

DIN 01557

Natural Resources Technical Report

Durham-Orange Light Rail Transit Project



July 24, 2015

The NEPA Preferred Alternative for the D-O LRT Project would generally follow NC 54, I-40, US 15-501, and the North Carolina Railroad (NCRR) Corridor in downtown Durham and east Durham. The alignment would begin at UNC Hospitals, parallel Fordham Boulevard, proceed east on NC 54, travel north on I-40, parallel US 15-501 before it turns east toward the Duke University campus along Erwin Road, and then follow the NCRR Corridor parallel to NC 147 through downtown Durham, before reaching its eastern terminus near Alston Avenue. The alignment would consist of at-grade alignment, fill and cut sections, and elevated structures. In two sections of the alignment, Little Creek and New Hope Creek, multiple Light Rail Alternatives are evaluated in the DEIS.

This technical report contains information for all alternatives analyzed in the DEIS. However, pursuant to MAP 21, the Moving Ahead for Progress in the 21st Century Act (P.L. 112-141), a NEPA Preferred Alternative has been developed, which recommends C2A in the Little Creek section of the alignment, NHC 2 in the New Hope Creek section of the alignment, the Trent/Flowers Drive station, and the Farrington Road Rail Operations and Maintenance Facility.

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List of Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AA	Alternatives Analysis
CAMA	Coastal Area Management Act
DEIS	Draft Environmental Impact Statement
D-O	Durham-Orange
D-O LRT	Durham-Orange Light Rail Transit
DTCC	Durham Technical Community College
DUMC	Duke University Medical Center
EFH	essential fish habitat
ESA	Endangered Species Act of 1973
FPPA	Farmland Protection Policy Act
HQW	high quality water
I-40	Interstate 40
JD	Jurisdictional Determination
LPA	Locally Preferred Alternative
LRT	light rail transit
MSL	mean sea level
NC	North Carolina
NCCU	North Carolina Central University
NCDA	North Carolina Department of Agriculture
NCDENR	North Carolina Department of Environment and Natural Resources
NCDWR	North Carolina Division of Water Resources
NCDWQ	North Carolina Division of Water Quality
NCEEP	North Carolina Ecosystem Enhancement Program
N.C.G.S.	North Carolina General Statutes
NCNHP	North Carolina Natural Heritage Program
NCRR	North Carolina Railroad
NCWAM	North Carolina Wetland Assessment Method
NCWFAT	North Carolina Wetland Functional Assessment Team
NCWRC	North Carolina Wildlife Resources Commission
NHC	New Hope Creek
NMFS	National Marine Fisheries Service

NHPNA	Natural Heritage Program Natural Area
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRTR	Natural Resources Technical Report
NSW	nutrient sensitive water
ORW	outstanding resource water
ROMF	Rail Operations Maintenance Facility
SNHA	significant natural heritage areas
TSM	Transportation System Management
UNC	University of North Carolina
US	United States
USACE	United State Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
UT	unnamed tributary
VA	Veterans Affairs
WS	water supply

1. Introduction

Triangle Transit, in cooperation with the Federal Transit Administration (FTA), has prepared a Draft Environmental Impact Statement (DEIS) to evaluate a potential high-capacity transit improvement in the Triangle region, within the Durham-Orange (D-O) Corridor, between Chapel Hill and Durham. This technical Appendix focuses on the potential effects of the alternatives to natural resources, including soils, farmlands, water resources, terrestrial communities and wildlife, aquatic communities and wildlife, and threatened and endangered species, and was prepared in consideration of the Scoping comments received from the stakeholder agencies.

Through the Alternatives Analysis (AA) process, which included extensive public outreach, a Locally Preferred Alternative (LPA) was selected to address the purpose and need of the (D-O Corridor). The proposed project is an approximately 17 mile double-track light rail transit (LRT) line with 17 proposed stations that will greatly expand transit service in Durham and Orange counties. The proposed Durham-Orange Light Rail Transit (D-O LRT) Project extends from the western terminus of the proposed UNC Hospitals Station, at the University of North Carolina at Chapel Hill (UNC), to the eastern terminus in Durham at the Alston Avenue Station. The proposed D-O LRT Project connects a range of educational, medical, employment, and other important activity centers, including UNC; UNC Hospitals; the William and Ida Friday Center for Continuing Education (Friday Center); Duke University; Durham Veterans Affairs (VA) Medical Center and Duke University Medical Center (DUMC); downtown and east Durham; North Carolina Central University (NCCU); and Durham Technical Community College (DTCC).

1.1 Description of the Study Corridor

The D-O Corridor is located within the Triangle region. It extends roughly 17 miles from southwest Chapel Hill to east Durham, and includes several educational, medical, and other key activity centers which generate a large number of trips each day. The land uses in the D-O Corridor are supported by a network of major highways including NC 54, I-40, US 15-501, Erwin Road, and NC 147. Additional detail regarding the study corridor is included in the *Durham-Orange Light Rail Transit Project DEIS*, chapters 1 and 2.

1.2 Alternatives Considered

- No-Build Alternative
- Light Rail Alternatives

In addition to the Light Rail Alternatives, the DEIS considers a No-Build Alternative comprised of the existing and programmed transportation network improvements without the planned rail improvements and associated bus network modifications. Additional detail regarding the alternatives considered is included in the *Durham-Orange Light Rail Transit Project DEIS*, chapter 2.

1.2.1 No-Build Alternative

The No-Build Alternative includes the existing and planned transportation programs and projects scheduled to be built and implemented before forecast year 2040 and contained in the 2040 MTP, excluding only the proposed Light Rail Alternatives, rail transit improvements and related bus transit modifications that would be associated with the proposed D-O LRT Project.

1.2.2 Light Rail Alternatives

Through the Alternatives Analysis and Scoping process, a majority of the proposed D-O LRT Project alignment was identified. However, there are a few areas where different alternatives were retained for further evaluation. As a result, multiple alignments crossing Little Creek and New Hope Creek are evaluated in the DEIS.

- Four potential crossings of Little Creek between Hamilton Road and the proposed Leigh Village Station (Alternatives C1, C1A, C2, and C2A)
- Three potential crossings of New Hope Creek and Sandy Creek between Patterson Place and South Square (Alternatives NHC LPA, NHC 1, and NHC 2)
- Station alternatives at Duke/VA Medical Centers (i.e., Duke Eye Center and Trent/Flowers Drive)
- Five proposed locations for the rail operations and maintenance facility (ROMF) (i.e., Leigh Village ROMF, Farrington Road ROMF, Patterson Place ROMF, Cornwallis Road ROMF, and Alston Avenue ROMF)

The Light Rail Alternatives would generally follow North Carolina (NC) Highway 54 (NC 54), Interstate 40 (I-40), United States (US) 15-501, and the North Carolina Railroad (NCR) Corridor in downtown Durham and east Durham. The alignment would begin in Chapel Hill at UNC Hospitals, parallel Fordham Boulevard, proceed eastward adjacent to NC 54, travel north along I-40, parallel US 15-501 before it would turn east toward Duke University and run within Erwin Road, and then follow the NCR Corridor that parallels NC Highway 147 (NC 147) through downtown Durham, before reaching its eastern terminus in Durham near Alston Avenue. The alignment would consist of at-grade alignment, fill and cut sections, and elevated structures. A total of 17 stations are planned, and up to 5,100 parking spaces would be provided along the Light Rail Alternatives. In addition, a ROMF would be constructed to accommodate the D-O LRT fleet (initially 17 vehicles, with the ability to accommodate up to 26 vehicles without needing expansion).

Bus routes would be modified to feed into the D-O LRT stations, and headways would be adjusted to provide more frequent bus service and minimize transfer waiting times. These services would also connect light rail passengers with other area transportation hubs, including park-and-ride lots and transfer centers.

2. Legal and Regulatory Framework

The Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531 et seq.), is the federal statute that regulates endangered and threatened species through administering permits, implementing recovery plans, and monitoring listed endangered and threatened species. The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) administer the ESA. Certain species fall under the protection of other legislation besides the ESA. Bald Eagles are protected under the Bald Eagle and Golden Eagle Protection Act (16 U.S.C. § 668). Many other species of bird are protected under the Migratory Bird Treaty Act of 1918 (16 U.S.C. § 703-712).

North Carolina protects locally or regionally rare species in addition to federally listed species. Protection for animals and plants in North Carolina is recognized under two separate laws. The protection of animals is addressed by the North Carolina Endangered Species Act (North Carolina General Statutes [N.C.G.S.] § 113-331 et seq.), which is administered by the North Carolina Wildlife Resources Commission. Endangered, threatened, and rare plants are protected by the North Carolina Plant Protection and Conservation Act (N.C.G.S. § 106-202.12 et seq.). This law is administered by the Plant Conservation Program in the North Carolina Department of Agriculture (NCDA). North Carolina also regulates Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act (P.L. 94-265).

The Farmland Protection Policy Act (FPPA) states that federal agencies must “minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses....” (7 USC § 73).

The Rivers and Harbors Act (33 U.S.C. § 403) limits construction that would obstruct navigable waters within the United States.

The Jordan Lake buffer rule (15A NCAC 02B.0267) applies to all perennial and intermittent streams, lakes, ponds, and estuaries in the Jordan Lake water basin and establishes a protected 50-foot wide riparian buffer around these waterbodies.

3. Methodology and Qualifications

All work in support of this Natural Resources Technical Report (NRTR) was conducted in accordance with the Triangle Transit August 2013 *Environmental Methodology Report* prepared for this project. Field investigations of the project study area were conducted in August, 2013, through August, 2014. Field verification meetings with representatives of the US Army Corps of Engineers (USACE) and the North Carolina Division of Water Resources (NCDWR) [formerly named the North Carolina Division of Water Quality (NCDWQ)] for jurisdictional determinations were conducted and USACE issued their notice of jurisdiction determination on May 12, 2014. An updated notice of jurisdiction determination was issued on November 7, 2014 for additional study area resources. The principal environmental scientists contributing to this document were Charles Benton - URS, and William B. Fulton and Brandon J. Phillips – STV Group.

Data was collected throughout the D-O Corridor. However, the assessment of effects was limited to a study area, which is defined as the limits of construction for the proposed Light Rail Alternatives. This included the Light Rail Alternatives alignments, stations, park-and-ride facilities, and ROMF.

Information regarding the relevant resource areas was collected from a review of USFWS Threatened and Endangered Species databases, the North Carolina Natural Heritage Program’s (NCNHP) databases, Durham and Orange counties soil surveys, aerial photography, topographic maps, and technical staff field investigations. The most current available data from local sources and recent aerial photography, supplemented by field work, were used in the analysis.

The environmental evaluation for this study began with a broad review of environmental factors to identify notable issues and constraints. Some of these factors and considerations were documented during project Scoping. Agency Scoping comments are located in Appendix E. Where relevant, this information provided the starting point for the environmental analysis.

The natural resources evaluation primarily assessed site-specific effects, the significance of these effects, and what potential mitigation measures may be required as a result of these effects. Habitat connections were also addressed, including the New Hope Creek and Sandy Creek corridors and the Piedmont swamp forest ecological corridor connecting Duke Forest and Jordan Lake Game Lands.

The principal environmental scientists contributing to this document were Charles Benton – URS and Brandon J. Phillips – STV Group. Other contributors to this document are listed in Appendix F.

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 Environmental Scientist, Frederick P. Clark Associates, 2000-2002
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Principal

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Wetland and stream delineations, Section 404/401 permitting, mitigation, natural resources inventory, stream assessment, document preparation, quality assurance

4. Affected Environment

The following subsections describe the affected environment.

4.1 Physical Resources

The majority of the project study area is located in the easternmost of the four Triassic Basin Eco-regions of the Piedmont physiographic province of North Carolina (Griffith et al., 2002). A small portion of the western tip of the LPA alignment is located within the Carolina Slate Belt of the Piedmont physiographic province of North Carolina (Griffith et al., 2002). The topography of the project study area is characterized as gently rolling with some steep areas. Gently rolling areas are found within interstream areas, with steeper slopes found along the edges of some stream floodplains. Elevations range from approximately 420 feet above mean sea level (MSL) along the LPA Alignment in the City of Durham (United States Geological Survey [USGS] – Northwest Durham {1987}), to approximately 235 feet above MSL along NC 54 where Little Creek exits the southern portion of the C2 and C2A alignment alternatives (USGS - Southwest Durham, NC [1981]). Topographic mapping is presented in Appendix A (Figures 2 through 16). Land use within the project vicinity includes a mixture of urban, residential, and forested areas. The western end of the LPA alignment is located within the Chapel Hill, NC USGS quadrangle (1981).

4.1.1 Soils

Natural Resources Conservation Service (NRCS) data for Orange and Durham counties identifies 41 soil types within the study area (Table 1). Soils were determined based on a one-quarter mile search range from the potential alignments. Soils mapping is presented in Appendix A (Figures 17 through 31).

Table 1: Soils in the Study Area

Soil Series	Mapping Unit	Drainage Class	Hydric Status	Bedrock Depth
Altavista silt loam; 2-6% slope	AIB	Moderately Well Drained	Non-hydric	>60"
Appling sandy loam, 2-6% slope	ApB	Well Drained	Non-hydric	>60"
Appling sandy loam; 6-10% slope	ApC	Well Drained	Non-hydric	>60"
Appling-Urban land complex, 2-10% slope	AuC	Well Drained	Non-hydric	>60"
Cartecay and Chewada soils; 0-2% slope	Cc	Somewhat Poorly Drained	Hydric*	>60"
Cecil fine sandy loam; 2-6% slope	CfB	Well Drained	Non-hydric	>60"
Cecil fine sandy loam; 6-10% slope	CfC	Well Drained	Non-hydric	>60"
Pacolet fine sandy loam; 10-25% slope	CfE	Well Drained	Non-hydric	>60"
Chewada and Wehadkee soils; 0-2% slope	Ch	Somewhat Poorly Drained	Hydric	>60"
Creedmoor-Green Level complex; 2-6% slope	CrB	Moderately Well Drained	Non-hydric	>60"
Creedmoor-Green Level complex;	CrC	Moderately Well Drained	Non-hydric	60"

Soil Series	Mapping Unit	Drainage Class	Hydric Status	Bedrock Depth
6-10% slope				
Enon loam, 2-6% slope	EnB	Well Drained	Non-hydric	>60"
Enon loam, 6-12% slope	EnC	Well Drained	Non-hydric	>60"
Georgeville-Urban land complex, 2-10% slope	GhC	Well Drained	Non-hydric	>60"
Goldston channery silt loam, 15-45% slope	GIF	Well drained	Non-hydric	20-40"
Granville sandy loam; 2-6% slope	GrB	Well drained	Non-hydric	>60"
Granville sandy loam; 6-10% slope	GrC	Well drained	Non-hydric	>60"
Iredell loam; 2-6% slope	IrB	Moderately well drained	Non-hydric	20-40"
Iredell loam; 6-10% slope	IrC	Moderately well drained	Non-hydric	>42"
Louisburg (Wateree) sandy loam, 6-15% slope	LoC	Well drained	Non-hydric	48-120"
Mayodan sandy loam, 2-6% slope	MfB	Well drained	Non-hydric	>60"
Mayodan sandy loam, 6-10% slope	MfC	Well drained	Non-hydric	>60"
Mayodan sandy loam, 10-15% slope	MfD	Well drained	Non-hydric	>60"
Mayodan sandy loam, 15-25% slope	MfE	Well drained	Non-hydric	>60"
Mayodan-Urban land complex, 0-10% slope	MrC	Well drained	Non-hydric	>60"
Mayodan-Urban land complex, 10-15% slope	MrD	Well drained	Non-hydric	>60"
Pinkston fine sandy loam, 10-25% slope	PfE	Well drained	Non-hydric	>30"
Tarrus silt loam, 8-15% slope	TaD	Well drained	Non-hydric	>42"
Tarrus silt loam, 15-25% slope	TaE	Well drained	Non-hydric	>42"
Hornsboro silt loam, 0-2% slope, rarely flooded	Wh	Somewhat poorly drained	Hydric*	>60"
Wedowee sandy loam, 8-15% slope	WmD	Well drained	Non-hydric	48-60"
Wedowee sandy loam, 15-25% slope	WmE	Well drained	Non-hydric	48-60"
White Store loam, 2-6% slope	WsB	Moderately well drained	Non-hydric	48-72"
White Store sandy loam, 6-10% slope	WsC	Moderately well drained	Non-hydric	>48"
White Store sandy loam, 10-25% slope	WsE	Moderately well drained	Non-hydric	>48"
White Store clay loam, 6-15% slope, moderately eroded	WtC2	Moderately well drained	Non-hydric	48-72"
White Store clay loam, 2-10% slopes, moderately eroded	WvC2	Moderately well drained	Non-hydric	>48"

Soil Series	Mapping Unit	Drainage Class	Hydric Status	Bedrock Depth
White Store clay loam, 10-25% slopes, moderately eroded	WvE2	Moderately well drained	Non-hydric	>48"
White Store-Urban land complex, 2-8% slope	WwC	Moderately well drained	Non-hydric	48-72"
White Store-Urban land complex, 10-25% slope	WwE	Moderately well drained	Non-hydric	>48"
Wilkes gravelly loam, 8 to 15 percent slope	WxD	Well drained	Non-hydric	40-80"

4.1.2 Farmlands

The Farmland Protection Policy Act (FPPA) states that federal agencies must “minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses...” The FPPA is administered by the U. S. Department of Agriculture Natural Resource Conservation Service (USDA NRCS). The North Carolina office of the USDA NRCS was contacted regarding whether the proposed project is subject to FPPA requirements. Responses from the USDA NRCS dated July 31, 2014 and March 24, 2015 (Appendix E) state the project area meets one or more of the criteria for non-farmland. Therefore, no farmland area will be affected or converted, directly or indirectly.

4.1.3 Water Resources

4.1.3.1 Streams

Water resources in the study area are part of the Cape Fear River Basin (USGS Hydrologic Unit 03030002). Fifty-seven streams were identified in the study area (Table 2). The location of each water resource is shown on Figures 47 through 68 in Appendix A. The physical characteristics of these streams are provided in Table 3.

Best Usage Classifications are ranks assigned for each surface water body by the NCDWR in accordance with Procedures for Assignment of Water Quality Standards (15A NCAC 2B .0100) and Classifications and Water Quality Standards Applicable to the Surface Waters of North Carolina (15A NCAC 2B .0200). These classifications serve to protect water quality by governing the uses of the water resource (NCDWQ, 2004). Water supply (WS) watersheds listed as IV and V are waters protected as water supplies that are generally located in watersheds that are moderately to highly developed. Nutrient Sensitive Waters (NSW) are waters that require limitations on nutrient inputs. All of the named streams within the study area are classified either as WS-IV; nutrient sensitive waters (NSW) or WS-V; NSW. All unnamed tributaries (UT) share the same designation as the body of water to which they flow.

There are no designated North Carolina Wildlife Resource Commission (NCWRC) trout waters, water supply watersheds (WS-I or WS-II), High Quality Waters (HQW), or Outstanding Resource Waters (ORW) within 1.0 mile downstream of the study area. The North Carolina 2012 Final 303(d) list of impaired waters identifies New Hope Creek and Little Creek as waters within the study area as impaired. The impairments for New Hope Creek include turbidity (water clarity), low dissolved oxygen levels, ecological/biological integrity benthos (community of small aquatic organisms that live in streams) and fecal coliform (an anaerobic bacterium that lives in the intestines of warm-blooded animals, and can cause illness in humans when found in high concentrations within waterbodies). The impairment for Little Creek is ecological/biological integrity benthos.

Table 2: Water Resources in the Study Area

Stream Name	Map ID	Figure Number	NCDWR Index Number	Best Usage Classification
UT to Sandy Creek	A	4M	–	WS-V; NSW
UT to Little Creek	AA	4D	–	WS-IV; NSW
UT to Sandy Creek	B	4M	–	WS-V; NSW
UT to Sandy Creek	C	4M	–	WS-V; NSW
UT to Little Creek	CC	4D	–	WS-IV; NSW
UT to Sandy Creek	D	4M	–	WS-V; NSW
UT Chapel Branch	DD	4D	–	WS-IV; NSW
UT to Sandy Creek	E	4M	–	WS-V; NSW
UT Chapel Branch	EE	4D	–	WS-IV; NSW
UT Chapel Branch	EEE	4C	–	WS-IV; NSW
UT to Sandy Creek	F	4L	–	WS-V; NSW
UT to Sandy Creek	G	4L	–	WS-V; NSW
UT to Sandy Creek	GG	4N	–	WS-V; NSW
UT to Little Creek	GGG	4F	–	WS-IV; NSW
UT to Sandy Creek	H	4L	–	WS-V; NSW
UT to Sandy Creek	HH	4N	–	WS-V; NSW
UT to Sandy Creek	I	4K	–	WS-V; NSW
UT to Sandy Creek	II	4O	–	WS-V; NSW
Sandy Creek	J	4J, 4K, 4N, 4O, 4P	16-41-1-11	WS-V; NSW
UT to Sandy Creek	JJ	4O	–	WS-V; NSW
UT Chapel Branch	JJJ	4D	–	WS-IV; NSW
UT to Sandy Creek	K	4J, 4K	–	WS-V; NSW
UT to Sandy Creek	KK	4P	–	WS-V; NSW
UT Chapel Branch	KKK	4C	–	WS-IV; NSW
UT to New Hope Creek	L	4K	–	WS-IV; NSW
UT to Little Creek	LL	4H	–	WS-IV; NSW
UT Chapel Branch	LLL	4C	–	WS-IV; NSW
UT to Little Creek	M	4G	–	WS-IV; NSW
UT to Little Creek	MM	4H	–	WS-IV; NSW
UT Chapel Branch	MMM	4C	–	WS-IV; NSW
UT to Little Creek	N	4G	–	WS-IV; NSW
UT to Little Creek	NN	4G	–	WS-IV; NSW

Stream Name	Map ID	Figure Number	NCDWR Index Number	Best Usage Classification
UT to Little Creek	O	4J	--	WS-IV; NSW
UT to Little Creek	OO	4D	--	WS-IV; NSW
UT to Little Creek	OOO	4J	--	WS-IV; NSW
UT to Little Creek	P	4J	--	WS-IV; NSW
UT to Little Creek	PP	4G	--	WS-IV; NSW
UT to Little Creek	Q	4J	--	WS-IV; NSW
UT Chapel Branch	QQ	4C	--	WS-IV; NSW
UT to Little Creek	QQQ	4J	--	WS-IV; NSW
UT to Little Creek	R	4I	--	WS-IV; NSW
UT Chapel Branch	RR	4C	--	WS-IV; NSW
UT to New Hope Creek	S	4K	--	WS-IV; NSW
UT Chapel Branch	SS	4C	--	WS-IV; NSW
New Hope Creek	T	4J, 4K	16-41-1	WS-IV; NSW
UT Chapel Branch	TT	4B	--	WS-IV; NSW
UT to Meeting of the waters	UU	4B	--	WS-IV; NSW
UT to Sandy Creek	UUU	4J	--	WS-V; NSW
UT to Little Creek	V	4F	--	WS-IV; NSW
UT to Little Creek	W	4E, 4F	--	WS-IV; NSW
Chapel Branch	WW	4B	16-41-2-8	WS-IV; NSW
UT to Little Creek	X	4E	--	WS-IV; NSW
UT to Meeting of the waters	XX	4B	--	WS-IV; NSW
UT to Little Creek	XXX	4J	--	WS-IV; NSW
Little Creek	Y	4D, 4E	16-41-1-15	WS-IV; NSW
Meeting of the Waters	YY	4B	16-41-2-7	WS-IV; NSW
UT to Little Creek	Z	4D	--	WS-IV; NSW

-- Unnamed tributaries do not have NCDWR Index Numbers.

