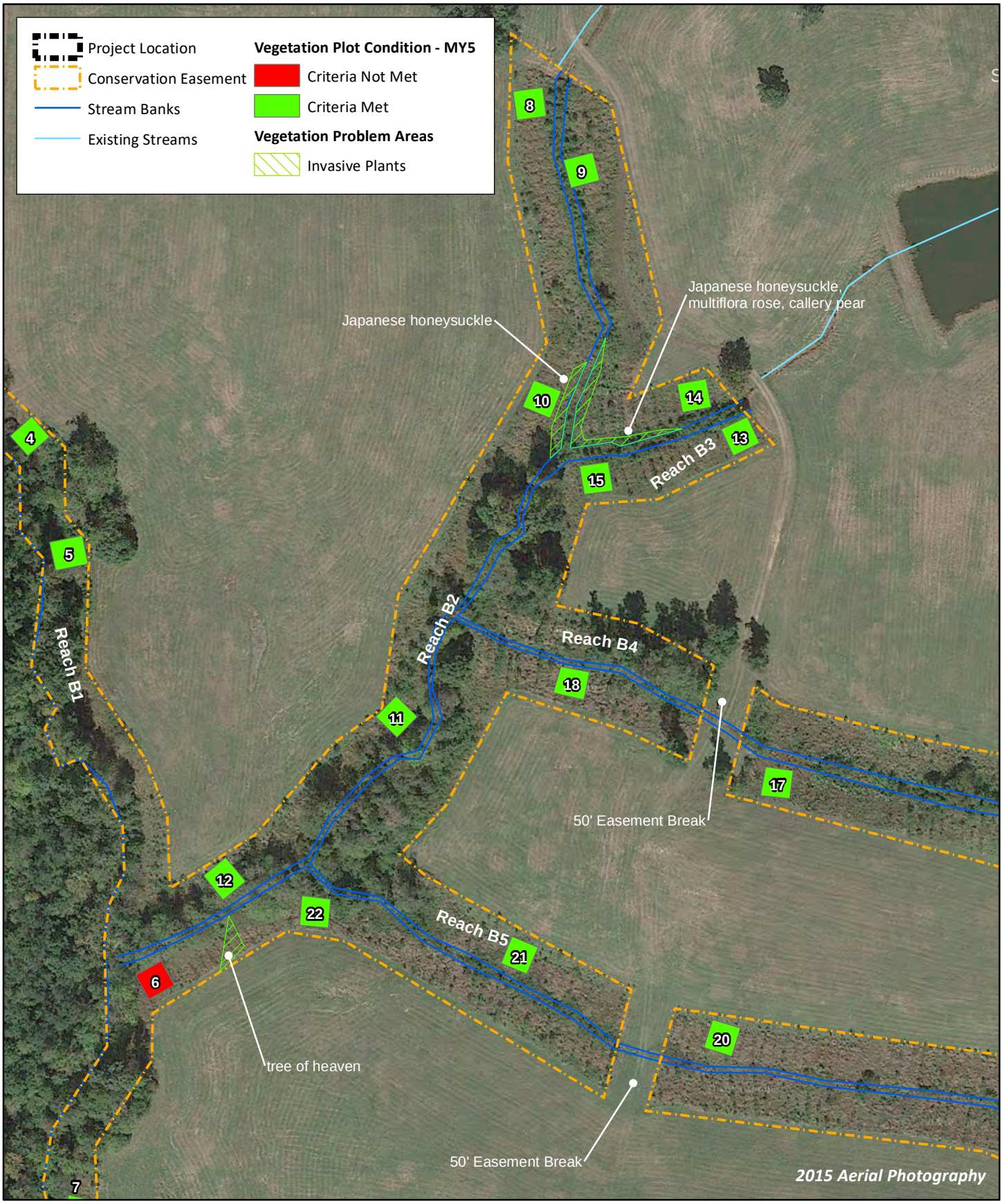


WILDLANDS ENGINEERING

0 75 150 Feet

N

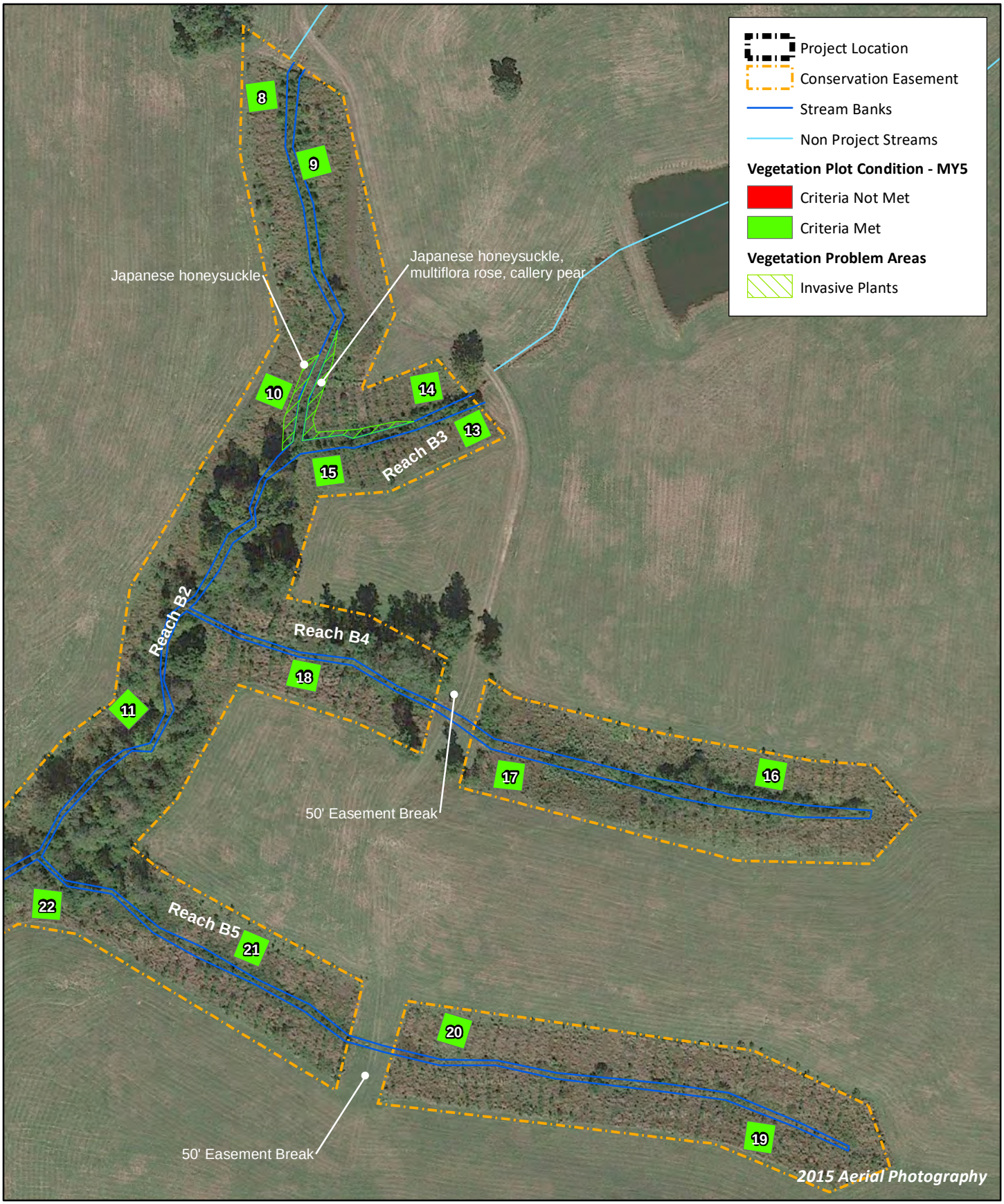
Figure 3.1 Integrated Current Condition Plan View
(Sheet 1 of 3)
Burnetts Chapel Buffer Mitigation Site
DMS Project No. 95009
Monitoring Year 5
Guilford County, NC



0 75 150 Feet

N

Figure 3.2 Integrated Current Condition Plan View
(Sheet 2 of 3)
Burnetts Chapel Buffer Mitigation Site
DMS Project No. 95009
Monitoring Year 5
Guilford County, NC



WILDLANDS ENGINEERING

0 75 150 Feet

N

Figure 3.3 Integrated Current Condition Plan View
(Sheet 3 of 3)
Burnetts Chapel Buffer Mitigation Site
DMS Project No. 95009
Monitoring Year 5
Guilford County, NC

Table 5. Vegetation Condition Assessment Table

Burnetts Chapel Buffer Mitigation Site

DMS Project No. 95009

Monitoring Year 5 - 2016

Planted Acreage **9.45**

Vegetation Category	Definitions	Mapping Threshold (acres)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	0	0.00	0.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0.00	0.0%
		Total	**0**	**0.00**	**0.0%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	0	0.00	0.0%
		Cumulative Total	**0**	**0.00**	**0.0%**

Easement Acreage **12**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Planted Acreage
Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale).	1000	3	0.08	0.8%
Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale).	none	0	0	0%