Table 3: Water Resources Physical Characteristics

Map ID	Figure Number	Average Bank Height (ft)	Average Bankful Width (ft)	Variable Water Depth (in)	Average Channel Substrate	Average Velocity	Average Clarity
A	4M	4	11.8	6	Moderate	Low	Fair
AA	4D	1	6.3	3	Weak	Low	Poor
B	4M	0.5	3	4	Moderate	Low	Fair
C	4M	0.5	4	3	Weak	Low	Fair

Map ID	Figure Number	Average Bank Height (ft)	Average Bankful Width (ft)	Variable Water Depth (in)	Average Channel Substrate	Average Velocity	Average Clarity
CC	4D	4	21.2	36	Moderate	Low	Poor
D	4M	0.5	4	1	Moderate	Medium	Fair
DD	4D	0.5	8.2	2	Weak	Medium	Good
E	4M	0.5	4	2	Moderate	Low	Poor
EE	4D	0.5	12.6	3	Moderate	Medium	Good
EEE	4C	1	3.8	2	Moderate	Low	Poor
F	4L	6	22	5	Moderate	Medium	Fair
G	4L	2-3	3	2	Weak	Low	Poor
GG	4N	2-3	5.1	2	Weak	Medium	Good
GGG	4F	1	3.7	4	Weak	Low	Poor
H	4L	1	5.5	2	Weak	Medium	Poor
HH	4N	4-5	28.5	2	Moderate	High	Good
I	4K	2	9.4	4	Weak	Medium	Poor
II	4O	1-2	3.7	1	Weak	Medium	Fair
J	4J,K,N,O,P	4	31.1	8	Moderate	Medium	Poor
JJ	4O	3	11.3	1	Weak	High	Fair
JJJ	4D	1	4.2	4	Weak	Low	Fair
K	4J	2	16.5	3	Moderate	Medium	Good
KK	4P	4	12.3	3	Moderate	Medium	Good
KKK	4C	1	3.4	3	Weak	Low	Poor
L	4K	2	3	4	Weak	Low	Fair
LL	4H	2	13.8	8	Moderate	Low	Fair
LLL	4C	1	2	3	Moderate	Low	Good
M	4G	2	3.1	2	Weak	Low	Fair
MM	4H	3	12.2	4	Strong	Medium	Good
MMM	4C	1-3	5.2	2	Moderate	Medium	Fair
N	4G	2	4.5	2	Weak	Low	Fair
NN	4G	2	3.8	4	Moderate	Low	Good
O	4J	2	24.6	2	Weak	High	Good
OO	4D	2	6.1	2	Weak	Medium	Fair
OOO	4J	1	3.5	2	Moderate	Low	Fair
P	4J	1	3	1	Weak	Medium	Fair
PP	4G	2	3.2	2	Moderate	Low	Fair
Q	4J	1	5.2	3	Weak	Low	Fair
QQ	4C	2	5.6	4	Moderate	Low	Fair
QQQ	4J	1	3.3	2	Moderate	Low	Fair
R	4I	2	4	1	Moderate	Medium	Fair

Map ID	Figure Number	Average Bank Height (ft)	Average Bankful Width (ft)	Variable Water Depth (in)	Average Channel Substrate	Average Velocity	Average Clarity
RR	4C	1	4.4	3	Moderate	Low	Fair
S	4K	5	17.9	10	Moderate	Low	Fair
SS	4C	1	4	2	Weak	Low	Fair
T	4J,4K	6	46.1	24	Moderate	Medium	Poor
TT	4B	8	10.5	6	Moderate	Low	Fair
UU	4B	4	4.3	4	Weak	Low	Poor
UUU	4J	3	20	2	Moderate	Medium	Good
V	4F	0.5	3.9	2	Weak	Low	Good
W	4E,4F	1	4.3	2	Weak	Low	Fair
WW	4B	3	8.1	4	Strong	Low	Good
X	4E	2	39.4	8	Weak	Medium	Poor
XX	4B	3	3.6	1	Moderate	Medium	Fair
XXX	4J	2	9.25	12	Weak	Low	Fair
Y	4D, 4E	4	47.7	36	Weak	Low	Poor
YY	4B	3	23.4	6	Strong	Medium	Excellent
Z	4D	1	6	4	Weak	Low	Poor

4.1.3.2 Ponds

In addition to the streams listed above, eight open water features were identified within the study area (Table 4). These open waters are characterized as ponds in the text and mapping (Figures 47 through 68 in Appendix A). A description of each pond is provided as follows:

Pond A is unnamed open water that is located northwest of University Drive and west of Martin Luther King Jr. Parkway. Pond A has a fountain to help maintain water quality and has a shoreline that is partially maintained by the adjacent apartment complex.

Pond B is unnamed open water that is located west of Farrington Road and south of Wendell Road. Pond B serves as the headwaters for Stream V.

Pond C is unnamed open water that is located north of Prestwick Road and south of NC 54. Pond C is lined with a masonry retaining wall and is well maintained.

Pond D is unnamed open water that is located east of Finley Golf Course Road and south of NC 54. Pond D has a fountain to help maintain water quality and has a fringe of emergent wetland vegetation.

Pond E is unnamed open water that is located east of Finley Golf Course Road and south of NC 54 within the Finley Golf Course.

Pond F is unnamed open water that is located east of Finley Golf Course Road and south of NC 54 north of the Finley Golf Course. Pond F has a fountain to help maintain water quality and has a fringe of emergent wetland vegetation. Pond F serves as the headwaters for Stream QQ.

Pond H is unnamed open water that is located east of Friday Center Drive and south of NC 54. Pond H serves as the headwaters for Stream MMM.

Pond G is unnamed open water that is located east of Friday Center Drive and south of NC 54. Pond G is unmaintained which has resulted in a shoreline fringe of palustrine scrub-shrub/emergent wetlands in addition to being covered by a thick layer of duckweed.

Table 4 summarizes the area of ponds that are located within the alignment alternative study areas.

Table 4: Jurisdictional Ponds in the Study Area

Pond Designation	Figure Number	Alignment(s)	Area (acre)
C	4B	C1, C1A, C2, C2A	0.107
D	4C	C1, C1A, C2, C2A	0.185
E	4C	C1, C1A, C2	0.016
F	4C	C1, C1A, C2	0.173
H	4C	C2	0.129
G	4C	C2	0.146
B	4F	C1, C1A, C2, C2A	0.335
A	4L	NHC 2, LPA	0.264

4.2 Biotic Resources

4.2.1 Terrestrial Communities

Four terrestrial communities were identified in the study area as shown in Appendix A (Figures 32 through 46): maintained/disturbed, mesic mixed forest, alluvial hardwood forest, and bottomland hardwood forest. A brief description of each community type follows. Scientific names of all species identified are included in Appendix B.

The NCNHP has identified select unique habitat areas throughout North Carolina as NHP Natural Areas (NHPNA), formerly called Significant Natural Heritage Areas (SNHA). These areas are considered especially valuable because they contain special habitats, rare species, ecologically significant natural communities, and are considered reservoirs of biological diversity. NHPNA designation does not confer legally mandated protections; however, this status does imply that these areas will be given special consideration during an environmental review process. An overview of the NHPNAs present within the project area is provided in Figure 68 of Appendix A. The two NHPNAs that would be impacted by the project alternative are the New Hope Creek Bottomland Forest and the Little Creek Bottomlands and Slopes. The other NHPNAs that are shown in Figure 68 are outside of the areas that would be impacted by the project.

4.2.1.1 Maintained/Disturbed

This community incorporates several land cover types, including residential, commercial, industrial, recreational, and cleared/maintained transportation corridors. The majority of the study corridor is designated maintained/disturbed land.

Plant communities in residential areas often contain relict species from before the area was cleared or disturbed, usually canopy trees that reflect their historic assemblages. Usually, introduced species predominate in maintained areas, and weedy species are opportunistic in recently disturbed areas. Canopy trees include red maple, hickory, white ash, sweetgum, tulip poplar, loblolly pine, black cherry, and oaks including white oak, southern red oak, willow oak, northern red oak, and black oak. Shrubs

include flowering dogwood, winged sumac, sourwood, wax myrtle, maple-leaf viburnum, and weedy species including mimosa, princess tree, blackberry, multiflora rose, tree-of-heaven, Japanese knotweed, autumn olive, bamboo, bush honeysuckle, poison ivy, and Chinese privet. Vines include Japanese honeysuckle, trumpet creeper, kudzu, oriental bittersweet, English ivy, catbrier, and muscadine. The herb layer includes ragweed, broomsedge, crabgrass, horseweed, beggar ticks, fireweed, dog fennel, St. Peter's cross, horse nettle, goldenrod, Japanese grass, and Queen Anne's lace.

4.2.1.2 Mesic Mixed Forest

This community, if left undisturbed, would most closely resemble Schafale and Weakley's (1990) mesic mixed hardwood forest. Mature, stable forests in this region are usually characterized by a hardwood canopy. However, this community is characterized by a mixture of pine and hardwood species, with pines occasionally comprising greater than 30 percent of canopy stems. The community in the study area occurs primarily as a buffer around roads, residential and other developed areas, and as secondary growth forest on previously timbered or otherwise disturbed land. Mesic mixed forest contains American beech, tulip poplar, red oak, black walnut, white oak, sourwood, Virginia pine, and loblolly pine in the canopy. The shrub layer supports American holly, flowering dogwood, blackberry, Chinese privet, multiflora rose, autumn olive, bamboo, Japanese barberry, and bush honeysuckle. The herb layer includes Christmas fern, lespedeza, heartleaf, and Japanese grass. Vines include oriental bittersweet, Japanese honeysuckle, poison ivy, and English ivy.

4.2.1.3 Alluvial Hardwood Forest

This plant community supports many species in common with Piedmont/low mountain alluvial forest as described by Schafale and Weakley (1990), but the extent of disturbance by diverted storm water flow and by invasive species along roadside edges cause this community to deviate noticeably from the natural community described. Alluvial hardwood forest occurs throughout the study area along small streams. This community has a significant component of wetland species, particularly in the herb layer. These areas are intermittently flooded, and may contain standing water for extended periods in the winter and spring. The forest canopy is characterized by sweetgum, tulip poplar, American elm, American sycamore, river birch, green ash, box elder, and red maple. American holly, slippery elm, American hornbeam, willow oak, ironwood, and common pawpaw occur most often as understory trees. Chinese privet, silky dogwood, multiflora rose, Japanese knotweed, spicebush, blackberry, poison ivy, Japanese honeysuckle, oriental bittersweet, and catbrier are found in the shrub layer. Herbaceous species include Japanese grass, smartweed, jewelweed, false nettle, soft rush, watercress, and sedges.

4.2.1.4 Bottomland Hardwood Forest

Bottomland hardwood forests distinguished from the alluvial hardwood forests by the presence of larger streams and the depositional fluvial landforms, or changes in the landscape resulting from the movement of sediment by the stream, that occur within the larger floodplain areas. Bottomland hardwood forests typically contain dominant canopy trees such as tulip poplar, sweetgum, American elm, green ash, loblolly pine. Understory trees include American hornbeam, flowering dogwood, red maple, and American holly. Chinese privet, silky dogwood, multiflora rose, Japanese knotweed, spicebush, blackberry, poison ivy, Japanese honeysuckle, oriental bittersweet, and catbrier are found in the shrub layer. Herbaceous species include Japanese grass, smartweed, jewelweed, false nettle, soft rush, watercress, and sedges. The New Hope Creek Corridor bottomland hardwood forest is located within the project study area.

New Hope Creek Corridor Bottomland Hardwood Forest

The broad bottomlands along New Hope Creek and its tributaries support some of the largest and oldest stands of hardwoods remaining in this part of the Piedmont, more than 4,480 acres (NCNHP, 1999). The New Hope Creek floodplain is an integral part of a much larger system of natural areas, extending from Duke Forest in the headwater area down to the Jordan Lake Game Lands, and farther downstream the Cape Fear all the way to the Coastal Plain. The project study area bisects the New Hope Creek Corridor bottomland hardwood forest in two locations: the US 15-501 bottomlands (wetlands E, G, H, I, J, K, N, O, OOO, P, Q, U, UUU, V, VV, VVV, W, WWW, X, XX, XXX, YYY, ZZZ) and the Little Creek bottomlands (wetlands Y, Z, AA, BB, CC, CCC, BBB, DD, DDD, EE, HHH, III, and FF). The text within the following two sections on the US 15-501 bottomlands and the Little Creek bottomlands are extracted from the 1999 Durham County *Inventory of Important Natural Areas, Plants and Wildlife* (NCNHP, 1999). A copy of the selected portions of this report can be found in Appendix C.

US 15-501 Bottomlands

The US 15-501 bottomlands are part of the New Hope Creek Bottomland Forest NHPNA and are located between US 15-501 and Old Chapel Hill Road. This part of the New Hope floodplain covers approximately 250 acres and supports a fairly mature stand of bottomland hardwood forest. Most trees range between 10 inches and 15 inches in diameter, but occasional specimens were observed that were over three feet in diameter. Canopy species observed include box elder, red maple, sugar maple, river birch, shagbark hickory, big shellbark hickory, mockernut hickory, southern hackberry, sweetgum, tulip poplar, loblolly pine, swamp chestnut oak, willow oak, and American elm. The plant list includes the large-flowered trout lily, yellow lady's slipper, and southern rein orchids, which are found in some of the low areas. The rarest plant is big shellbark hickory, a species listed by NCNHP as a candidate for the endangered and threatened list due to the small numbers found in North Carolina. There is a thriving population of small trees and one much larger and older tree present. In addition, according to the Durham County *Inventory of Important Natural Areas, Plants and Wildlife* (NCNHP, 1999), this whole area has been seriously affected by the increased run-off from development along US 15-501.

Little Creek Bottomlands and Slopes

Little Creek is one of the larger tributaries of New Hope Creek. The portion of Little Creek within the project study area is within the 100-year floodplain of Jordan Lake, and is part of the Jordan Lake Watershed Management Area. Little Creek Bottomlands are underwater when Jordan Lake is at flood level. This area contains a large tract of bottomland hardwood forest that provides habitat for many species of forest-interior and other disturbance-sensitive animals. Canopy species observed include shagbark hickory, American beech, swamp white oak, red oak, hop hornbeam, and elm. Little Creek Bottomlands and Slopes are designated as an NHPNA by the NCNHP.

4.2.1.5 Terrestrial Wildlife

The project study area was visually surveyed for signs of terrestrial wildlife between August 2013 and August 2014. Due to the disturbed nature of the project study area, all of the faunal species observed are opportunistic species that would inhabit any and all of the terrestrial communities discussed above. Faunal species observed within the project study area are discussed following the community descriptions. Wildlife expected within and around the project study area was determined through review of supporting literature (Burt, 1976; Martof et al., 1980; Sather et al., 2004; Sibley, 2003; Duke University, 2015). Wildlife directly observed or determined to be present through evidence (tracks, scat) during field investigations are indicated with an asterisk (*).

Bird species that utilize this community are those typical of developed areas in the Piedmont region of North Carolina. These species are tolerant of habitat fragmentation and regular disturbance. Typical birds of this community include the following: turkey vulture*, red-shouldered hawk, red-tailed hawk* American robin*, northern cardinal*, eastern towhee, American crow*, eastern bluebird, northern mockingbird*, Carolina wren, song sparrow, white-throated sparrow, rock dove, red-bellied woodpecker*, mourning dove*, common grackle*, blue jay*, American goldfinch, northern flicker, European starling, and tufted titmouse*. Mammals expected to occur in these forested areas include both those species acclimated to human disturbance and those species typical of relatively undisturbed forests of limited size. Expected mammals are: the eastern grey squirrel*, eastern red bat, white-tailed deer*, raccoon, eastern cottontail, opossum, eastern mole, and gray fox. Other species expected to be within the project study area include the shorttail shrew, striped skunk, and white-footed mouse.

Primarily terrestrial reptiles and amphibians that utilize open and disturbed areas typical of this community include the following: rat snake, eastern fence lizard, corn snake, and slimy salamander. Primarily terrestrial reptiles and amphibians who would typically favor forested habitats in the region include the following: eastern box turtle*, American toad, five-lined skink, copperhead, gray treefrog, upland chorus frog, wood frog, and slimy salamander.

4.2.2 Aquatic Communities

Aquatic communities within the project study area consist of many small intermittent and perennial streams, as well as a few larger perennial streams and their associated wetlands (e.g., New Hope Creek, Little Creek). Aquatic invertebrates and fish would be expected to be a major component of stream ecosystems, as primary and secondary consumers, and as prey items for organisms higher in the food chain. Typical aquatic organisms would include, caddisflies*, mayflies*, crane flies, crayfish*, stoneflies*, dobsonflies, dragonflies*, mosquitoes*, and black flies, bloodworm midge*, whirligig beetles, water boatman*, water striders*, crayfish*, snails*, Asiatic clam*, mosquito fish*, shiners*, and sunfish*.

4.2.3 Bottomland Hardwood Forest

The New Hope Creek bottomlands provide an important ecological corridor for the movement of animals. A species survey was conducted in the New Hope Creek Corridor bottomland hardwood forest as part of *The Durham County Inventory of Important Natural Areas, Plants and Wildlife*, 1999. The following description was extracted from this report, and a copy of the selected portions of this report can be found in Appendix C that contains a more complete list of species identified within the US 15-501 and Little Creek bottomlands located in the vicinity of the project study area.

Significant species recorded within the US 15-501 hardwood bottomland included four-toed salamanders, dwarf waterdogs, and river otters. Residence of otters in this area is an indication of both the undisturbed qualities of this bottomland as well as there being a substantial supply of fish and other aquatic species upon which they prey.

The Little Creek bottomland in the vicinity of the project study area contains a waterfowl impoundment located north of NC 54. This impoundment is one of seven waterfowl impoundments that were constructed by the USACE and the North Carolina Department of Transportation as mitigation for the loss of floodplains due to the impoundment of Jordan Lake. This Jordan Game Land area is managed by the NCWRC. Each impoundment has concrete control structures to regulate water level and base flow, allowing the sites to drain feely for eight months of the year and then inundating the areas from November through February.

Characteristic bottomland species observed at Little Creek included red-shouldered hawk, wood duck, otter, mink, muskrat, and beaver. The presence of pileated woodpeckers, along with the red-shouldered hawks, is indicative of the extensive nature and relative maturity of the hardwood forest. The most notable animal observed on this tract was the marsh rabbit; this species is one of a suite of essentially Coastal Plain species that occur above the Fall Line only within the extensive floodplains along Triassic Basin streams.

4.3 Jurisdictional Issues

Jurisdictional issues are described in the following subsections.

4.3.1 Clean Water Act of the U.S.

A field delineation of jurisdictional water resources within the project study area was conducted in 2013 and 2014 and again in 2015. Based on these field surveys, a preliminary Jurisdictional Determination (JD) of these features was issued by the USACE on May 12, 2014. Subsequent to the issuance of the JD, the project study area limits were revised. A modification of the May 12, 2014 JD was signed on November 7, 2014 based on the completion of additional field delineations (Appendix E). Fifty-seven jurisdictional streams were identified in the study area (Table 5). The locations of these streams are shown on Figures 47 through 67 in Appendix A. USACE and the NCDWR stream delineation forms are included in Appendix D. The physical characteristics and water quality designations of each jurisdictional stream are detailed in section 4.1.3.1. All jurisdictional streams in the study area have been designated as warm water streams for the purposes of stream mitigation.

Table 5: Jurisdictional Characteristics of Water Resources in the Study Area

Map ID	Length (ft.)	Classification	Compensatory Mitigation Required	River Basin Buffer
A	574	Perennial	Yes	Yes
AA	96	Intermittent	Yes	No
B	187	Perennial	Yes	Yes
C	47	Perennial	Yes	Yes
CC	230	Perennial	Yes	Yes
D	61	Intermittent	Yes	No
DD	250	Intermittent	Yes	Yes
E	320	Intermittent	Yes	Yes
EE	178	Perennial	Yes	Yes
EEE	78	Intermittent	Yes	No
F	754	Perennial	Yes	Yes
G	198	Intermittent	Yes	Yes
GG	268	Intermittent	Yes	No
GGG	288	Intermittent	Yes	Yes
H	276	Intermittent	Yes	Yes
HH	106	Perennial	Yes	Yes
I	2,450	Perennial	Yes	Yes
II	403	Intermittent	Yes	Yes
J	4,294	Perennial	Yes	Yes

Map ID	Length (ft.)	Classification	Compensatory Mitigation Required	River Basin Buffer
JJ	463	Perennial	Yes	Yes
JJJ	65	Intermittent	Yes	Yes
K	876	Perennial	Yes	No
KK	684	Perennial	Yes	Yes
KKK	168	Intermittent	Yes	Yes
L	175	Perennial	Yes	No
LL	205	Perennial	Yes	Yes
LLL	90	Intermittent	Yes	No
M	228	Intermittent	Yes	Yes
MM	297	Perennial	Yes	Yes
MMM	208	Intermittent	Yes	Yes
N	565	Intermittent	Yes	No
NN	148	Perennial	Yes	No
O	133	Perennial	Yes	Yes
OO	215	Intermittent	Yes	Yes
OOO	12	Intermittent	Yes	No
P	252	Intermittent	Yes	No
PP	220	Intermittent	Yes	Yes
Q	387	Intermittent	Yes	Yes
QQ	227	Perennial	Yes	Yes
QQQ	28	Intermittent	Yes	No
R	317	Intermittent	Yes	Yes
RR	683	Perennial	Yes	Yes
S	477	Perennial	Yes	Yes
SS	228	Intermittent	Yes	No
T	1,297	Perennial	Yes	Yes
TT	712	Perennial	Yes	Yes
UU	115	Intermittent	Yes	No
UUU	409	Perennial	Yes	Yes
V	792	Intermittent	Yes	Yes
W	645	Intermittent	Yes	Yes
WW	250	Perennial	Yes	Yes
X	180	Perennial	Yes	Yes
XX	66	Intermittent	Yes	No
XXX	72	Intermittent	Yes	Yes
XXX	132	Perennial	Yes	Yes
Y	1,514	Perennial	Yes	Yes
YY	280	Perennial	Yes	Yes
Z	233	Perennial	Yes	Yes

Eight ponds were identified within the project study area (Figures 47 – 68 in Appendix A).

Forty-six jurisdictional wetlands were identified within the study area (Figures 47 – 68 in Appendix A). Each wetland area was classified using the North Carolina Wetland Assessment Method (NCWAM), and given a quality rating of high, medium, or low by the North Carolina Wetland Functional Assessment Team (NCWFAT, 2010). Wetland classification and quality rating data are presented in Table 6. All wetlands in the study area are within the Cape Fear River basin (USGS Hydrologic Unit 03030002). USACE wetland delineation forms and NCWAM wetland rating forms for each site are included in Appendix D.

Table 6: Jurisdictional Characteristics of Wetlands in the Study Area

Map ID	Figure Number	NCWAM Classification	Hydrologic Classification	NCWAM Wetland Rating	Impacts (ac.)
A	4M	Headwater forest	PF01/04	High	0.11
AA	4E	Bottomland hardwood forest	PF01/EM	High	2.97
BB	4E	Bottomland hardwood forest	PF01	High	0.38
BBB	4E	Basin wetland	PF01/EM	High	0.35
C	4M	Headwater forest	PF01/EM	High	0.08
CC	4D	Bottomland hardwood forest	PF01	High	0.21
CCC	4E	Basin wetland	PEM	High	0.23
DD	4D	Bottomland hardwood forest	PF01	High	0.06
DDD	4E	Basin wetland	PF01	High	0.29
E	4K	Bottomland hardwood forest	PF01	High	2.45
EE	4D	Bottomland hardwood forest	PF01	High	1.17
F	4K	Bottomland hardwood forest	PEM	Medium	0.01
FF	4D	Bottomland hardwood forest	PF01/PEM	High	2.09
G	4J	Bottomland hardwood forest	PFO1	High	0.03
GG	4C	Bottomland hardwood forest	PF01	High	0.37
H	4J	Non-tidal freshwater marsh	PEM	Medium	0.01
HHH	4F	Non-tidal freshwater marsh	PEM	Low	0.05
I	4J	Bottomland hardwood forest	PFO1	High	0.31
III	4F	Bottomland hardwood forest	PF01	High	0.26
J	4J	Bottomland hardwood forest	PFO1	High	0.71
K	4J	Bottomland hardwood forest	PFO1	High	0.04
N	4J	Bottomland hardwood forest	PFO1	High	2.30
NNN	4G	Non-tidal freshwater marsh	PEM	High	0.27
O	4J	Bottomland hardwood forest	PFO1	High	2.21
OOO	4J	Basin wetland	PEM	Low	0.05
P	4J	Bottomland hardwood forest	PFO1	High	0.02
Q	4J	Bottomland hardwood forest	PFO1	High	0.25

Map ID	Figure Number	NCWAM Classification	Hydrologic Classification	NCWAM Wetland Rating	Impacts (ac.)
R	4I	Headwater forest	PF01/04	Low	0.22
S	4I	Headwater forest	PF01	High	0.10
T	4I	Headwater forest	PSS1	Low	0.08
TTT	4N	Bottomland hardwood forest	PF01/04	High	0.21
U	4K	Basin wetland	PF01	Medium	0.01
UUU	4J	Bottomland hardwood forest	PFO1	High	2.37
V	4K	Bottomland hardwood forest	PF01	Low	0.45
VV	4K	non-tidal freshwater marsh	PEM	Low	0.13
VVV	4J	Bottomland hardwood forest	PFO1	High	0.06
W	4K	Bottomland hardwood forest	PF01/PEM	High	0.77
WW	4B	Bottomland hardwood forest	PF01/EM	Low	0.04
WWW	4J	Bottomland hardwood forest	PFO1	High	0.18
XX	4J	Bottomland hardwood forest	PFO1	High	0.10
Y	4F	Basin wetland	PF01	Medium	0.06
YY	4C	Non-tidal freshwater marsh	PEM	Medium	0.04
YYY	4J	Bottomland hardwood forest	PFO1	High	0.03
Z	4F	Bottomland hardwood forest	PF01	High	0.45
ZZ	4B	Bottomland hardwood forest	PF01/EM	Medium	0.12
ZZZ	4J	Bottomland hardwood forest	PF01	High	0.07

4.3.2 Clean Water Act Permits

The proposed project will likely require an Individual Permit for the purposes of Section 404 certification. This permit must be accompanied by an individual Section 401 Water Quality Certification. The USACE holds the final discretion as to what permit will be required to authorize project construction.

4.3.3 Coastal Zones

The Coastal Zone Management Act of 1972 enables states, including North Carolina, to designate state coastal zone boundaries and develop coastal management programs to improve protection of sensitive shoreline resources and guide sustainable use of coastal areas. The North Carolina Coastal Area Management Act of 1974 establishes a cooperative program of coastal area management between local and state governments. According to the National Oceanic and Atmospheric Administration (NOAA, February 9, 2012) and the North Carolina Department of Environment and Natural Resources (NCDENR), the project area is not located within any of the 20 counties that comprise the state’s coastal zone boundaries and that are subject to the rules and policies of the state’s Coastal Resources Commission. Impacts to coastal zones would not occur with the proposed project.

4.3.4 Coastal Area Management Act Areas of Environmental Concern

Coastal Area Management Act (CAMA) wetlands or other areas of Environmental Concern do not occur in Orange or Durham counties or in the study area. Therefore, CAMA regulations would not apply to the study area.

4.3.5 Construction Moratorium

No trout or other construction moratorium will apply to any streams or waters in the study area. A construction moratorium is a period of time that construction may not occur, which is typically associated with the breeding season of a protected species.

4.3.6 N.C. River Basin Buffer Rules

Jordan Lake Buffer Rules apply to streams and waters in the study area. In an effort to improve water quality in the Jordan Lake watershed, a new mandatory buffer rule (15A NCAC 02B .0267) was adopted by the North Carolina Environmental Management Commission (EMC) on August 11, 2009. The purpose of this rule is to protect and preserve existing riparian buffers to maintain their nutrient removal function. Riparian buffers act to remove nitrogen, phosphorus, and other pollutants from rainwater and runoff.

The buffer rule applies to all perennial and intermittent streams, lakes, ponds, and estuaries in the Jordan Lake water basin that are shown on the latest USGS topographic quadrangle maps and Natural Resources Conservation Service soil survey maps. It does not apply to agricultural, forestry, or stormwater ditches. The buffer rule establishes a protected 50-foot wide riparian buffer consisting of two zones. Zone 1 consists of a vegetated area that extends landward a distance of 30 feet on all sides of a surface water. Zone 2 begins at the outer edge of Zone 1 and extends landward 20 feet. Under the buffer rules, Zones 1 and 2 are to remain essentially undisturbed, except for certain exempted and allowed uses provided by 15A NCAC 02B .0267 (6). Uses designated as prohibited under this rule may not proceed within the riparian buffer unless a variance is granted pursuant to 15A NCAC 02B .0267 (9). The buffer rules are administered by the NCDWR.

4.3.7 Rivers and Harbors Act Section 10 Navigable Waters

There are no surface waters identified as “Navigable Waters” under section 10 of the Rivers and Harbors Act (33 U.S.C. § 403) in the study area. The USACE defines navigable waters as those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 C.F.R. § 329.4). The Rivers and Harbors Act limits the construction of any structure that would obstruct navigable waters.

4.3.8 Endangered Species Act Protected Species

The ESA of 1973 (16 U.S.C. § 1531 et seq.), is the federal statute that regulates endangered and threatened species through administering permits, implementing recovery plans, and monitoring listed endangered and threatened species. Species with the federal status of endangered (E), threatened (T), proposed endangered (PE), and proposed threatened (PT) are protected under the ESA. Any action likely to adversely affect a species classified as federally protected will be subject to review by the USFWS. The USFWS lists five federally protected species for Orange and Durham counties (Table 7). A brief description of each species’ habitat requirements follows, along with the Biological Conclusion rendered based on survey results in the study area. Habitat requirements for each species are based on the current best available information from the USFWS. The USFWS optimal survey windows are based on

recommendations from the USFWS on the best times to find and identify these species. Optimal survey windows for plants were determined from species recovery plans, field observations, and herbarium specimens at the North Carolina State University herbarium. Optimal survey windows for animals were approved by the National Marine Fisheries Service (NMFS) on April 4, 2008 and the USFWS Raleigh Field Office on April 7, 2008. USFWS concurrence of the Biological Conclusions is pending their review of this report.

Table 7: Federally Protected Species Listed for Orange and Durham Counties

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
<i>Rhus michauxii</i>	Michaux's sumac	Endangered	Yes	May affect, not likely to adversely affect
<i>Echinacea laevigata</i>	Smooth coneflower	Endangered	No	No effect
<i>Picoides borealis</i>	Red-cockaded woodpecker*	Endangered	No	No effect
<i>Alasmidonta heterodon</i>	Dwarf wedgemussel	Endangered	No	No effect
<i>Myotis septentrionalis</i>	Northern long-eared bat	Threatened	Yes	Unresolved

* - Historical record (the species was last observed in the county more than 50 years ago)

4.3.8.1 Michaux’s Sumac

USFWS optimal survey window: May through October

Habitat Description: Michaux’s sumac, endemic to the inner Coastal Plain and lower Piedmont, grows in sandy or rocky, open, upland woods on acidic or circumneutral, well-drained sands or sandy loam soils with low cation exchange capacities. The species is also found on sandy or submesic loamy swales and depressions in the fall line Sandhills region as well as in openings along the rim of Carolina bays; maintained railroad, roadside, power line, and utility rights-of-way; areas where forest canopies have been opened up by blowdowns and/or storm damage; small wildlife food plots; abandoned building sites; under sparse to moderately dense pine or pine/hardwood canopies; and in and along edges of other artificially maintained clearings undergoing natural succession. In the central Piedmont, it occurs on clayey soils derived from mafic rocks. The plant is shade intolerant and, therefore, grows best where disturbance (e.g., mowing, clearing, grazing, periodic fire) maintains its open habitat. Suitable habitat for Michaux’s sumac may exist along the existing powerline easements and roadway right-of-ways observed within the project study area.

Biological Conclusion: May affect, not likely to adversely affect

A survey for Michaux’s sumac and its habitat was conducted during the biotic community survey in September, 2013. Suitable habitat for Michaux’s sumac was present in the study area along roadside shoulders and utility easements. These habitat types exist along most of the project corridor and along all of the alignment alternatives, anywhere that the alignment approaches roads or utility easements. No individuals were found during the survey. A review of the NCNHP records, updated January 2015, indicates no known Michaux’s sumac occurrence within 1.0 mile of the study area.

4.3.8.2 Smooth Coneflower

USFWS optimal survey window: late May through October

Habitat Description: Smooth coneflower is typically found in open woods, glades, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium and calcium rich soils associated with amphibolite, dolomite or limestone (in Virginia), gabbro (in North Carolina and Virginia), diabase (in North Carolina and South Carolina), and marble (in South Carolina and Georgia). Smooth coneflower occurs in plant communities that have been described as xeric hardpan forests, diabase glades or dolomite woodlands. Optimal sites are characterized by abundant sunlight and little competition in the herbaceous layer. Natural fires, as well as large herbivores, historically influenced the vegetation in this species' range.

Biological Conclusion: No effect

A survey for smooth coneflower and its habitat was conducted during the biotic community survey in September, 2013. No suitable habitat for this species was identified within the project study area, and no individuals were found during the survey. A review of the NCNHP records, updated January 2015, indicates one historical occurrence of smooth coneflower within 1.0 mile of the study area. The habitat where this occurrence was observed is recorded as having been destroyed.

4.3.8.3 Red-cockaded Woodpecker

USFWS optimal survey window: year round; November-early March (optimal)

Habitat Description: For nesting/roosting habitat, open stands of pine containing trees 60 years old and older are preferred. Red-cockaded woodpeckers need live, large older pines in which to excavate their cavities. Longleaf pines are most commonly used, but other species of southern pine are also acceptable. Dense stands (stands that are primarily hardwoods, or that have a dense hardwood understory) are avoided. Foraging habitat is provided in pine and pine hardwood stands 30 years old or older with foraging preference for pine trees 10 inches or larger in diameter. In good, moderately-stocked, pine habitat, sufficient foraging substrate can be provided on 80 to 125 acres. Suitable habitat for the red-cockaded woodpecker does not exist in the project study area. Small, scattered patches of loblolly pine trees were identified in the project study area. The majority of vegetation in the project study area consists of hardwood trees and urban landscape plantings.

Biological Conclusion: No effect

Suitable habitat for the red-cockaded woodpecker does not exist in the study area. The entire study area is comprised of maintained/disturbed communities with no stands of mature pine forest. A review of the NCNHP records, updated January 2015, indicates no known red-cockaded woodpecker occurrence within 1.0 mile of the study area.

4.3.8.4 Dwarf Wedgemussel

USFWS optimal survey window: year round

Habitat Description: In North Carolina, the dwarf wedgemussel is known from the Neuse and Tar River drainages. The mussel inhabits creek and river areas with a slow to moderate current and sand, gravel, or firm silt bottoms. Water in these areas must be well oxygenated. Stream banks in these areas are generally stable with extensive root systems holding soils in place.

Biological Conclusion: No effect

The entire project study area is within the Cape Fear River Basin, which is not known to contain this species. A review of the NCNHP records, updated January 2015, indicates no known dwarf wedgemussel occurrence within 1.0 mile of the study area.

4.3.8.5 Northern Long-eared Bat

USFWS optimal survey window: May 15 – August 15;

Habitat Description: On October 2, 2013, the USFWS proposed listing the northern long-eared bat as endangered after a decline in the bat’s numbers caused by white-nose syndrome, a fungal disease that this species is susceptible to. On January 16, 2015, the USFWS began a 60-day public comment period regarding the potential listing of the northern long-eared bat as a threatened species. The USFWS made a final listing determination on April 2, 2015, effective May 4, 2015. Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places such as caves and mines.

Biological Conclusion: Unresolved

Suitable habitat for the northern long-eared bat was present within the study area’s larger undeveloped floodplains. A review of the NCNHP records, updated January 2015, indicates no known northern long-eared bat occurrence within 1.0 mile of the study area. A Biological Conclusion will be added upon pending consultation with the USFWS.

4.3.9 State Endangered Species Act

The North Carolina Endangered Species Act (N.C.G.S. § 113-331 et seq.) limits, regulates, or prohibits the taking, possession, collection, transportation, purchase or sale of those species and is administered by the NCWRC. Endangered, threatened, and rare plants are protected by the North Carolina Plant Protection and Conservation Act (N.C.G.S. § 106-202.12 et seq.). This law is administered by the Plant Conservation Program in the North Carolina Department of Agriculture (NCDA). All federally-listed species are included on the state list. The NCNHP currently lists 38 total species (21 Endangered, 17 Threatened), listed in Table 8. Coordination with NCDENR will take place pending its review of this report.

Table 8: State-listed Endangered and Threatened Species

Taxonomic Group	Scientific Name	Common Name	State Status	County
Bird	<i>Haliaeetus leucocephalus</i>	Bald eagle	T	Durham, Orange
Bird	<i>Picoides borealis</i>	Red-cockaded woodpecker	E	Durham, Orange
Freshwater bivalve	<i>Alasmidonta heterodon</i>	Dwarf wedgemussel	E	Orange
Freshwater bivalve	<i>Alasmidonta undulate</i>	Triangle floater	T	Durham, Orange
Freshwater bivalve	<i>Alasmidonta varicose</i>	Brook floater	E	Orange
Freshwater bivalve	<i>Elliptio roanokensis</i>	Roanoke slabshell	T	Durham
Freshwater bivalve	<i>Fusconaia masoni</i>	Atlantic pigtoe	E	Durham, Orange

Taxonomic Group	Scientific Name	Common Name	State Status	County
Freshwater bivalve	<i>Lampsilis cariosa</i>	Yellow lampmussel	E	Durham, Orange
Freshwater bivalve	<i>Lampsilis radiata</i>	Eastern lampmussel	T	Durham, Orange
Freshwater bivalve	<i>Lasmigona subviridis</i>	Green floater	E	Durham, Orange
Freshwater bivalve	<i>Strophitus undulatus</i>	Creeper	T	Durham, Orange
Freshwater bivalve	<i>Toxolasma pullus</i>	Savannah lilliput	E	Orange
Freshwater bivalve	<i>Villosa vaughaniana</i>	Carolina creekshell	E	Orange
Freshwater fish	<i>Noturus furiosus</i>	Carolina madtom	T	Durham
Vascular plant	<i>Anemone berlandieri</i>	Southern anemone	E	Orange
Vascular plant	<i>Baptisia australis</i> var. <i>aberrans</i>	Prairie blue wild indigo	E	Durham, Orange
Vascular plant	<i>Buchnera Americana</i>	American bluehearts	E	Durham, Orange
Vascular plant	<i>Cardamine douglassii</i>	Douglass's bittercress	T	Durham, Orange
Vascular plant	<i>Carya laciniosa</i>	Big shellbark hickory	T	Durham
Vascular plant	<i>Delphinium exaltatum</i>	Tall larkspur	E	Durham
Vascular plant	<i>Echinacea laevigata</i>	Smooth coneflower	E	Durham, Orange
Vascular plant	<i>Fleischmannia incarnate</i>	Pink thoroughwort	T	Durham
Vascular plant	<i>Gaylussacia brachycera</i>	Box huckleberry	E	Durham
Vascular plant	<i>Gillenia stipulate</i>	Indian physic	T	Durham, Orange
Vascular plant	<i>Lindera melissifolia</i>	Pondberry	E	Orange
Vascular plant	<i>Lithospermum canescens</i>	Hoary puccoon	T	Durham
Vascular plant	<i>Panicum flexile</i>	Wiry panic grass	T	Durham, Orange
Vascular plant	<i>Platanthera peramoena</i>	Purple fringeless orchid	T	Durham, Orange
Vascular plant	<i>Primula meadia</i>	Shooting star	T	Orange
Vascular plant	<i>Rhus michauxii</i>	Michaux's sumac	E	Durham, Orange
Vascular plant	<i>Ruellia humilis</i>	Low wild-petunia	E	Durham
Vascular plant	<i>Scutellaria australis</i>	Southern skullcap	E	Orange
Vascular plant	<i>Scutellaria leonardii</i>	Shale-barren skullcap	E	Durham, Orange
Vascular plant	<i>Scutellaria nervosa</i>	Veined skullcap	E	Durham
Vascular plant	<i>Symphotrichum leave</i> var. <i>concinnum</i>	Narrow-leaf aster	T	Durham, Orange
Vascular plant	<i>Trichostema brachiatum</i>	Glad bluecurls	E	Orange
Vascular plant	<i>Tridens chapmanii</i>	Chapman's redtop	T	Durham, Orange
Vascular plant	<i>Trifolium reflexum</i>	Buffalo clover	T	Durham

E – Endangered
T – Threatened

4.3.10 Bald Eagle and Golden Eagle Protection Act

The Bald Eagle and Golden Eagle Protection Act (16 U.S.C. § 668) prohibits the taking of a bald eagle, including any activity that would disturb a bald eagle by interfering with normal breeding, feeding, or sheltering behavior. Habitat for the bald eagle primarily consists of mature forest in proximity to large bodies of open water with abundant fish for foraging. Large, dominant trees are utilized for nesting sites, typically within 1.0 mile of open water. One study showed that eagles prefer nesting near lakes with a circumference greater than 7 miles (Peterson 1986). There are no large bodies of open water in close proximity to the study area. Therefore, no habitat within and near the study area constitutes foraging habitat for the bald eagle, and no detailed surveys for eagle nests or nesting habitat are planned within the study area or within a 660-foot buffer. A review of the NCNHP records, updated July 2014, indicates no known bald eagle occurrence within 1.0 mile of the study area. Consultation with the USFWS is pending review of this document.

4.3.11 Migratory Bird Treaty Act

There are a number of observed and expected bird species located in the project area which fall under the purview of the Migratory Bird Treaty Act of 1918. Bird species that were observed within the project area are listed in Appendix B. This act established a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. § 703). Consultation with the USFWS is pending review of this document.

4.3.12 Endangered Species Act Candidate Species

The USFWS defines candidate species as plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. As of December 2012, the USFWS lists no candidate species for Durham and Orange counties.

4.3.13 Essential Fish Habitat

The NMFS regulates Essential Fish Habitat (EFH) under Magnuson-Stevens Fishery Conservation and Management Act (P.L. 94-265), as amended by the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (P.L. 109-479). No Essential Fish Habitat has identified within Durham or Orange counties by the National Marine Fisheries Service.

5. Environmental Consequences

5.1 Biotic Communities within Alignment Alternatives

Table 9 indicates the acreage of each biotic community within the limits of construction, or project footprints, of each of the alignment alternatives (see Appendix A Figures 32 through 46). A description of the overall study area acreages follows.

Table 9: Biotic Communities in the Study Area

Biotic Community				
Alignment / Alignment Alternatives	Bottomland (Acres)	Alluvial (Acres)	Mesic Mixed (Acres)	Maintained / Disturbed (Acres)
LRA	0	3	66	169
C1	3	1	5	10
C1A	1	1	9	11
C2	1	1	8	13
C2A	1	0	5	19
NHC 1	2	0	5	22
NHC 2	3	0	8	16
NHC LPA	4	0	5	18
Rail Operation and Maintenance Facility Sites				
Leigh Village	0	0	17	4
Farrington	0	0	9	16
Patterson Place	0	0	16	0
Cornwallis	0	1	12	7
Alston	0	0	0	21
Alignment Alternative Combinations (all combinations assume the use of the common segments of the Light Rail Alternative)				
C1, NHC 1	5	4	77	200
C1, NHC 2	6	4	79	195
C1, NHC LPA	7	4	77	197
C1A, NHC 1	3	5	80	202
C1A, NHC 2	4	5	83	196
C1A, NHC LPA	5	5	80	198
C2, NHC 1	3	4	79	204
C2, NHC 2	4	4	82	198
C2, NHC LPA	5	4	79	200
C2A, NHC 1	3	4	76	210
C2A, NHC 2	4	4	79	204
C2A, NHC LPA	5	4	76	206

LRA – Common segments of Light Rail Alternative

5.1.1 C1, NHC 1

The corridor composed of the common segments of the Light Rail Alternative with the C1 Alignment Alternative and NHC 1 Alignment Alternative contains approximately 5 acres of bottomlands, 4 acres of alluvial hardwoods, 77 acres of mesic-mixed and approximately 200 acres of maintained/disturbed.

5.1.2 C1, NHC 2

The corridor composed of the common segments of the Light Rail Alternative with the C1 Alignment Alternative and NHC 2 Alignment Alternative contains approximately 6 acres of bottomlands, 4 acres of alluvial hardwoods, 79 acres of mesic-mixed and approximately 195 acres of maintained/disturbed.

5.1.3 C1, NHC LPA

The corridor composed of the common segments of the Light Rail Alternative with the C1 Alignment Alternative and NHC LPA Alignment Alternative contains approximately 7 acres of bottomlands, 4 acres of alluvial hardwoods, 77 acres of mesic-mixed and approximately 197 acres of maintained/disturbed.

5.1.4 C1A, NHC 1

The corridor composed of the common segments of the Light Rail Alternative with the C1A Alignment Alternative and NHC 1 Alignment Alternative contains approximately 3 acres of bottomlands, 5 acres of alluvial hardwoods, 80 acres of mesic-mixed and approximately 202 acres of maintained/disturbed.

5.1.5 C1A, NHC 2

The corridor composed of the common segments of the Light Rail Alternative with the C1A Alignment Alternative and NHC 2 Alignment Alternative contains approximately 4 acres of bottomlands, 5 acres of alluvial hardwoods, 83 acres of mesic-mixed and approximately 196 acres of maintained/disturbed.

5.1.6 C1A, NHC LPA

The corridor composed of the common segments of the Light Rail Alternative with the C1A Alignment Alternative and NHC LPA Alignment Alternative contains approximately 5 acres of bottomlands, 5 acres of alluvial hardwoods, 80 acres of mesic-mixed and approximately 198 acres of maintained/disturbed.