Vegetation Photographs

Vegetation Plot 1 *(07/07/2016)*

Vegetation Plot 2 *(07/07/2016)*

Vegetation Plot 3 *(07/07/2016)*

Vegetation Plot 4 *(07/07/2016)*

Vegetation Plot 5 *(07/07/2016)*

Vegetation Plot 6 *(07/06/2016)*

Vegetation Plot 7 *(07/06/2016)*

Vegetation Plot 8 *(07/07/2016)*

Vegetation Plot 9 *(07/07/2016)*

Vegetation Plot 10 *(07/07/2016)*

Vegetation Plot 11 *(07/06/2016)*

Vegetation Plot 12 *(07/06/2016)*

Vegetation Plot 13 *(07/07/2016)*

Vegetation Plot 14 *(07/07/2016)*

Vegetation Plot 15 *(07/07/2016)*

Vegetation Plot 16 *(07/06/2016)*

Vegetation Plot 17 *(07/06/2016)*

Vegetation Plot 18 *(07/06/2016)*

Vegetation Plot 19 *(07/06/2016)*

Vegetation Plot 20 *(07/06/2016)*

Vegetation Plot 21 *(07/06/2016)*

Vegetation Plot 22 *(07/06/2016)*

APPENDIX 3. Vegetation Plot Data

Table 6. Vegetation Plot Criteria Attainment
Burnetts Chapel Buffer Mitigation Site
DMS Project No. 95009
Monitoring Year 5 - 2016

Plot	MY4 Success Criteria Met (Y/N)	Tract Mean
1	Y	95%
2	Y	
3	Y	
4	Y	
5	Y	
6	N	
7	Y	
8	Y	
9	Y	
10	Y	
11	Y	
12	Y	
13	Y	
14	Y	
15	Y	
16	Y	
17	Y	
18	Y	
19	Y	
20	Y	
21	Y	
22	Y	

Table 7. CVS Vegetation Plot Metadata

Burnetts Chapel Buffer Mitigation Site

DMS Project No. 95009

Monitoring Year 5 - 2016

Report Prepared By	Ruby Davis
Date Prepared	*7/18/2016 14:59*
database name	*Burnetts Chapel MY5 cvs-eep-entrytool-v2.3.1.mdb*
database location	*Q:\ActiveProjects\005-02130 Burnetts Chapel Buffer Mitigation Site\Monitoring\Monitoring Year 5\Vegetation Assessment*
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	*Description of database file, the report worksheets, and a summary of project(s) and project data.*
Plots	*Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.*
Stem Count by Plot and Spp	*A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.*
PROJECT SUMMARY----------	
Project Code	95009
project Name	Burnetts Chapel Mitigation Site
Description	Buffer Mitigation
length (ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	22
Sampled Plots	22

Table 8. Planted and Total Stem Counts
Burnetts Chapel Mitigation Site
DMS Project No. 95009
Monitoring Year 5 - 2016

			Current Plot Data (MY5 2016)																								
			Vegetation Plot 1			Vegetation Plot 2			Vegetation Plot 3			Vegetation Plot 4			Vegetation Plot 5			Vegetation Plot 6			Vegetation Plot 7			Vegetation Plot 8		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree																					2			
Betula nigra	river birch	Tree	1	1	1				1	1	1	1	1	1				1	1	1	2	2	4			
Carpinus caroliniana	American hornbeam	Tree	1	1	1							1	1	1												
Cephalanthus occidentalis	common buttonbush	Shrub																								
Cercis canadensis	eastern redbud	Tree															1			12						
Cornus florida	flowering dogwood	Tree															3									
Diospyros virginiana	common persimmon	Tree						1			3			1												
Fraxinus pennsylvanica	green ash	Tree	1	1	1				1	1	1	1	1	1	2	2	2	2	2	3	1	1	3	6	6	6
Juglans nigra	black walnut	Tree																								
Juniperus virginiana	eastern redcedar	Tree																								
Liquidambar styraciflua	sweetgum	Tree			10			15			33			8			10			4			14			1
Liriodendron tulipifera	tuliptree	Tree			1	8	8	13	6	6	32			11			20			5			6	10	10	12
Nyssa sylvatica	blackgum	Tree																								
Pinus	pine	Tree																								
Pinus rigida	pitch pine	Tree																		1						
Platanus occidentalis	American sycamore	Tree	6	6	6	4	4	4	5	5	5	9	9	9	5	5	5	1	1	1	4	4	5			
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	1	1	1										1	1	1						1
Quercus nigra	water oak	Tree																								
Quercus phellos	willow oak	Tree							1	1	1	1	1	1				1	1	1	2	2	2			
Quercus rubra	northern red oak	Tree				1	1	1				1	1	1	2	2	2				1	1	1			
Rhus	sumac	shrub												1												
Robinia pseudoacacia	black locust	Tree						1																		
Rosa palustris	swamp rose	Shrub																								
Symphoricarpos orbiculatus	coralberry	Shrub																								
Ulmus alata	winged elm	Tree						2			3			3			1			1						
Ulmus rubra	slippery elm	Tree																								
Stem count			10	10	21	14	14	38	14	14	79	14	14	38	9	9	44	6	6	30	10	10	37	16	16	20
size (ares)			1			1			1			1			1			1			1			1		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
Species count			5	5	7	4	4	8	5	5	8	6	6	11	3	3	8	5	5	10	5	5	8	2	2	4
Stems per ACRE			405	405	850	567	567	1538	567	567	3197	567	567	1538	364	364	1781	243	243	1214	405	405	1497	647	647	809