5.1.7 C2, NHC 1

The corridor composed of the common segments of the Light Rail Alternative with the C2 Alignment Alternative and NHC 1 Alignment Alternative contains approximately 3 acres of bottomlands, 4 acres of alluvial hardwoods, 79 acres of mesic-mixed and approximately 204 acres of maintained/disturbed.

5.1.8 C2, NHC 2

The corridor composed of the common segments of the Light Rail Alternative with the C2 Alignment Alternative and NHC 2 Alignment Alternative contains approximately 4 acres of bottomlands, 4 acres of alluvial hardwoods, 82 acres of mesic-mixed and approximately 198 acres of maintained/disturbed.

5.1.9 C2, NHC LPA

The corridor composed of the common segments of the Light Rail Alternative with the C2 Alignment Alternative and NHC LPA Alignment Alternative contains approximately 5 acres of bottomlands, 4 acres of alluvial hardwoods, 79 acres of mesic-mixed and approximately 200 acres of maintained/disturbed.

5.1.10 C2A, NHC 1

The corridor composed of the common segments of the Light Rail Alternative with the C2A Alignment Alternative and NHC 1 Alignment Alternative contains approximately 3 acres of bottomlands, 4 acres of alluvial hardwoods, 76 acres of mesic-mixed and approximately 210 acres of maintained/disturbed.

5.1.11 C2A, NHC 2

The corridor composed of the common segments of the Light Rail Alternative with the C2A Alignment Alternative and NHC 2 Alignment Alternative contains approximately 4 acres of bottomlands, 4 acres of alluvial hardwoods, 79 acres of mesic-mixed and approximately 204 acres of maintained/disturbed.

5.1.12 C2A, NHC LPA

The corridor composed of the common segments of the Light Rail Alternative with the C2A Alignment Alternative and NHC LPA Alignment Alternative contains approximately 5 acres of bottomlands, 4 acres of alluvial hardwoods, 76 acres of mesic-mixed and approximately 206 acres of maintained/disturbed.

5.2 Natural Areas within Alignment Alternatives

Table 10 indicates the acreage of each Natural Area and the acreage of NCWRC gamelands and waterfowl impoundments within the limits of construction, or project footprints, of each of the alignment alternatives (see Appendix A Figures 68-70).

Table 10: Natural Areas in the Study Area

Alignment Alternatives	Natural Area			
	Little Creek Bottomlands and Slopes NHPNA (Acres)	New Hope Creek Bottomland Forest NHPNA (Acres)	Gameland (Acres)	Waterfowl Impoundments (Acres)
C1	6.1	–	2.3	0.8
C1A	6.0	–	0.0	0.0
C2	5.2	–	2.2	0.0
C2A	5.2	–	2.2	0.0
NHC 1	–	1.0	–	–
NHC 2	–	1.0	–	–
NHC LPA	–	3.4	–	–

6. Mitigation

6.1 Wetland and Stream Mitigation

On February 6, 1990, the Department of the Army (DA) and the U.S. Environmental Protection Agency (EPA) signed a memorandum of agreement (MOA) establishing procedures to determine the type and level of mitigation necessary to comply with the Clean Water Act Section 404(b)(1) Guidelines. This MOA provides for first, avoiding impacts to waters and wetlands through the selection of the least damaging, practical alternative; second, taking appropriate and practical steps to minimize impacts on waters and wetlands; and finally, compensating for any remaining unavoidable impacts to the extent appropriate and practical.

6.1.1 Avoidance and Minimization of Impacts

Throughout the project development and preliminary engineering design process, efforts have been made to avoid and minimize impacts to wildlife habitat, including streams and wetlands. This is exemplified by the development of several alternative alignments in the vicinity of Little Creek and New Hope Creek that follow existing travel corridors, and the shifting of sections of alternative alignments to avoid wetland impacts. Further, several measures and construction techniques were incorporated in the design to avoid and minimize impacts to wetlands and streams, such as using aerial structures on piers to cross larger wetland areas. The placement of the piers would be located outside of wetlands and streams to the greatest extent practicable. Moreover, top-down construction of the aerial structures would minimize disturbance to the wetland soils. For wetland crossings where it is not feasible to use aerial structures, impacts to these resources would be minimized by using retaining walls or similar structures and 2:1 side slopes. Bottomless culverts would be used to minimize stream crossing impacts. Specific design measures can be found in the Basis for Engineering Design (appendix xx) and the Design Criteria documents prepared for this project.

Construction activities would be conducted in accordance with local, state, and federal regulations, as well as best management practices (BMPs), including the NCDENR *Manual of Stormwater Best Management Practices*, the *North Carolina Erosion and Sediment Control Planning and Design Manual*, and the *Design Standards in Sensitive Watersheds* (15A NCAC 04B.0124). Construction staging areas would be located away from wetlands, and preserved wetland areas would be demarcated prior to construction. Wetlands anticipated to be temporarily affected by construction would be restored to their original condition as much as possible and would be planted with an appropriate native wetland seed mix. More information on construction impacts and mitigation are presented in section 4.16 of the DEIS.

6.1.2 Compensatory Mitigation of Impacts

Per the USACE 2008 Regulatory Guidance Letter 08-03, and North Carolina G.S. § 143-214.11 and 143-214.20, the preferred method of compensatory mitigation is through the purchase of credits at a USACE approved mitigation bank. If the purchase of available credits from a regional Mitigation Bank would not satisfy the project's mitigation requirements, the NCDENR Ecosystem Enhancement Program (NCEEP) may also be requested to provide mitigation via purchase of in-lieu fee credits. Similarly, riparian buffer credits to offset impacts to the Jordan Lake water supply riparian buffers may be purchased from regional Mitigation Bank or through the Riparian Buffer Restoration Fund offered by the NCEEP. Other forms of Jordan Lake water supply riparian buffer impact mitigation may include the donation of real property or an interest in real property, or the restoration or enhancement of a non-forested riparian

buffer as described in 15A NCAC 02B.0268. Specific compensatory mitigation measures will be developed in consultation with the USACE and DWR the Section 404/401 permitting process that will occur during project design.

6.2 Wildlife Mitigation

Adverse effects to aquatic wildlife will be minimized by bridging wetland and stream areas with aerial structures or bottomless culverts and employing sediment and erosion control BMPs. For the larger wetland crossings such as the Little Creek and New Hope Creek areas, the aerial crossing structures will contain an eight to twelve foot clearance between the bottom of the aerial structure and ground level. This clearance will accommodate the passage of animals beneath the span, and maintain the wildlife corridor within the bottomlands. Efforts to avoid, minimize, or mitigate impacts to wildlife and their habitats will continue during final design and construction. Coordination with the USFWS, NCWRC, and the NCDCA are pending review of this report. Mitigation measures, if required, will be developed in consultation with these agencies.

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Appendices



Natural Resources Technical Report - Appendices

Appendix A: Figures

Figure 1: Project Overview

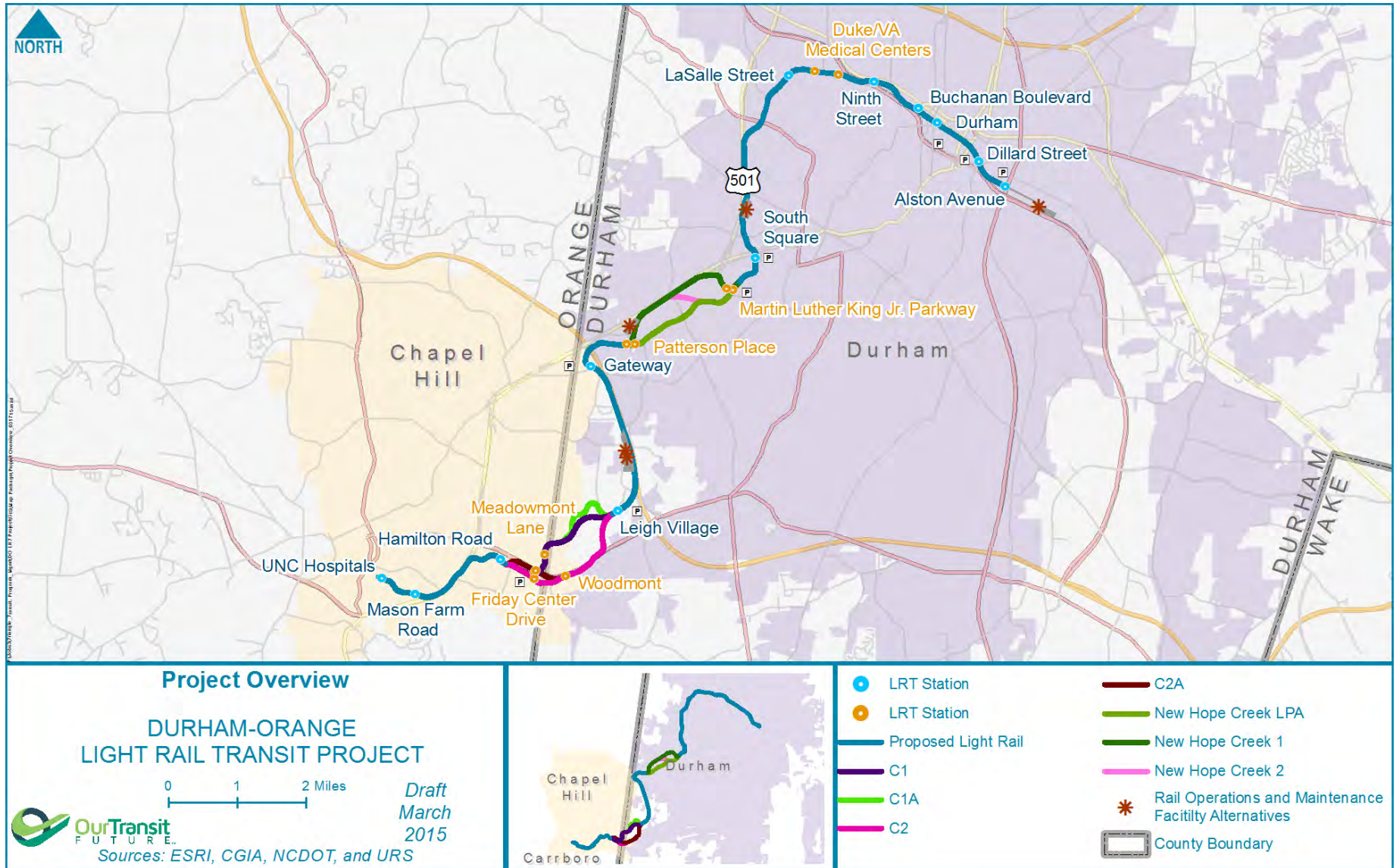


Figure 2: Topographic Features

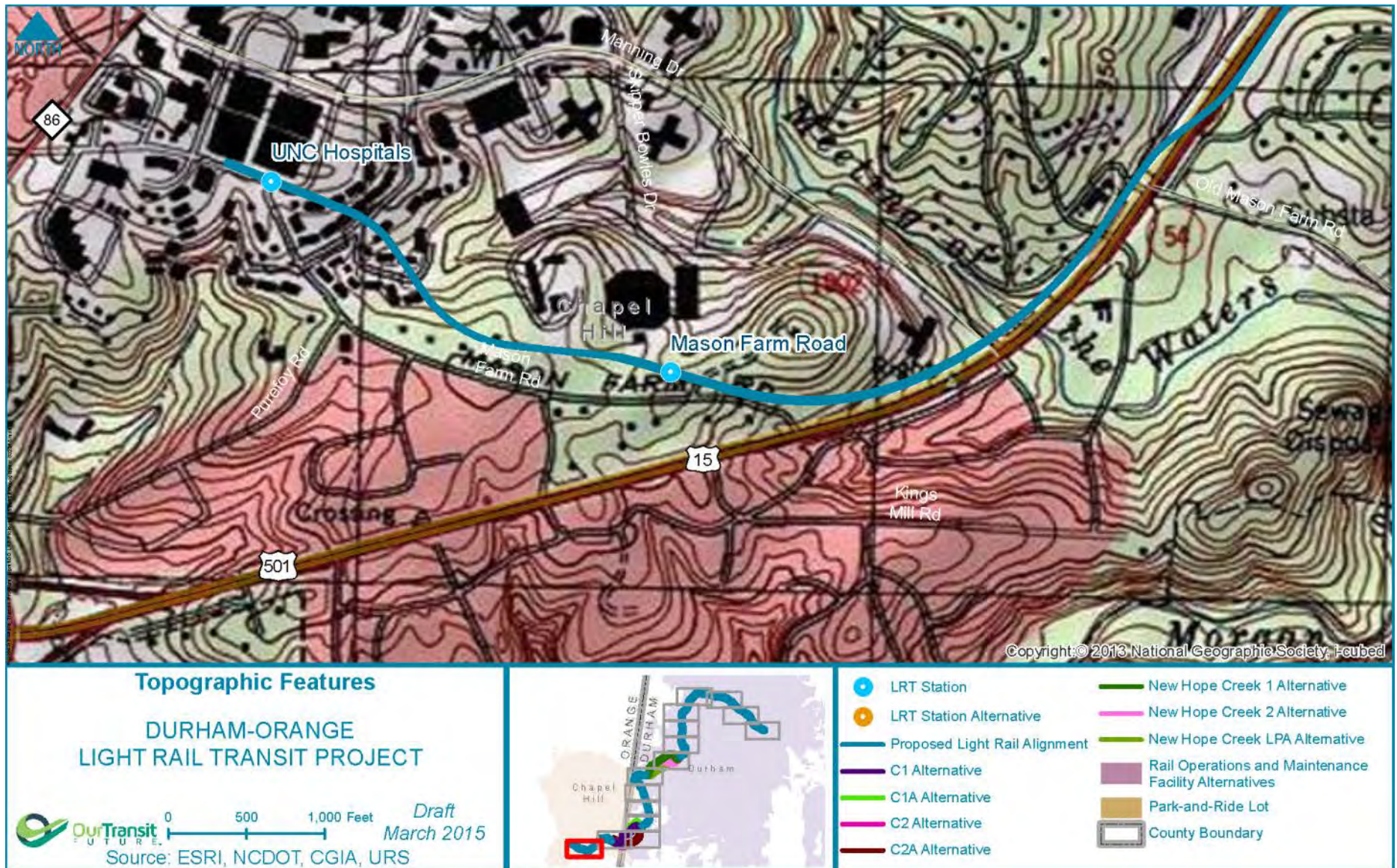


Figure 3: Topographic Features

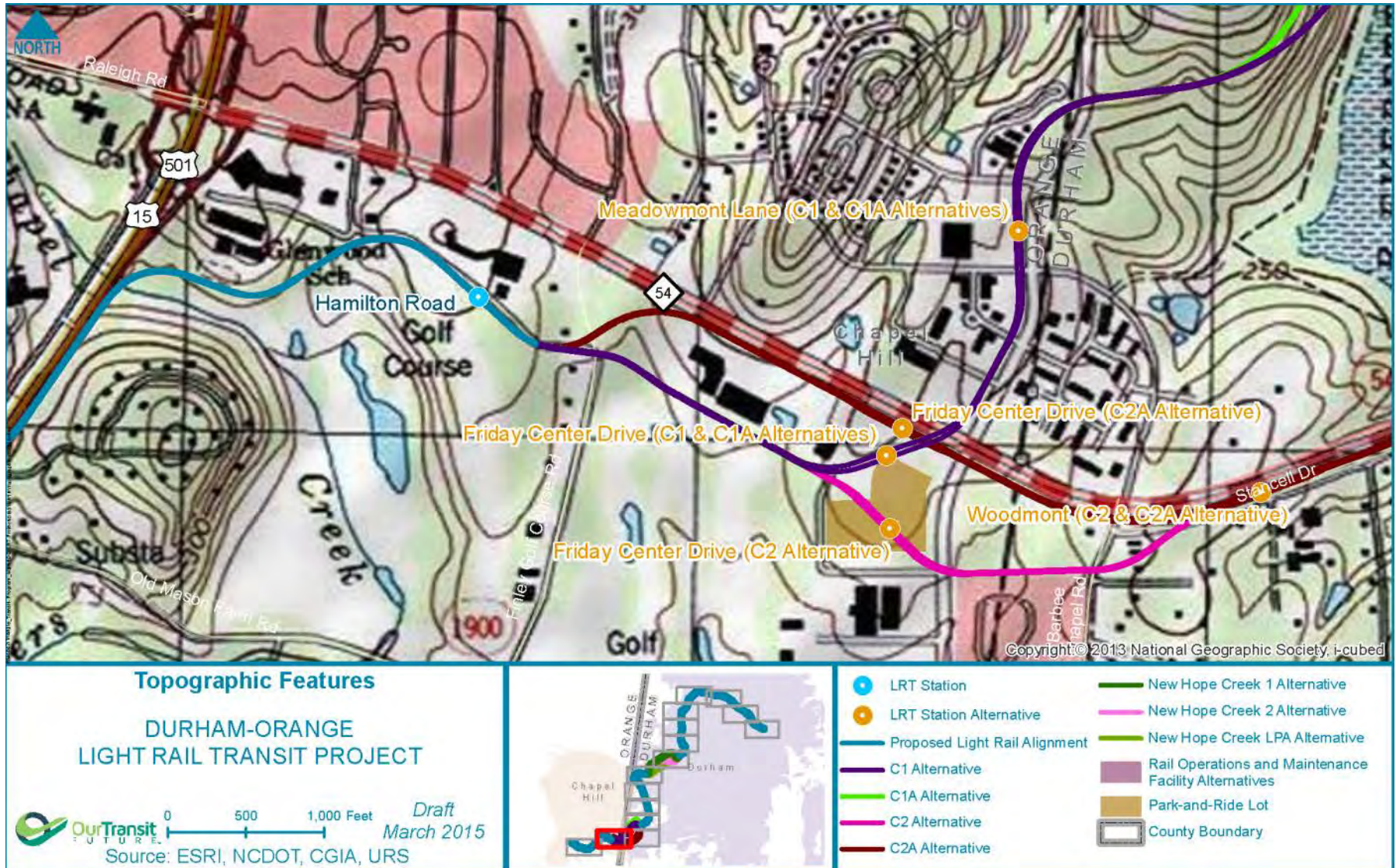


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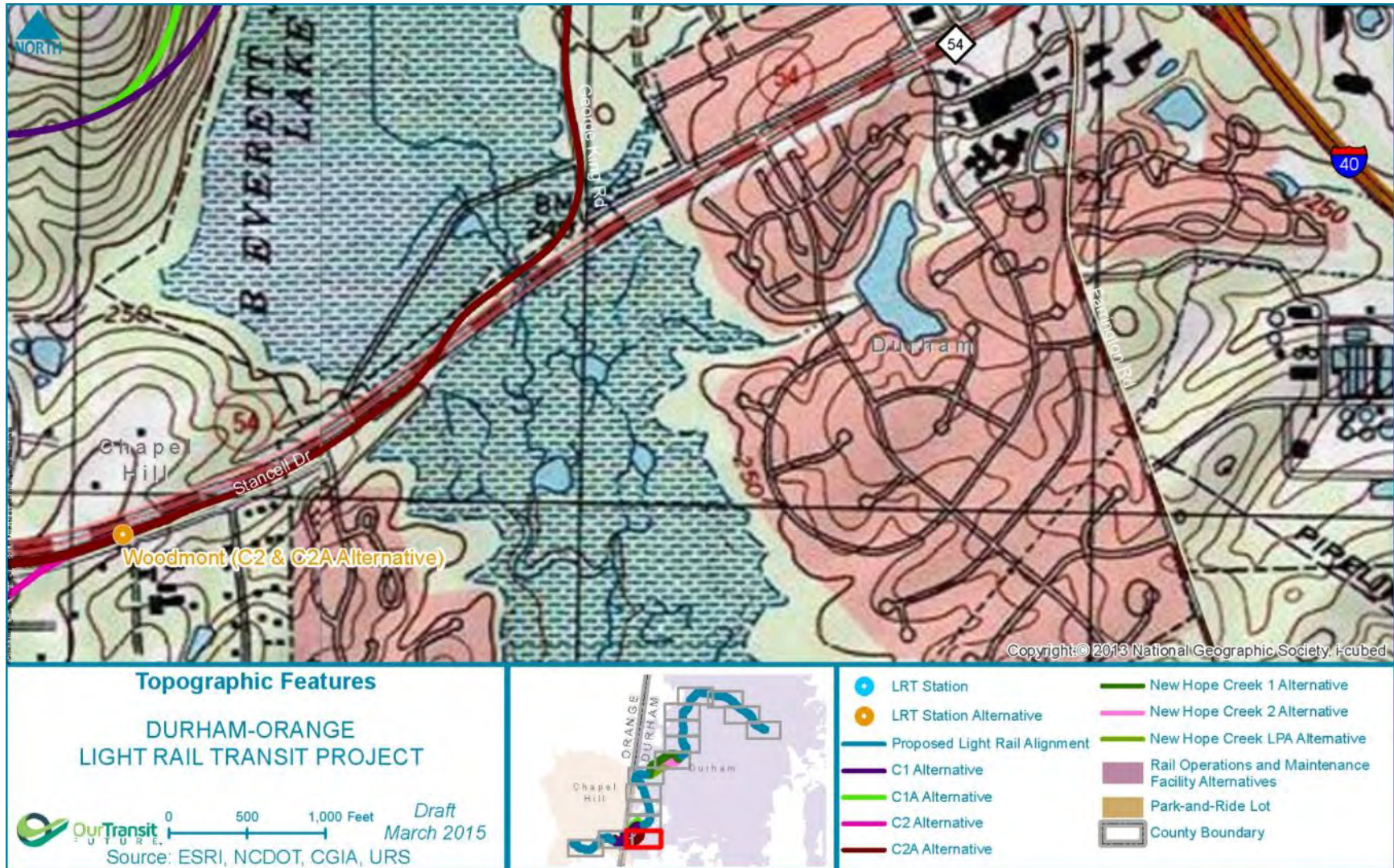


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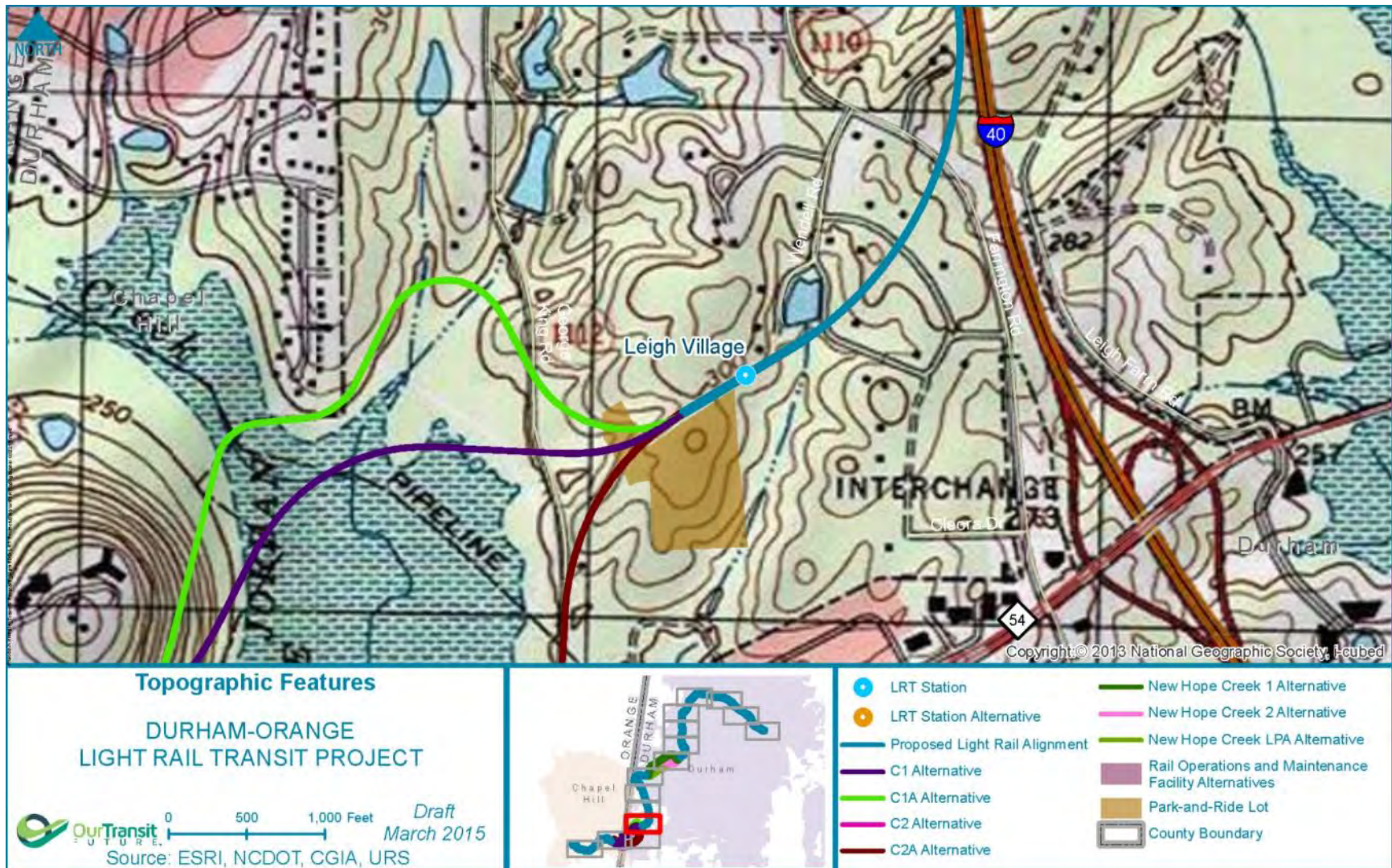


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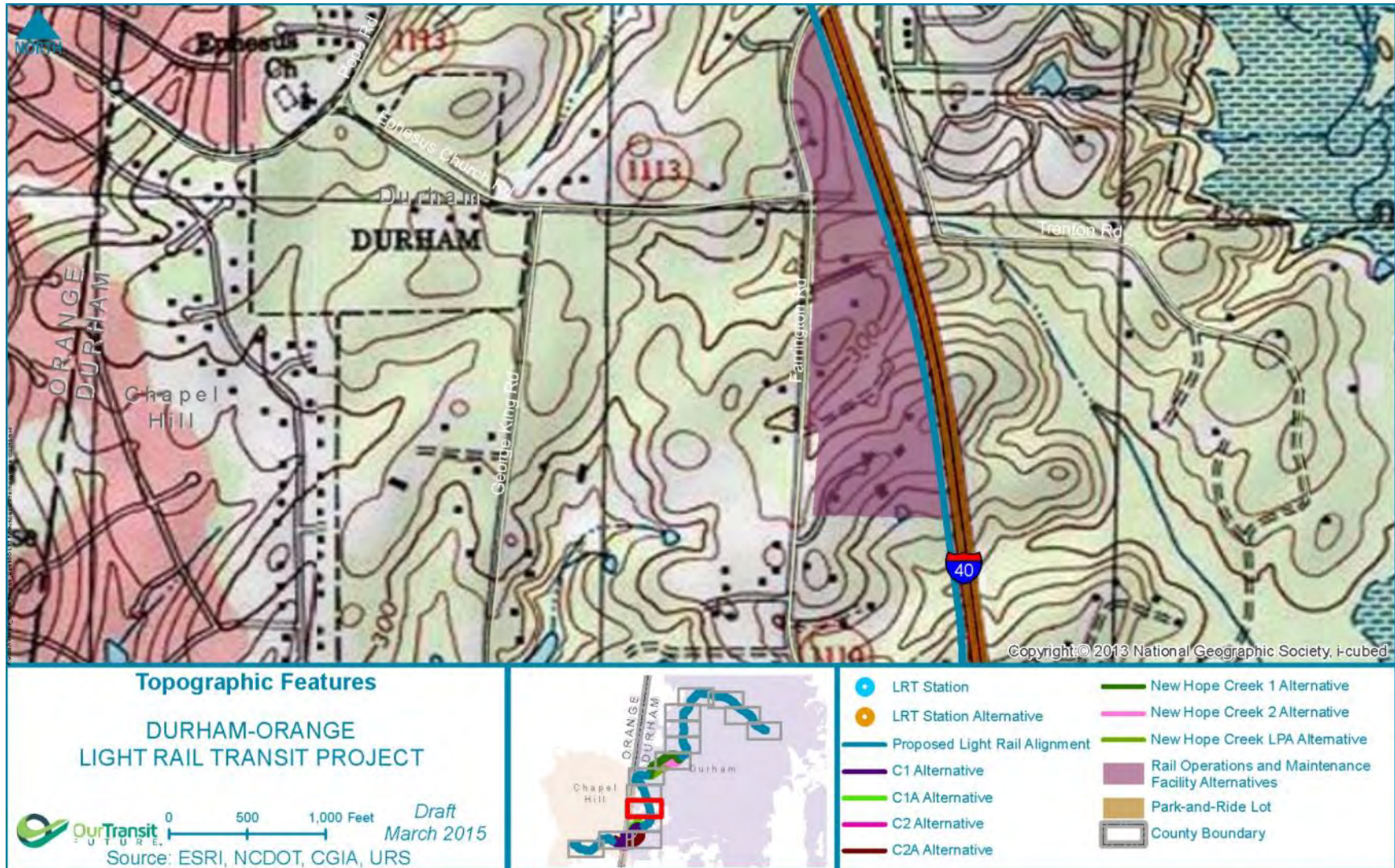


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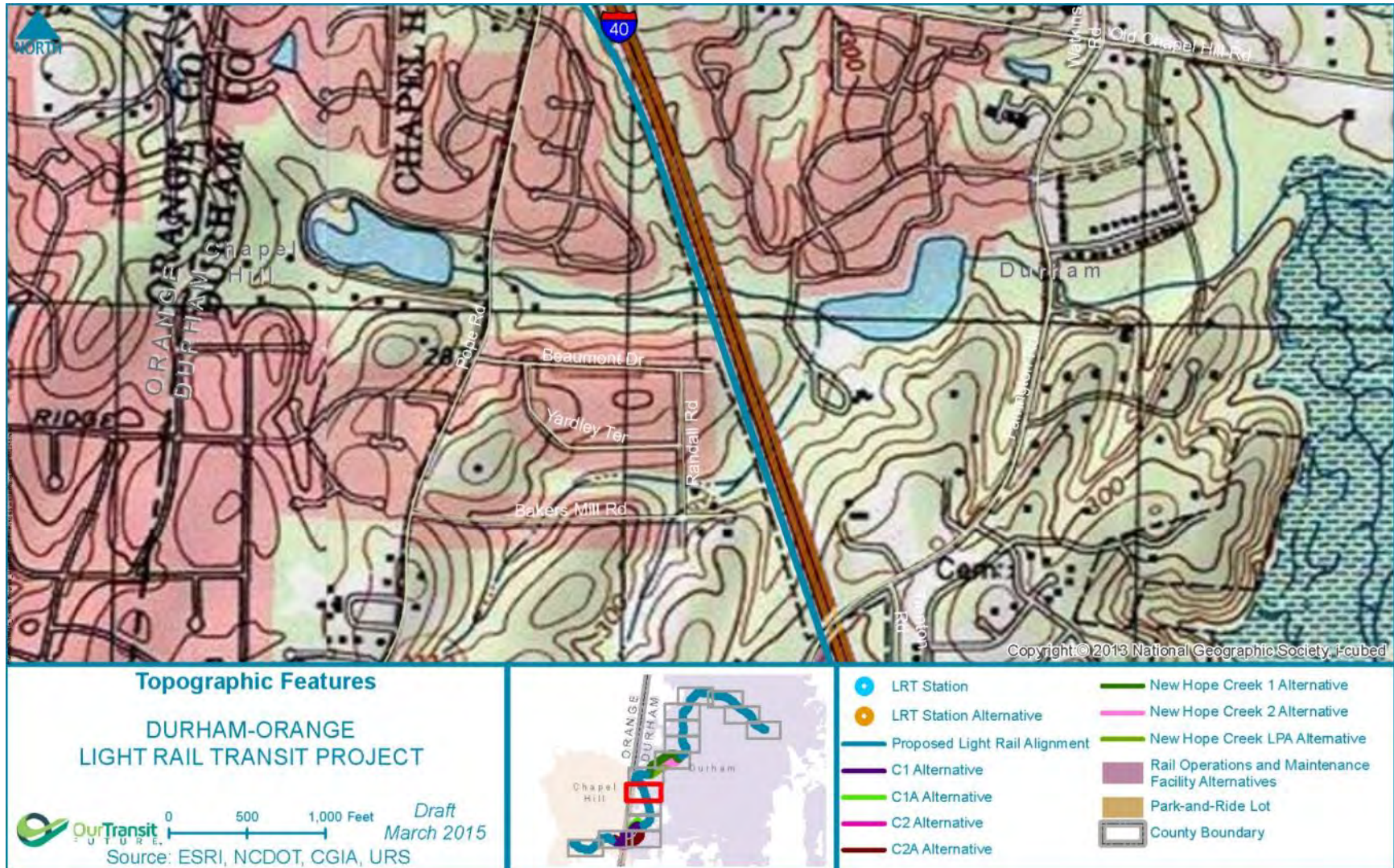


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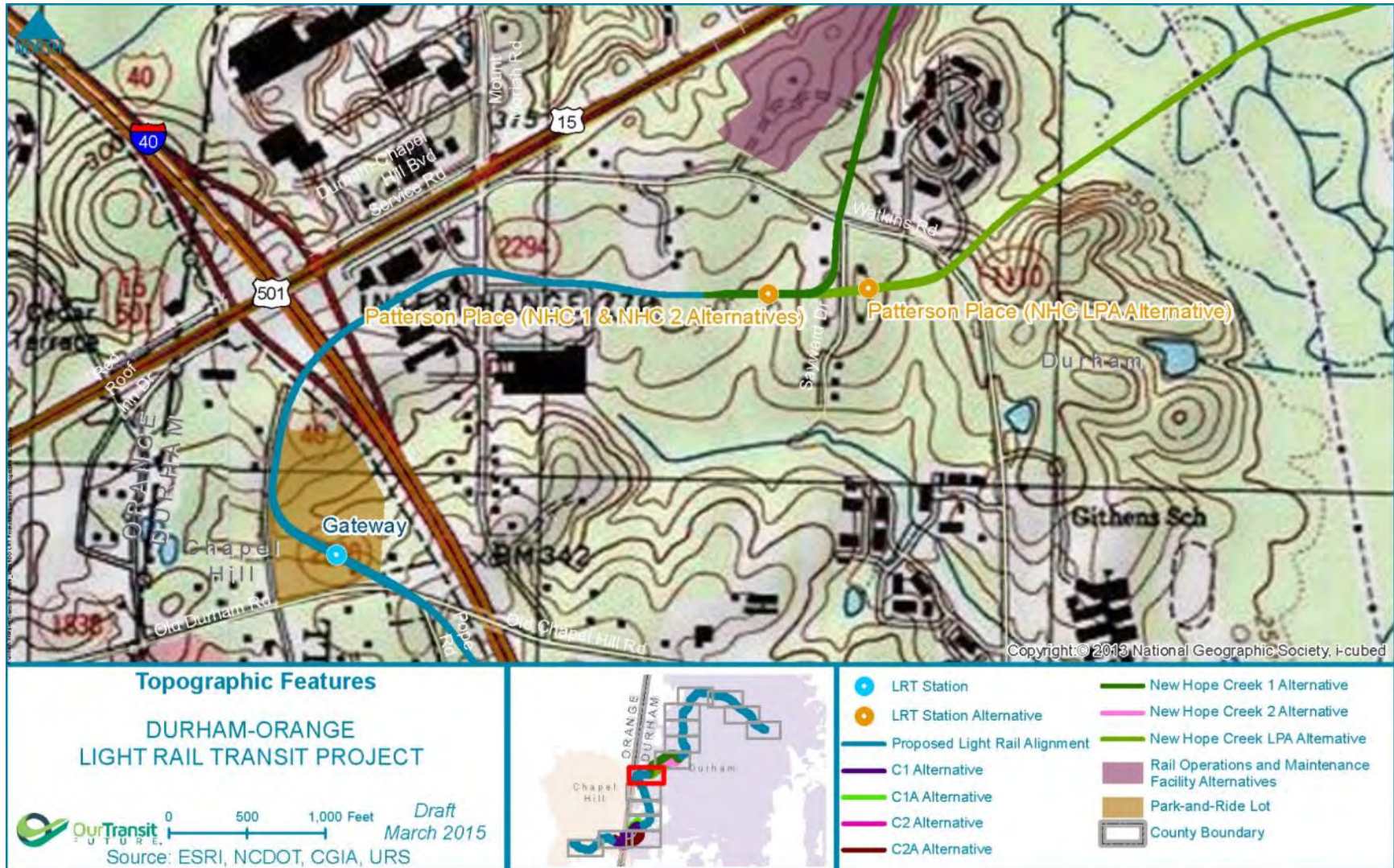


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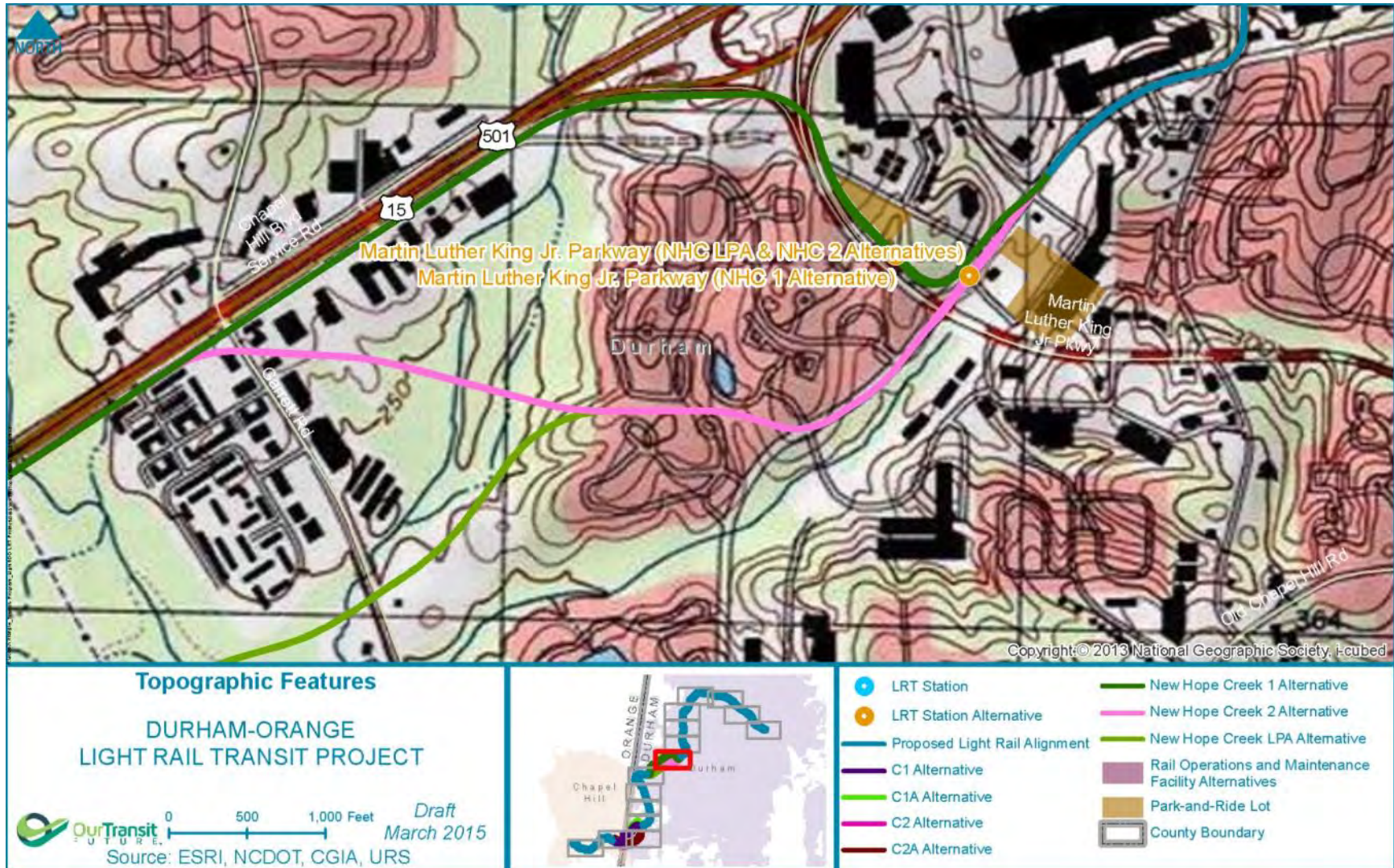


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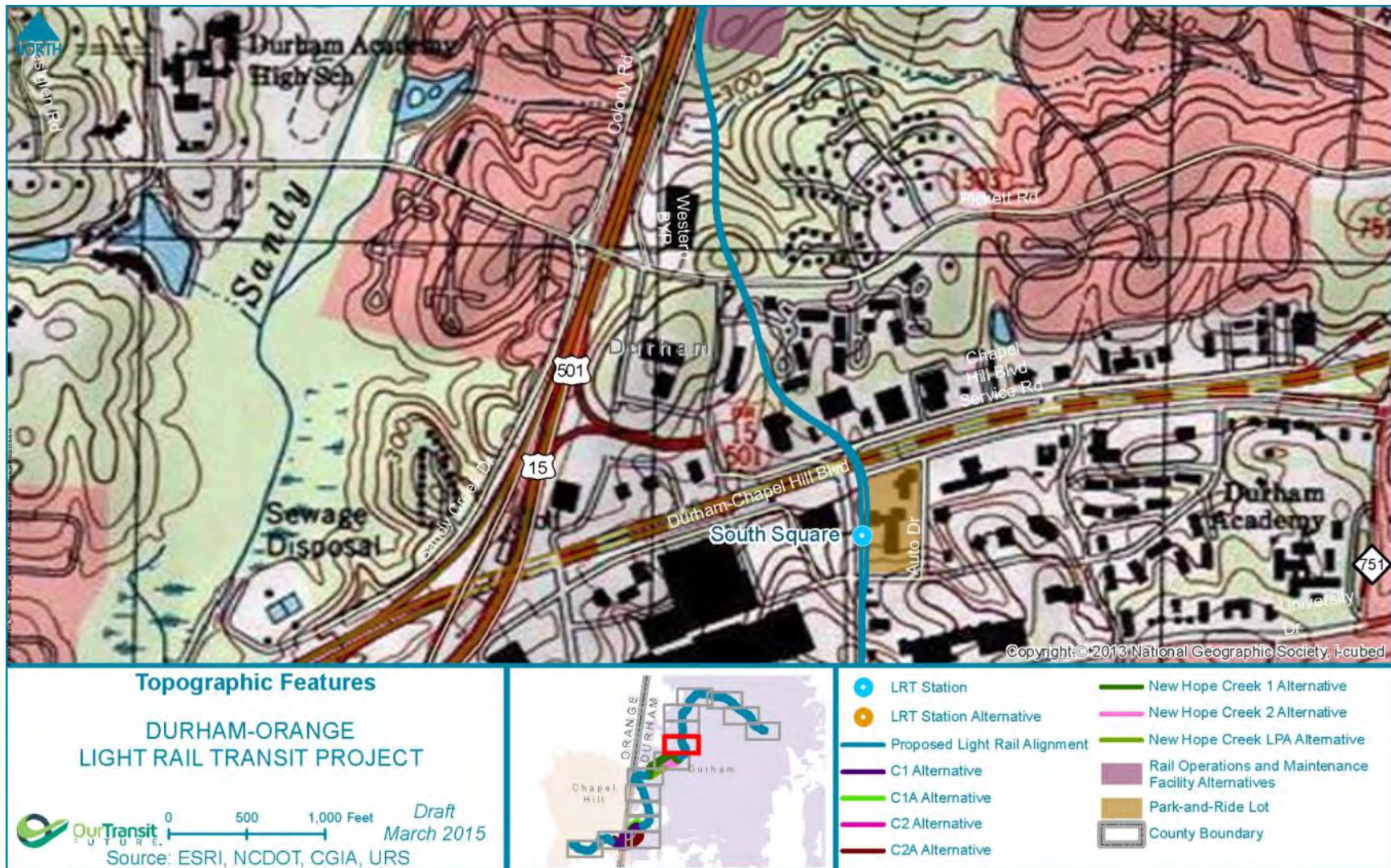


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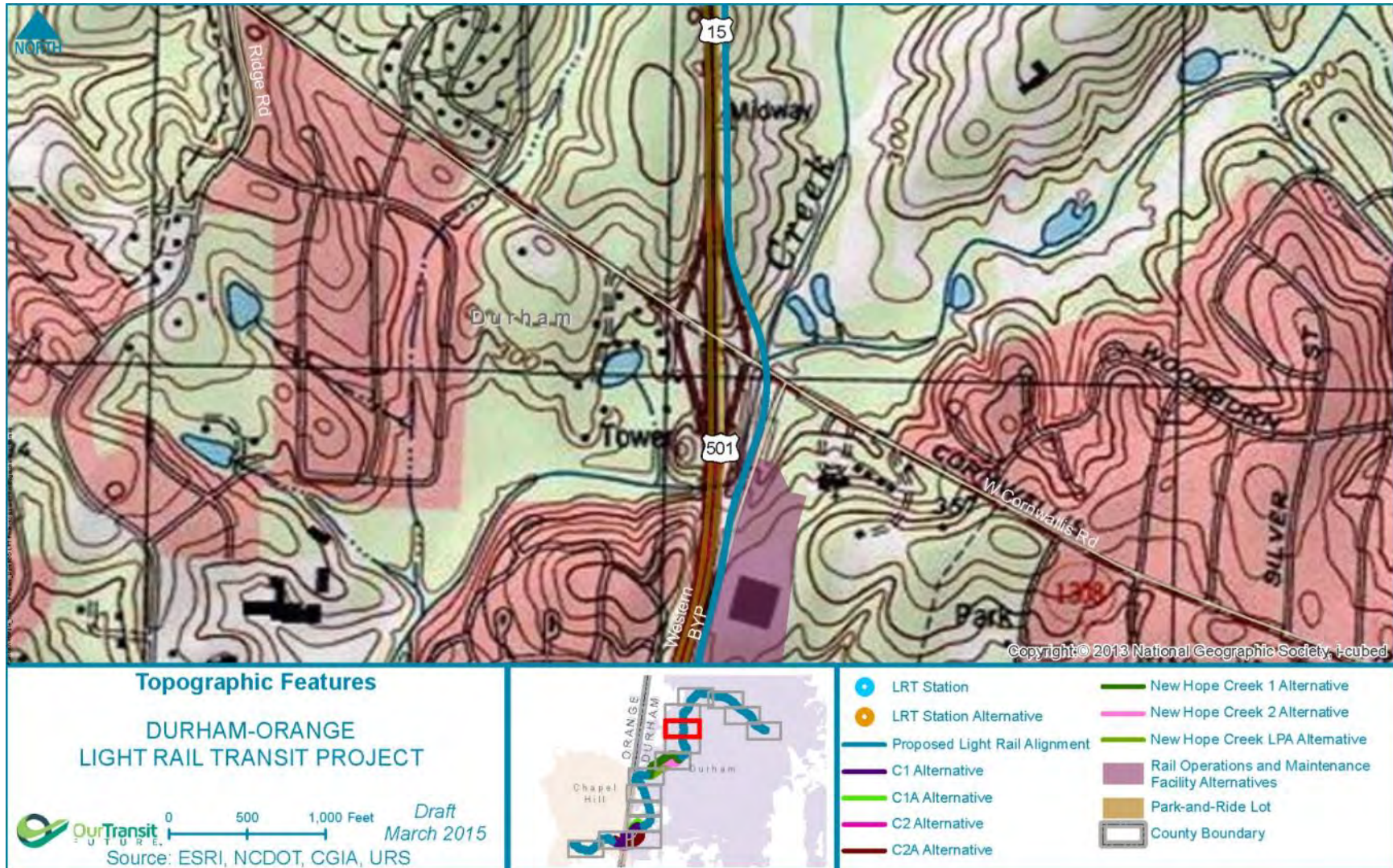