Table 8. Planted and Total Stem Counts
Burnetts Chapel Mitigation Site
DMS Project No. 95009
Monitoring Year 5 - 2016

			Current Plot Data (MY5 2016)																								
			Vegetation Plot 9			Vegetation Plot 10			Vegetation Plot 11			Vegetation Plot 12			Vegetation Plot 13			Vegetation Plot 14			Vegetation Plot 15			Vegetation Plot 16		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree									12																
Betula nigra	river birch	Tree	1	1	1	3	3	3	2	2	2				2	2	2	2	2	2	1	1	1			
Carpinus caroliniana	American hornbeam	Tree							1	1	1							1	1	1						
Cephalanthus occidentalis	common buttonbush	Shrub			1			1															1			
Cercis canadensis	eastern redbud	Tree																								
Cornus florida	flowering dogwood	Tree																								
Diospyros virginiana	common persimmon	Tree																								
Fraxinus pennsylvanica	green ash	Tree				4	4	4	3	3	3	10	10	10										4	4	4
Juglans nigra	black walnut	Tree									2			1												
Juniperus virginiana	eastern redcedar	Tree																								
Liquidambar styraciflua	sweetgum	Tree						3			29			4						5			12			
Liriodendron tulipifera	tuliptree	Tree	1	1	1			1	1	1	7			1									6	1	1	1
Nyssa sylvatica	blackgum	Tree																								
Pinus	pine	Tree																								
Pinus rigida	pitch pine	Tree																								
Platanus occidentalis	American sycamore	Tree	4	4	4				9	9	10	1	1	1	2	2	2	6	6	6	2	2	2	7	7	7
Quercus michauxii	swamp chestnut oak	Tree	2	2	2	2	2	2	1	1	2				4	4	4	6	6	6	8	8	8			
Quercus nigra	water oak	Tree																								
Quercus phellos	willow oak	Tree	2	2	2	2	2	2	1	1	1				4	4	4				6	6	6			
Quercus rubra	northern red oak	Tree	7	7	7							4	4	4	2	2	2									
Rhus	sumac	shrub																								
Robinia pseudoacacia	black locust	Tree																								
Rosa palustris	swamp rose	Shrub																								
Symphoricarpos orbiculatus	coralberry	Shrub																								
Ulmus alata	winged elm	Tree												1												
Ulmus rubra	slippery elm	Tree																								
		Stem count	17	17	18	11	11	16	18	18	69	15	15	22	14	14	14	15	15	20	17	17	36	12	12	12
		size (ares)	1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	6	6	7	4	4	7	7	7	10	3	3	7	5	5	5	4	4	5	4	4	7	3	3	3
		Stems per ACRE	688	688	728	445	445	647	728	728	2792	607	607	890	567	567	567	607	607	809	688	688	1457	486	486	486

Table 8. Planted and Total Stem Counts
Burnetts Chapel Mitigation Site
DMS Project No. 95009
Monitoring Year 5 - 2016