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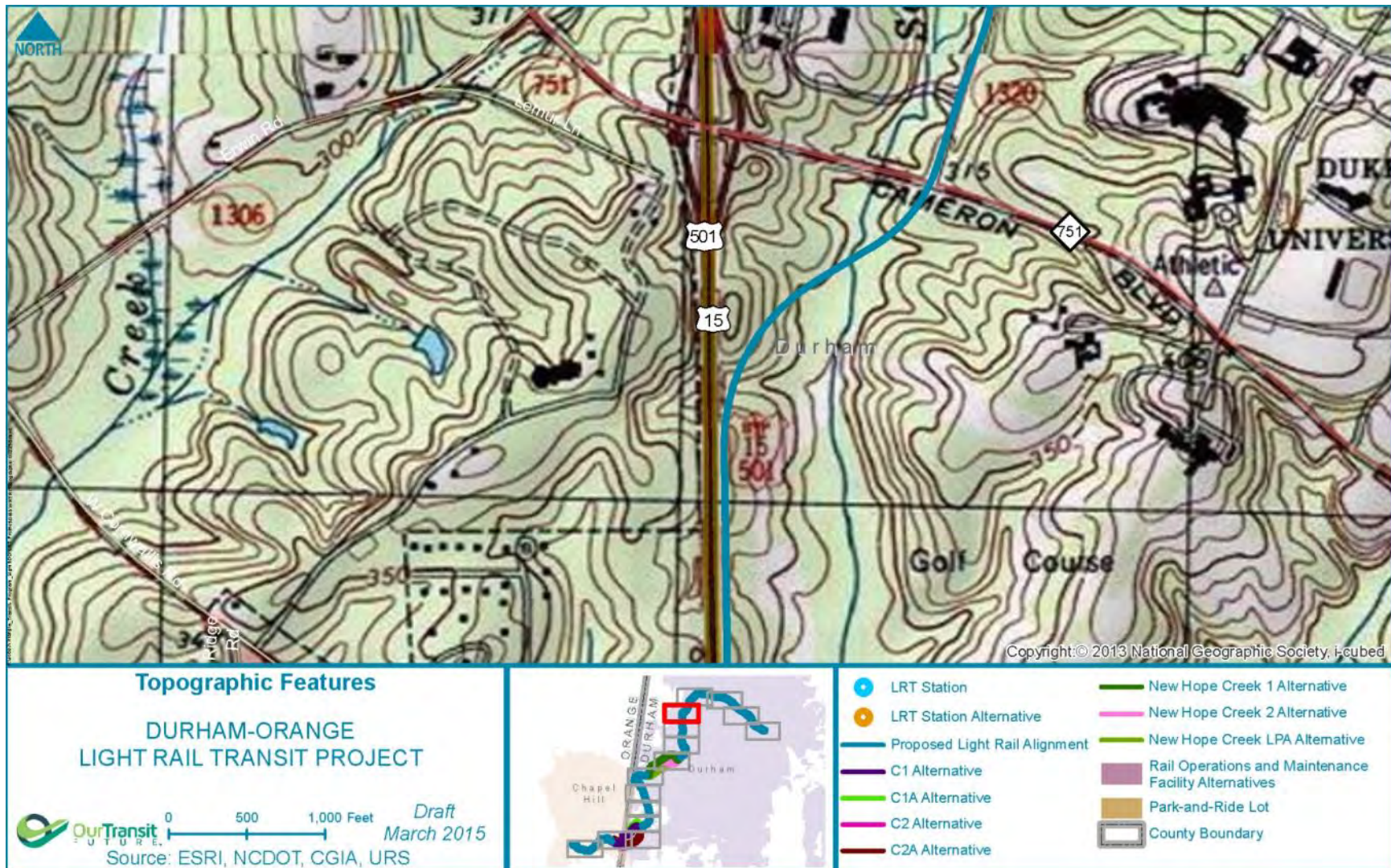


Figure 13: Topographic Features

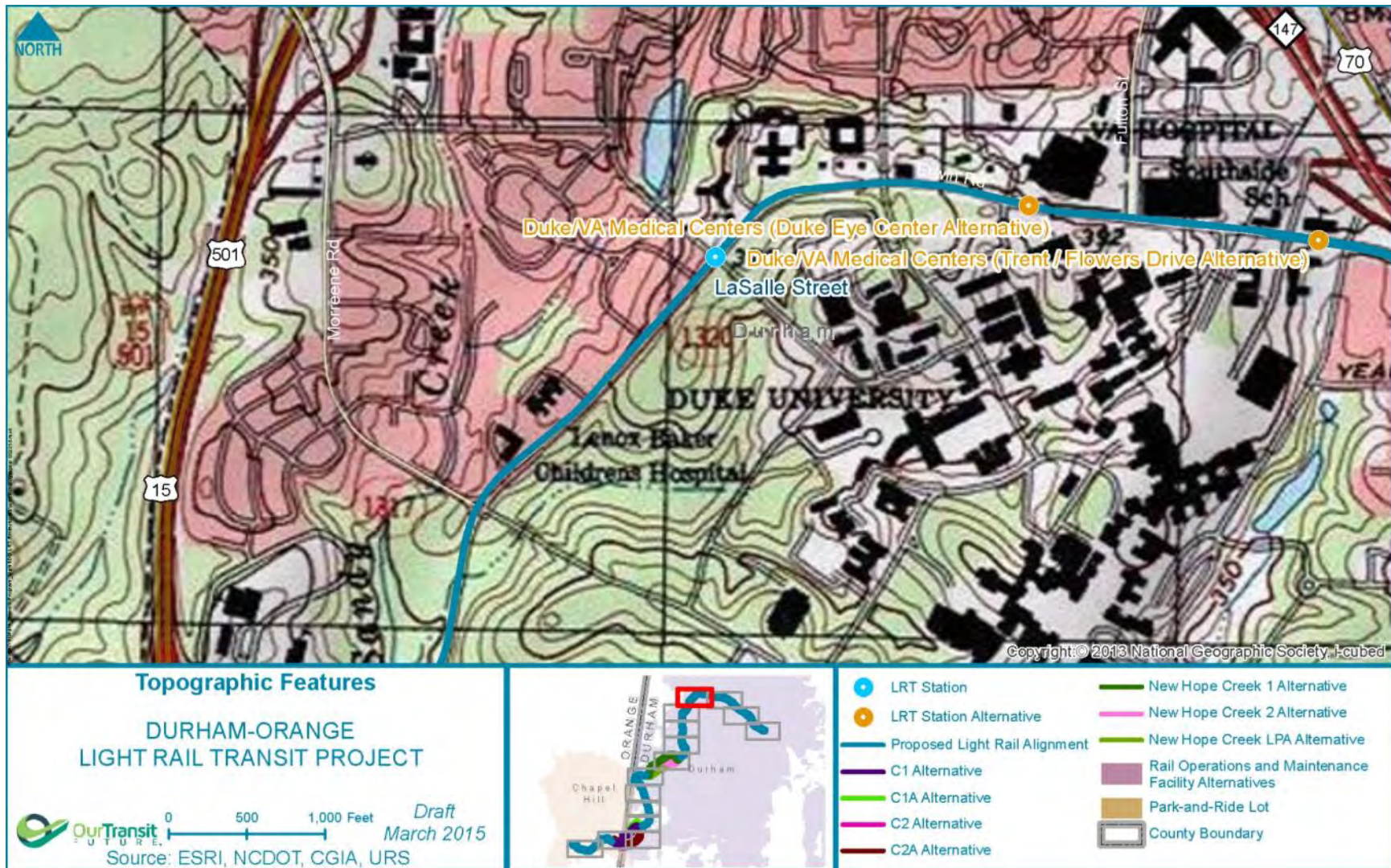


Figure 14: Topographic Features

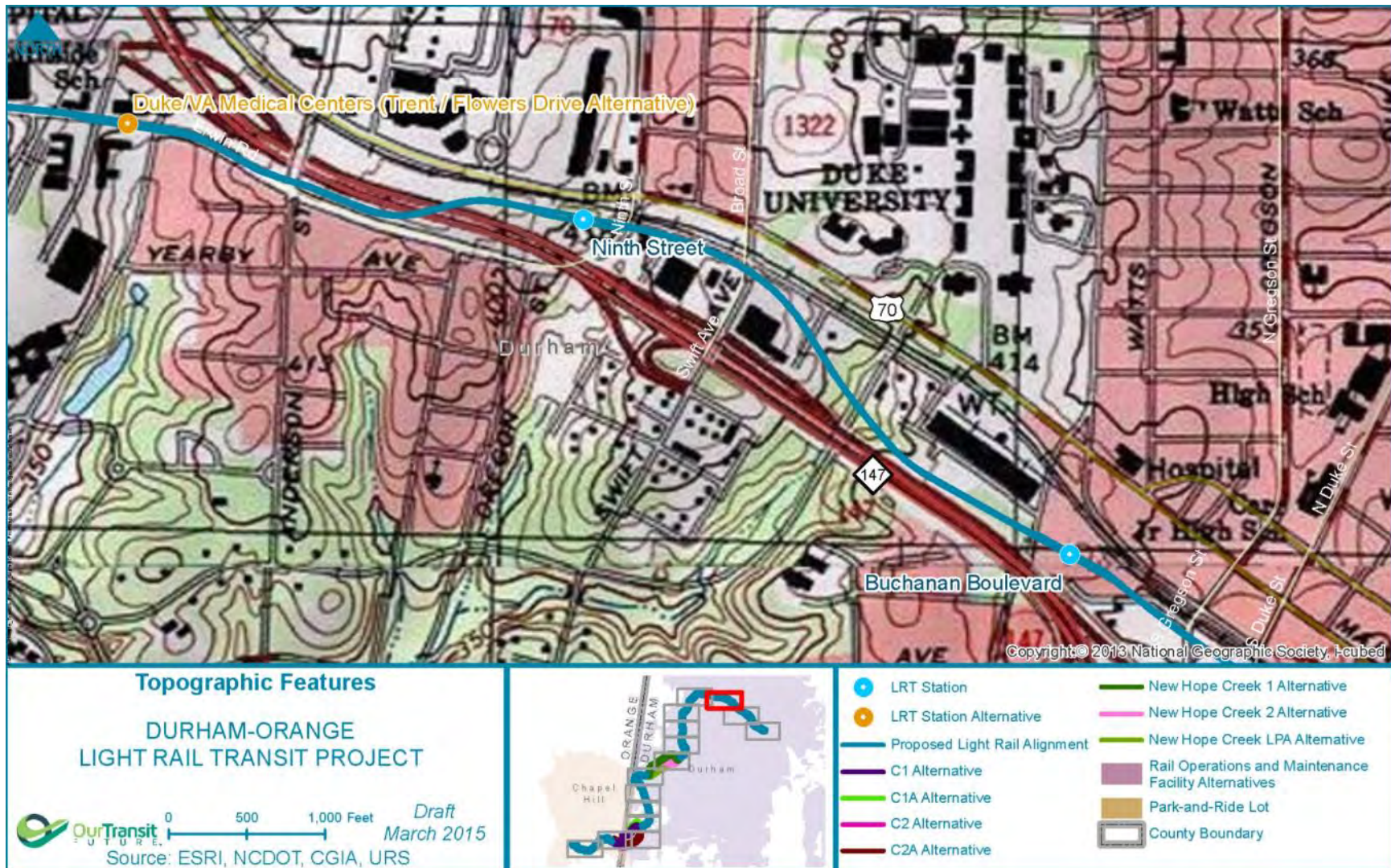


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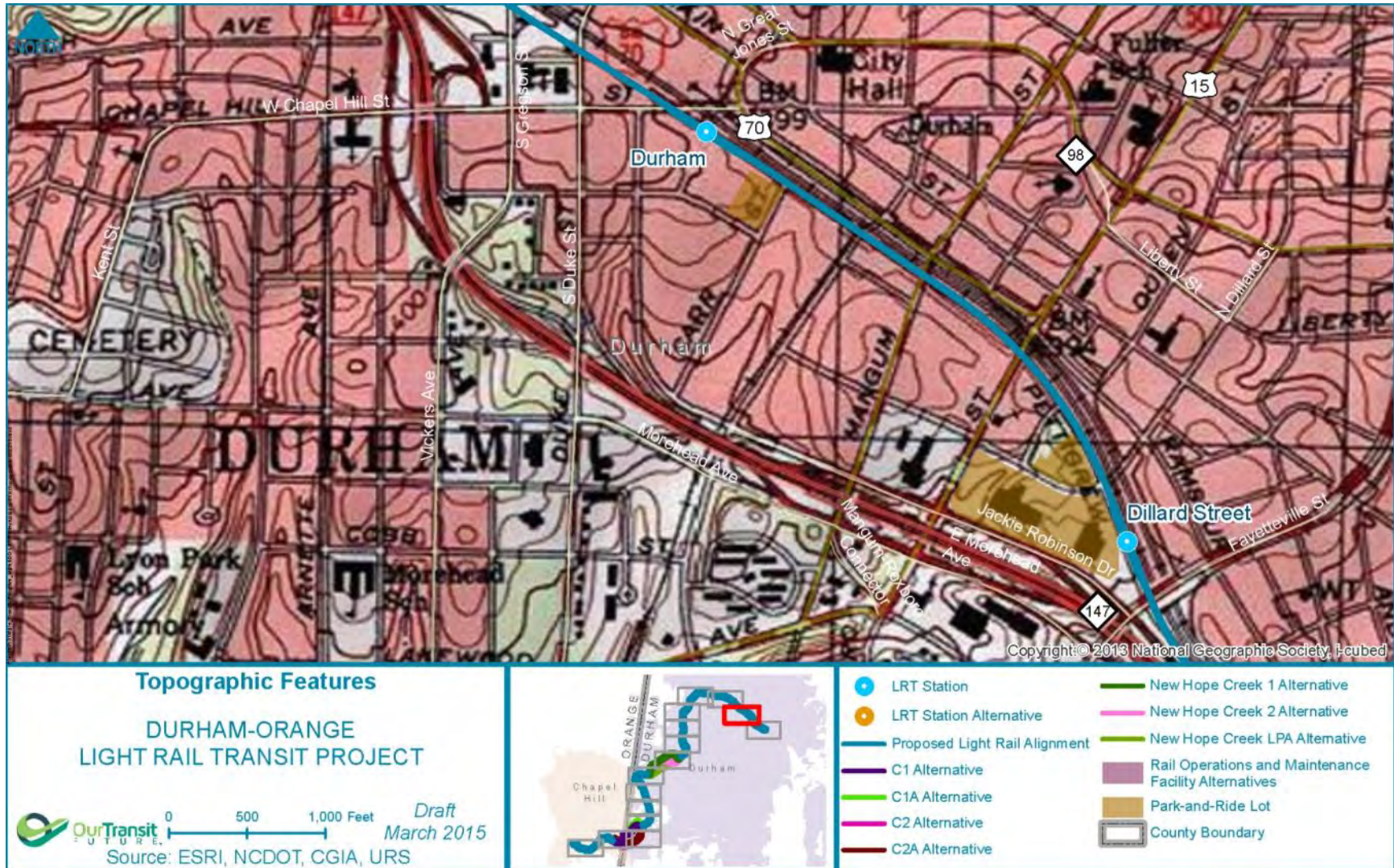


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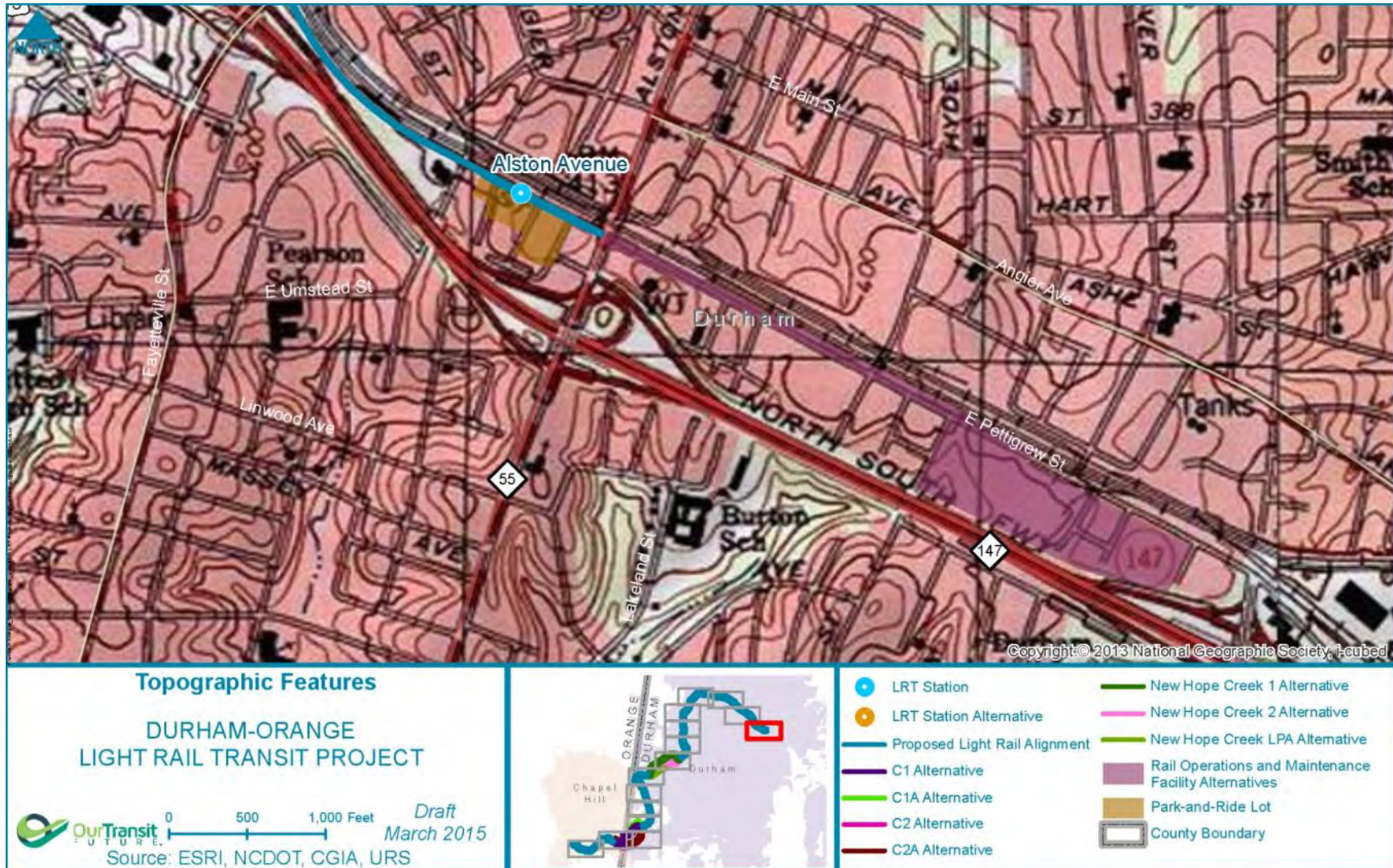


Figure 17: Soils

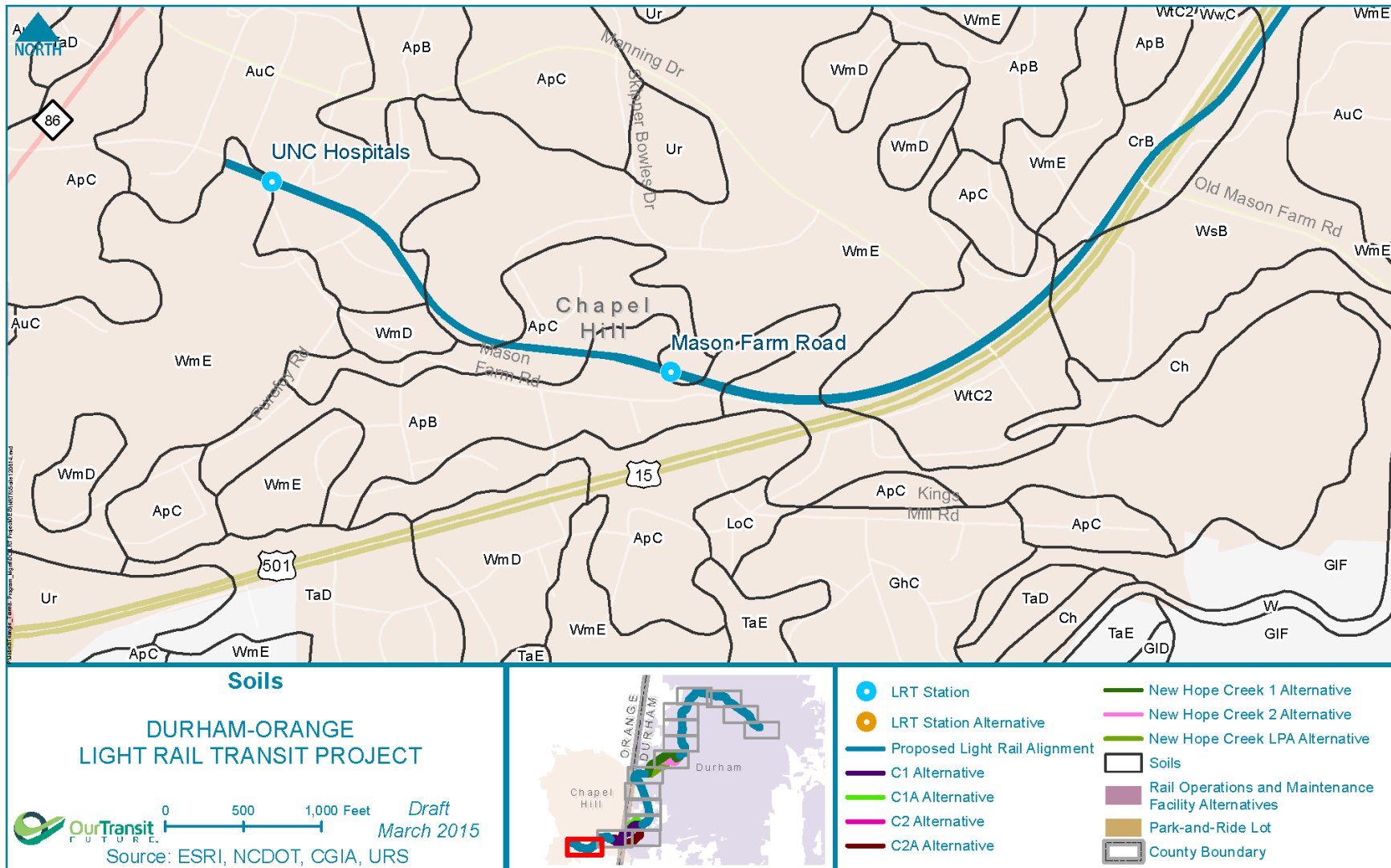


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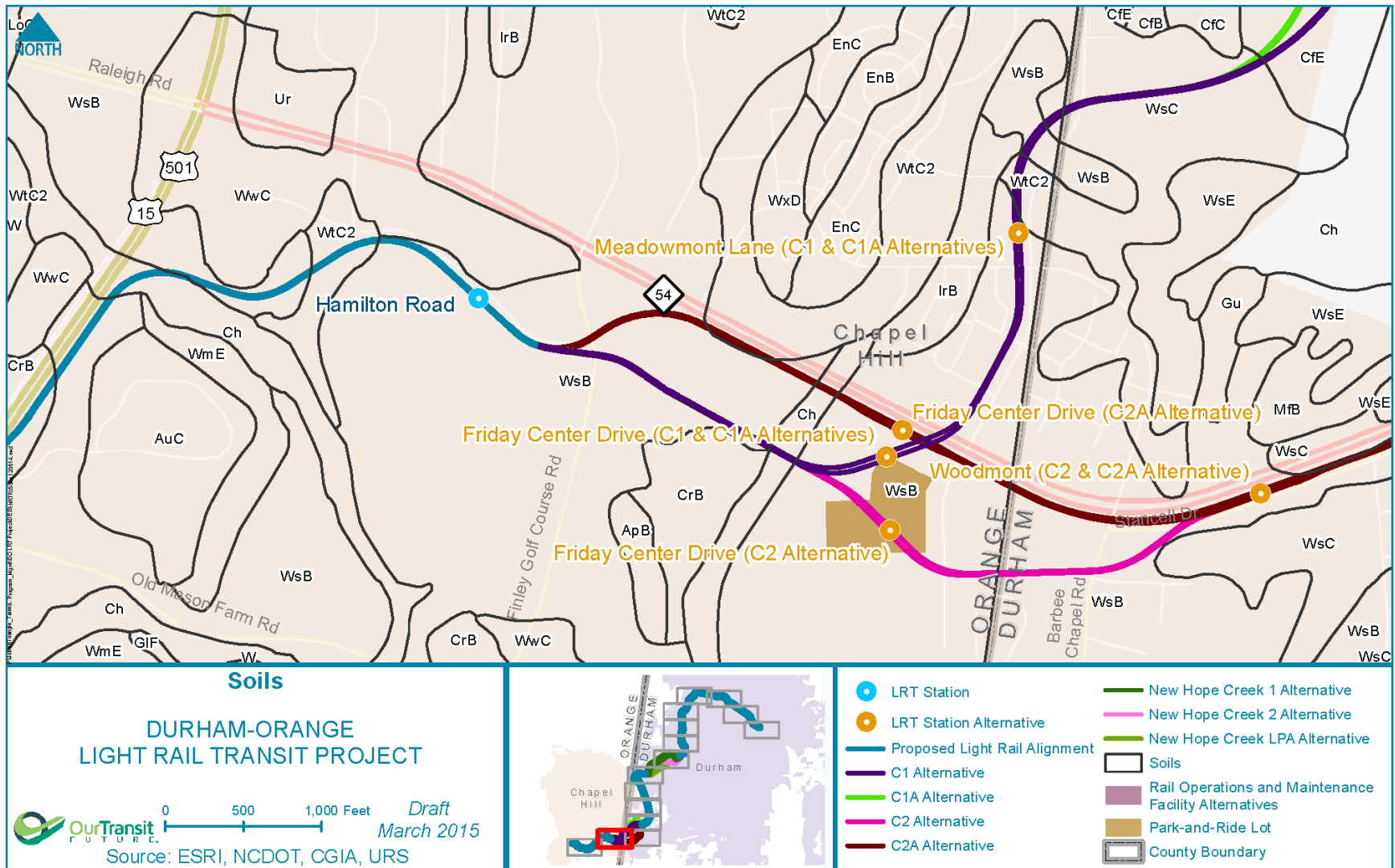


Figure 19: Soils

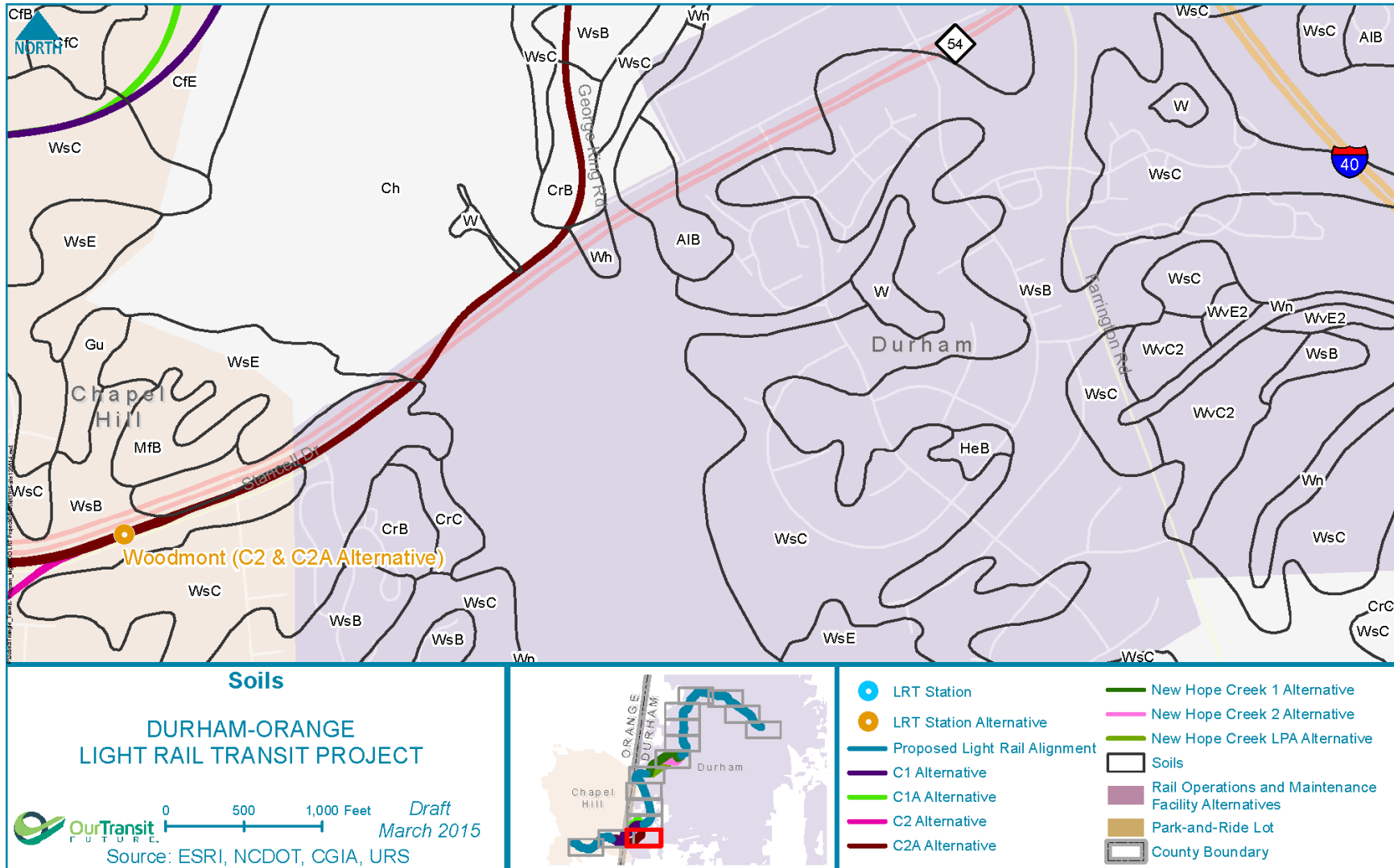


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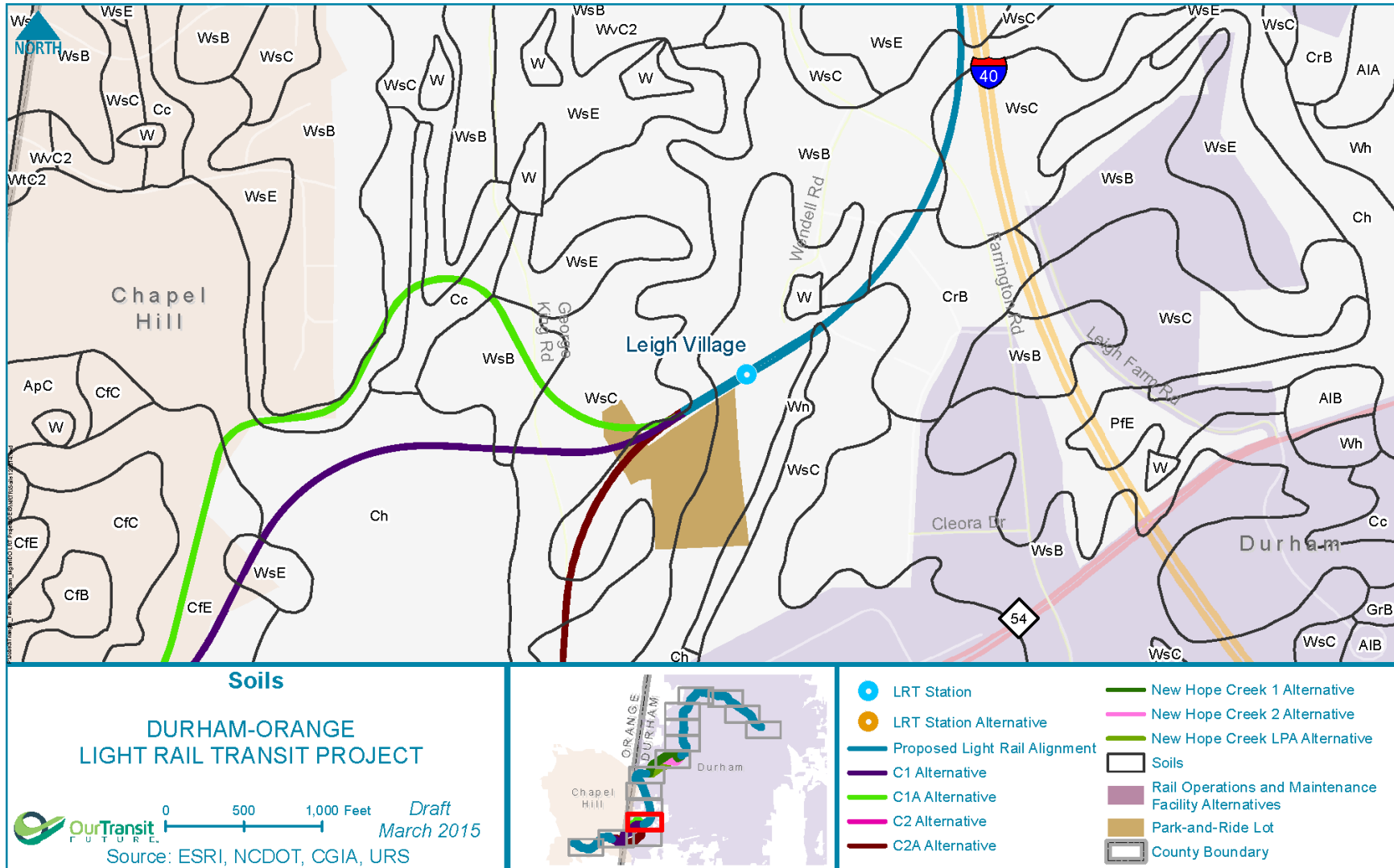


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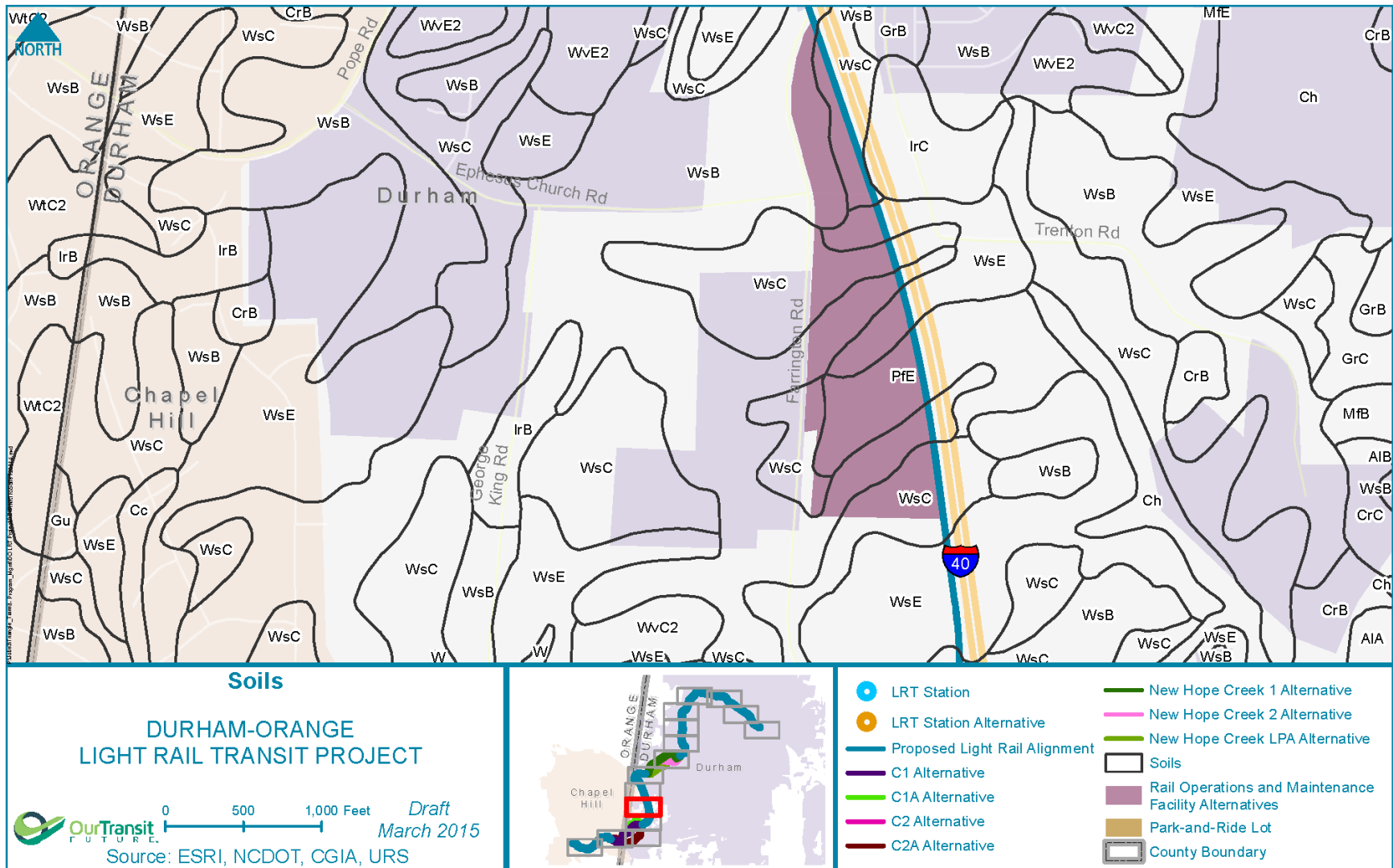


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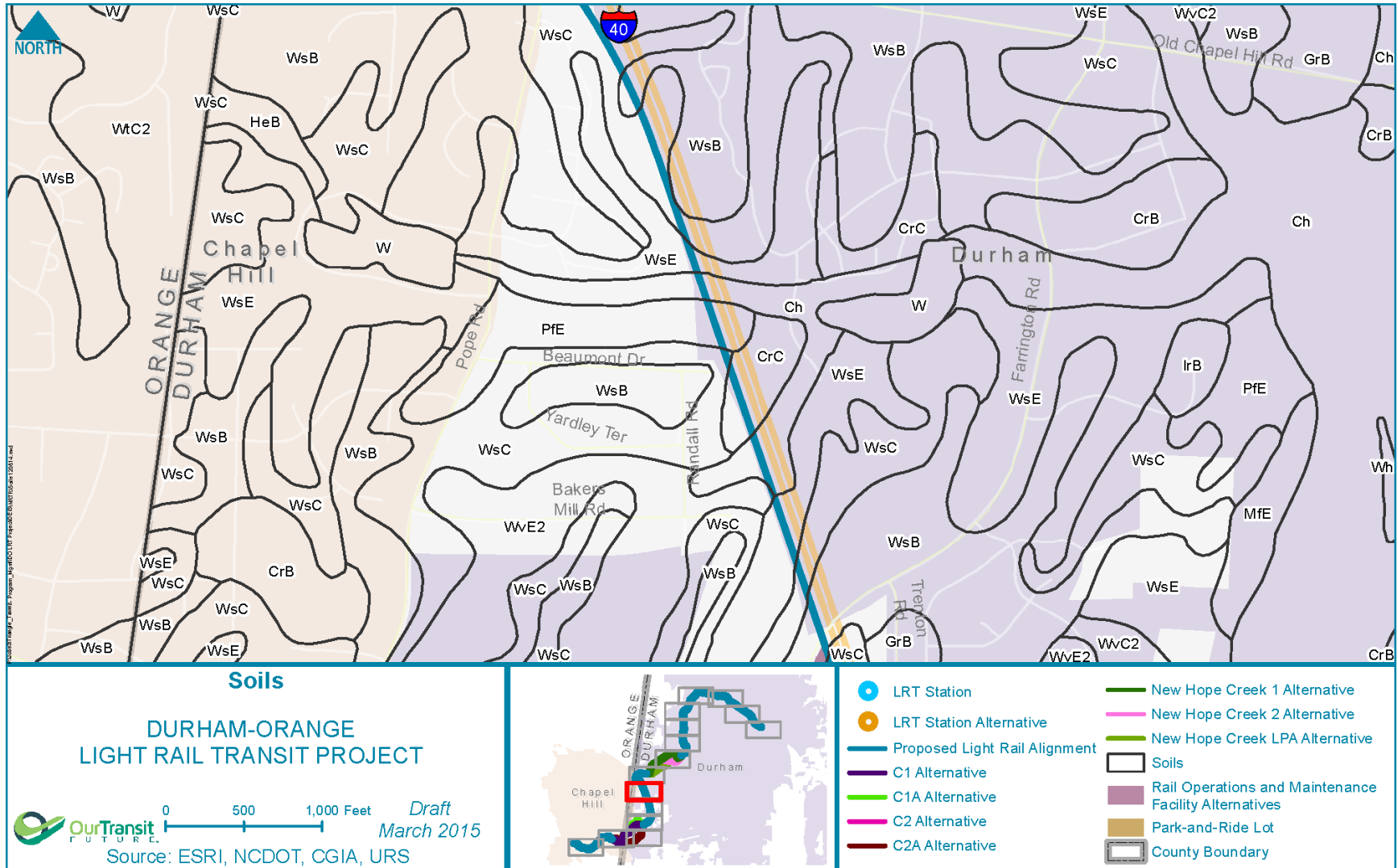


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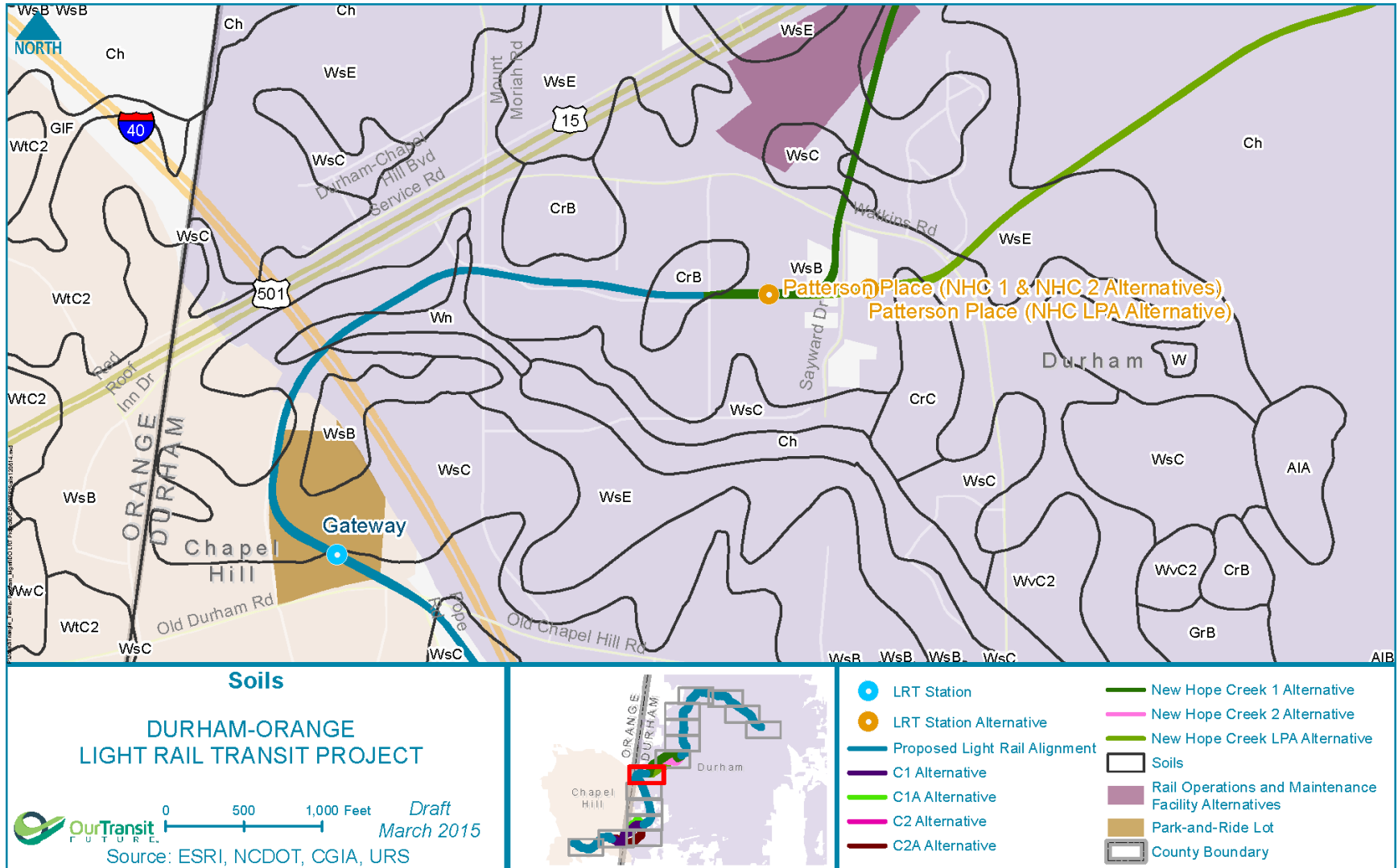