			Current Plot Data (MY5 2016)																	
			Vegetation Plot 17			Vegetation Plot 18			Vegetation Plot 19			Vegetation Plot 20			Vegetation Plot 21			Vegetation Plot 22		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree																		
Betula nigra	river birch	Tree				2	2	2				2	2	2				4	4	4
Carpinus caroliniana	American hornbeam	Tree							6	6	6	3	3	3	1	1	1			
Cephalanthus occidentalis	common buttonbush	Shrub																		
Cercis canadensis	eastern redbud	Tree																		
Cornus florida	flowering dogwood	Tree																		
Diospyros virginiana	common persimmon	Tree												1						
Fraxinus pennsylvanica	green ash	Tree	2	2	2	5	5	5				2	2	2	5	5	5	2	2	4
Juglans nigra	black walnut	Tree						1												
Juniperus virginiana	eastern redcedar	Tree																		
Liquidambar styraciflua	sweetgum	Tree			9			16			4									2
Liriodendron tulipifera	tuliptree	Tree				2	2	5			1	4	4	4	5	5	6	1	1	5
Nyssa sylvatica	blackgum	Tree																		
Pinus	pine	Tree																		
Pinus rigida	pitch pine	Tree									2			2						
Platanus occidentalis	American sycamore	Tree	4	4	4	3	3	3	3	3	3	1	1	1				10	10	11
Quercus michauxii	swamp chestnut oak	Tree																		
Quercus nigra	water oak	Tree																		
Quercus phellos	willow oak	Tree	6	6	6	3	3	3	5	5	5	2	2	2	2	2	2			
Quercus rubra	northern red oak	Tree																		
Rhus	sumac	shrub																		
Robinia pseudoacacia	black locust	Tree						8												
Rosa palustris	swamp rose	Shrub																		
Symphoricarpos orbiculatus	coralberry	Shrub																		
Ulmus alata	winged elm	Tree																		
Ulmus rubra	slippery elm	Tree																		
		Stem count	12	12	21	15	15	43	14	14	21	14	14	17	13	13	14	17	17	26
		size (ares)	1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	3	3	4	5	5	8	3	3	6	6	6	8	4	4	4	4	4	5
		Stems per ACRE	486	486	850	607	607	1740	567	567	850	567	567	688	526	526	567	688	688	1052

Table 8. Planted and Total Stem Counts
Burnetts Chapel Mitigation Site
DMS Project No. 95009
Monitoring Year 5 - 2016

			Annual Summary																	
			MY5 (2016)			MY4 (2015)			MY3 (2014)			MY2 (2013)			MY1 (2012)			MY0 (2012)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree			14			11			1									
Betula nigra	river birch	Tree	25	25	27	25	25	25	26	26	26	25	25	25	37	37	37	76	76	76
Carpinus caroliniana	American hornbeam	Tree	14	14	14	14	14	14	13	13	13	13	13	13	31	31	31	43	43	43
Cephalanthus occidentalis	common buttonbush	Shrub			3						3			2						
Cercis canadensis	eastern redbud	Tree			13			9			3									
Cornus florida	flowering dogwood	Tree			3			3												
Diospyros virginiana	common persimmon	Tree			6			4			2									
Fraxinus pennsylvanica	green ash	Tree	51	51	56	51	51	52	52	52	54	51	51	51	52	52	52	51	51	51
Juglans nigra	black walnut	Tree			4			3												
Juniperus virginiana	eastern redcedar	Tree						1												
Liquidambar styraciflua	sweetgum	Tree			179			117			42			12						
Liriodendron tulipifera	tuliptree	Tree	39	39	138	39	39	119	42	42	128	41	41	41	44	44	44	53	53	53
Nyssa sylvatica	blackgum	Tree									2									
Pinus	pine	Tree									2									
Pinus rigida	pitch pine	Tree			5			2												
Platanus occidentalis	American sycamore	Tree	86	86	89	85	85	86	87	87	88	86	86	86	98	98	98	106	106	106
Quercus michauxii	swamp chestnut oak	Tree	26	26	28	27	27	27	28	28	28	28	28	28	30	30	30	28	28	28
Quercus nigra	water oak	Tree						1												
Quercus phellos	willow oak	Tree	38	38	38	32	32	32	31	31	31	30	30	30	32	32	32	23	23	23
Quercus rubra	northern red oak	Tree	18	18	18	21	21	22	21	21	21	22	22	22	25	25	25	35	35	35
Rhus	sumac	shrub			1															
Robinia pseudoacacia	black locust	Tree			9						4									
Rosa palustris	swamp rose	Shrub									2									
Symphoricarpos orbiculatus	coralberry	Shrub						8			3									
Ulmus alata	winged elm	Tree			11			5			8									
Ulmus rubra	slippery elm	Tree						1												
		Stem count	297	297	656	294	294	542	300	300	461	296	296	310	349	349	349	415	415	415
		size (ares)		22			22			22			22			22			22	
		size (ACRES)		0.54			0.54			0.54			0.54			0.54			0.54	
		Species count	8	8	19	8	8	20	8	8	19	8	8	10	8	8	8	8	8	8
		Stems per ACRE	546	546	1207	541	541	997	552	552	848	544	544	570	642	642	642	763	763	763