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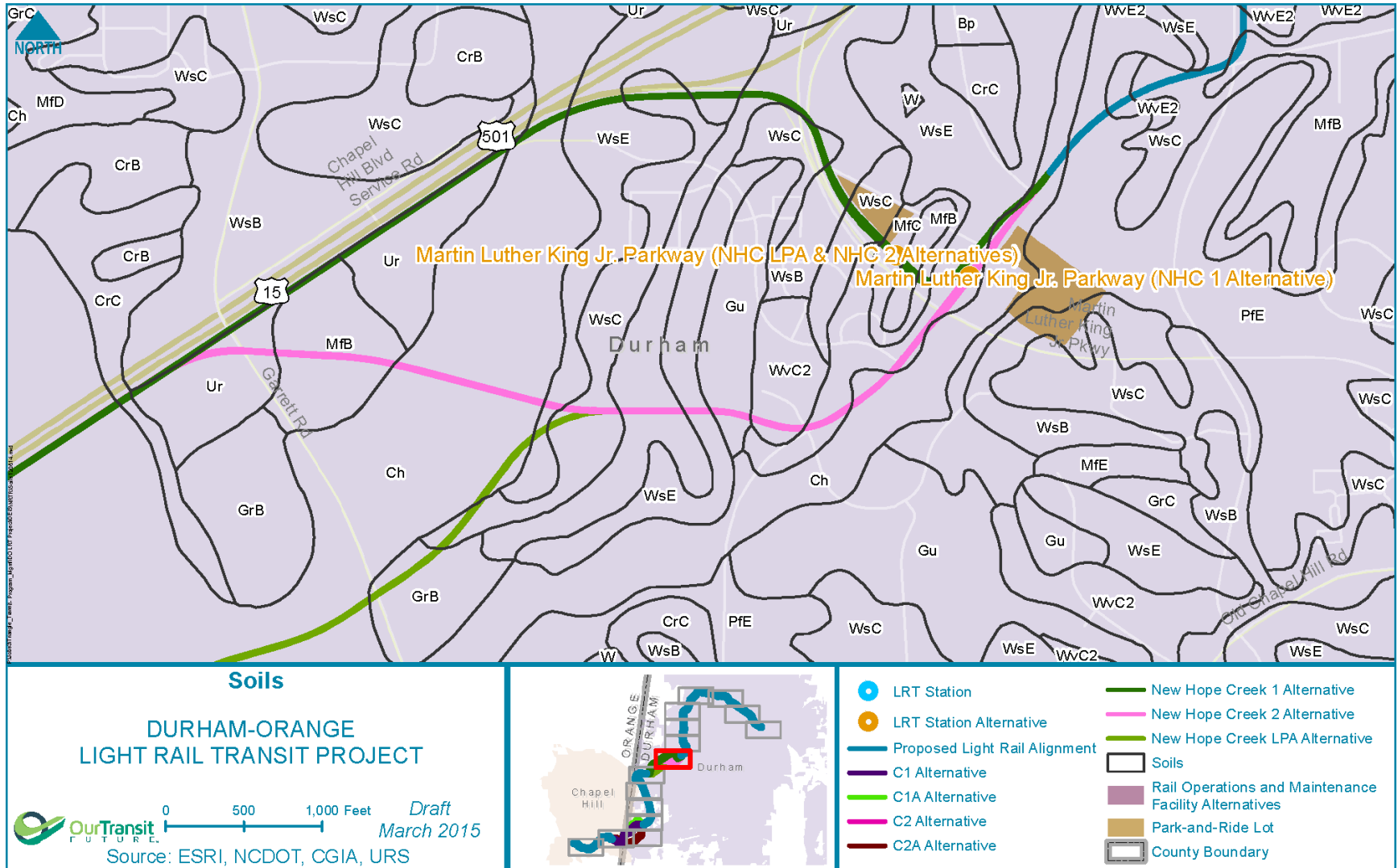


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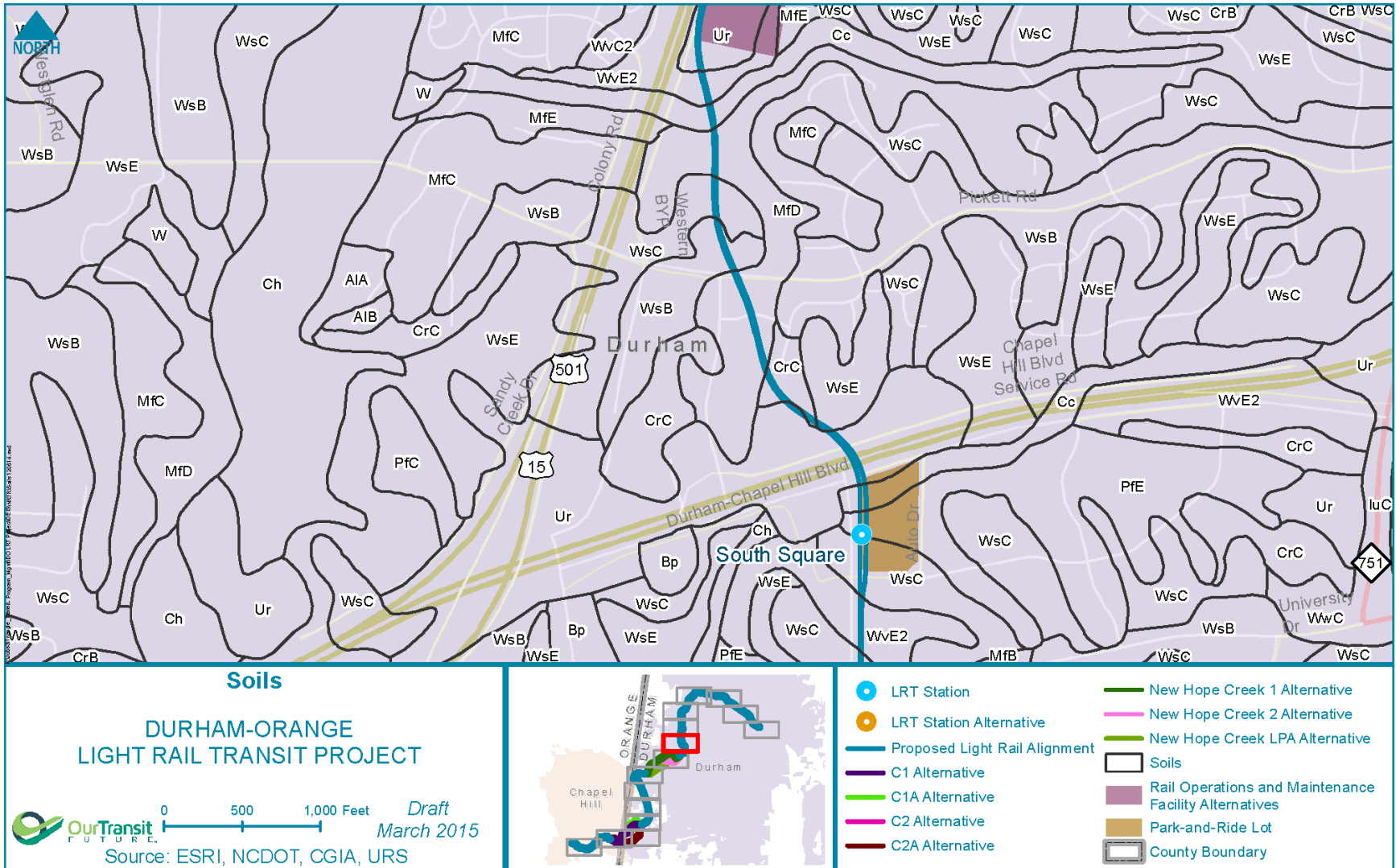


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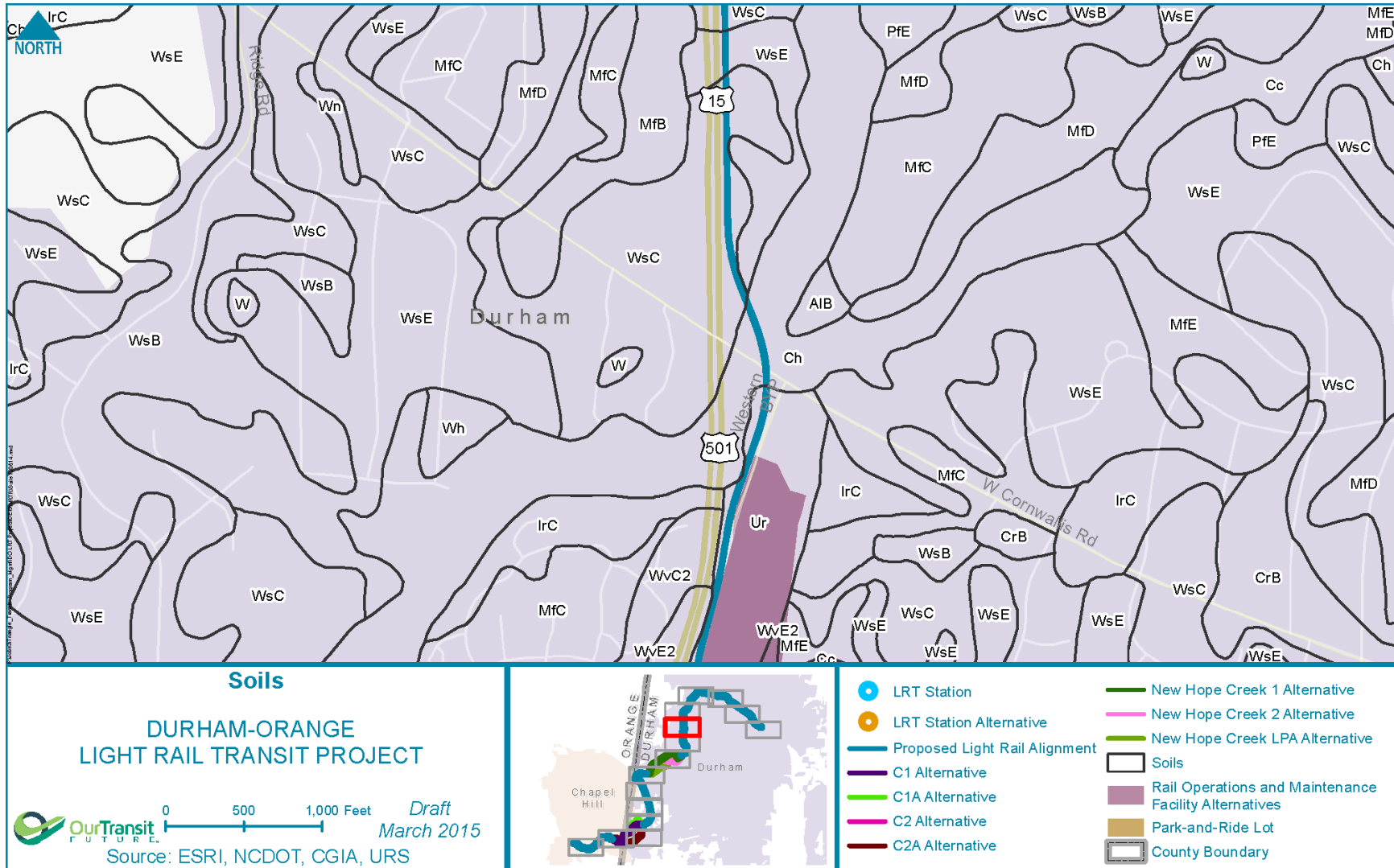


Figure 27: Soils

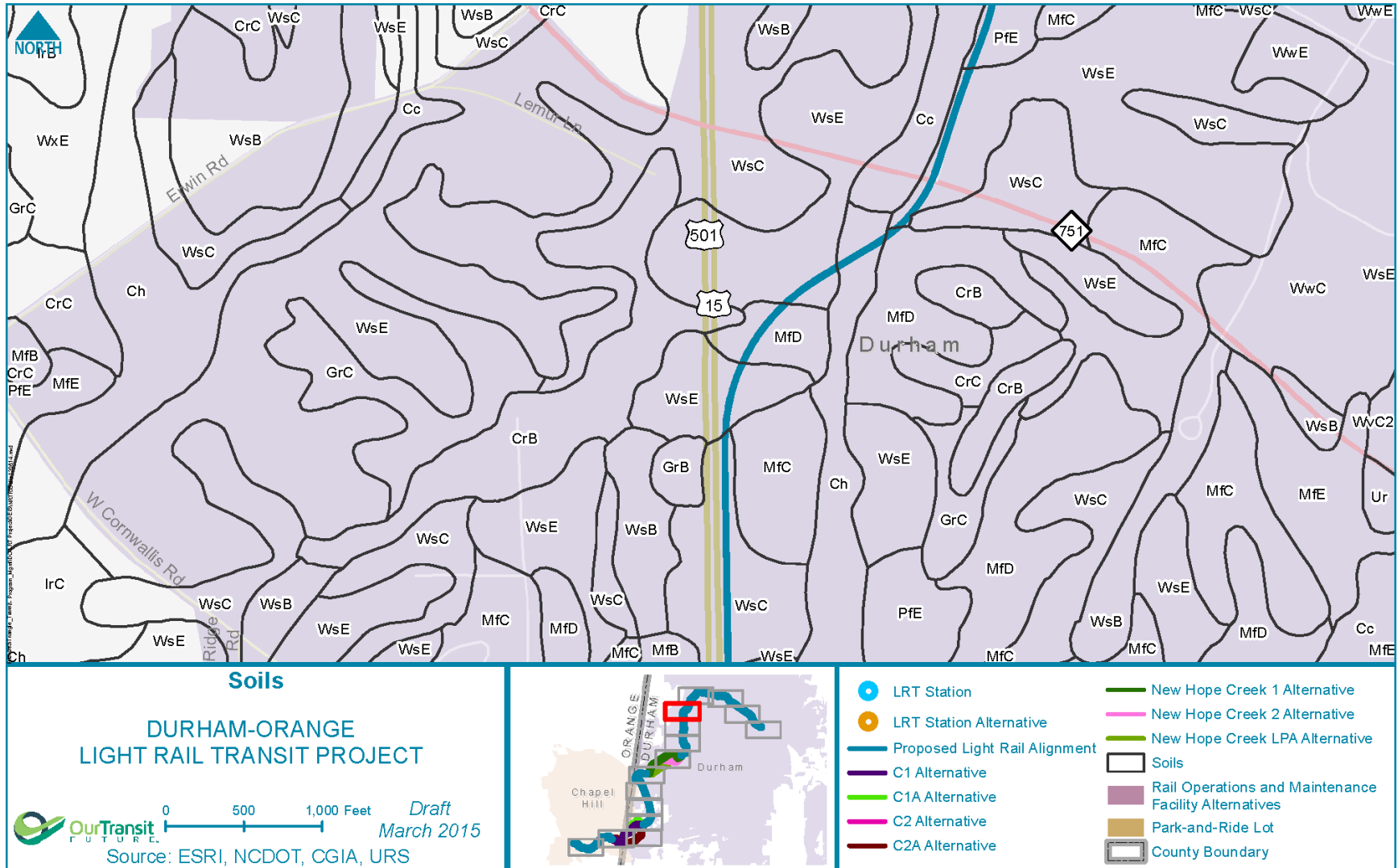


Figure 28: Soils

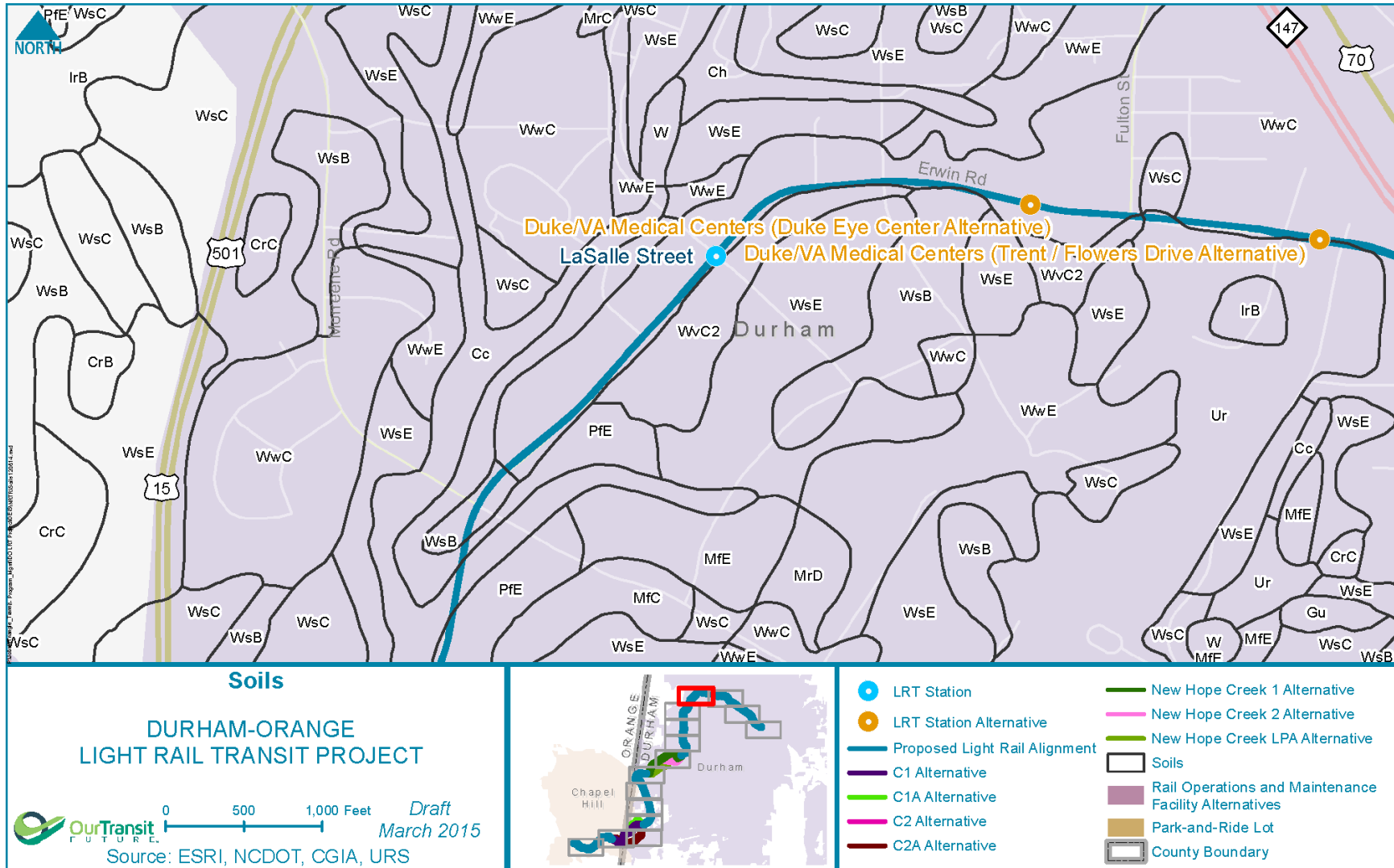


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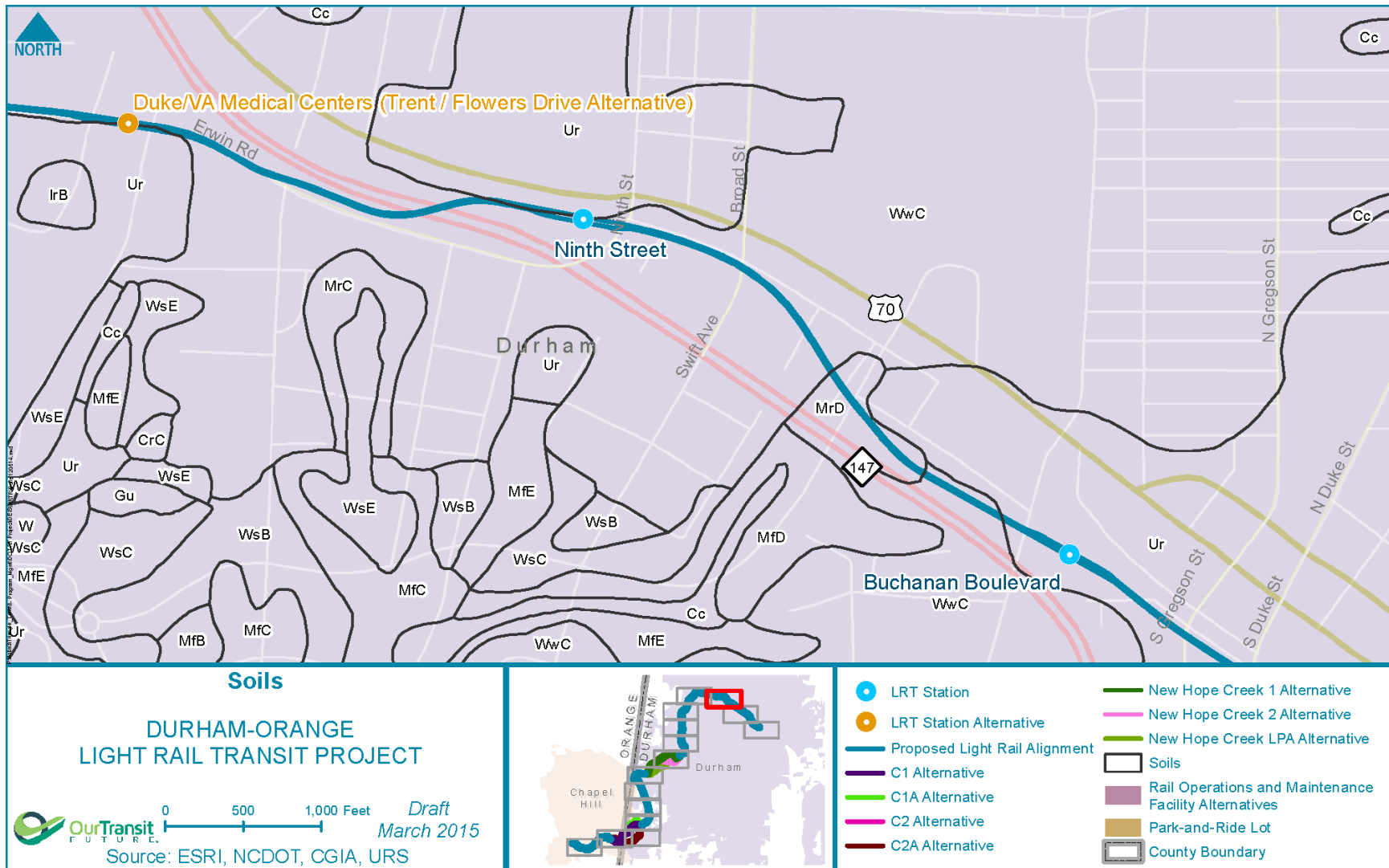


Figure 30: Soils

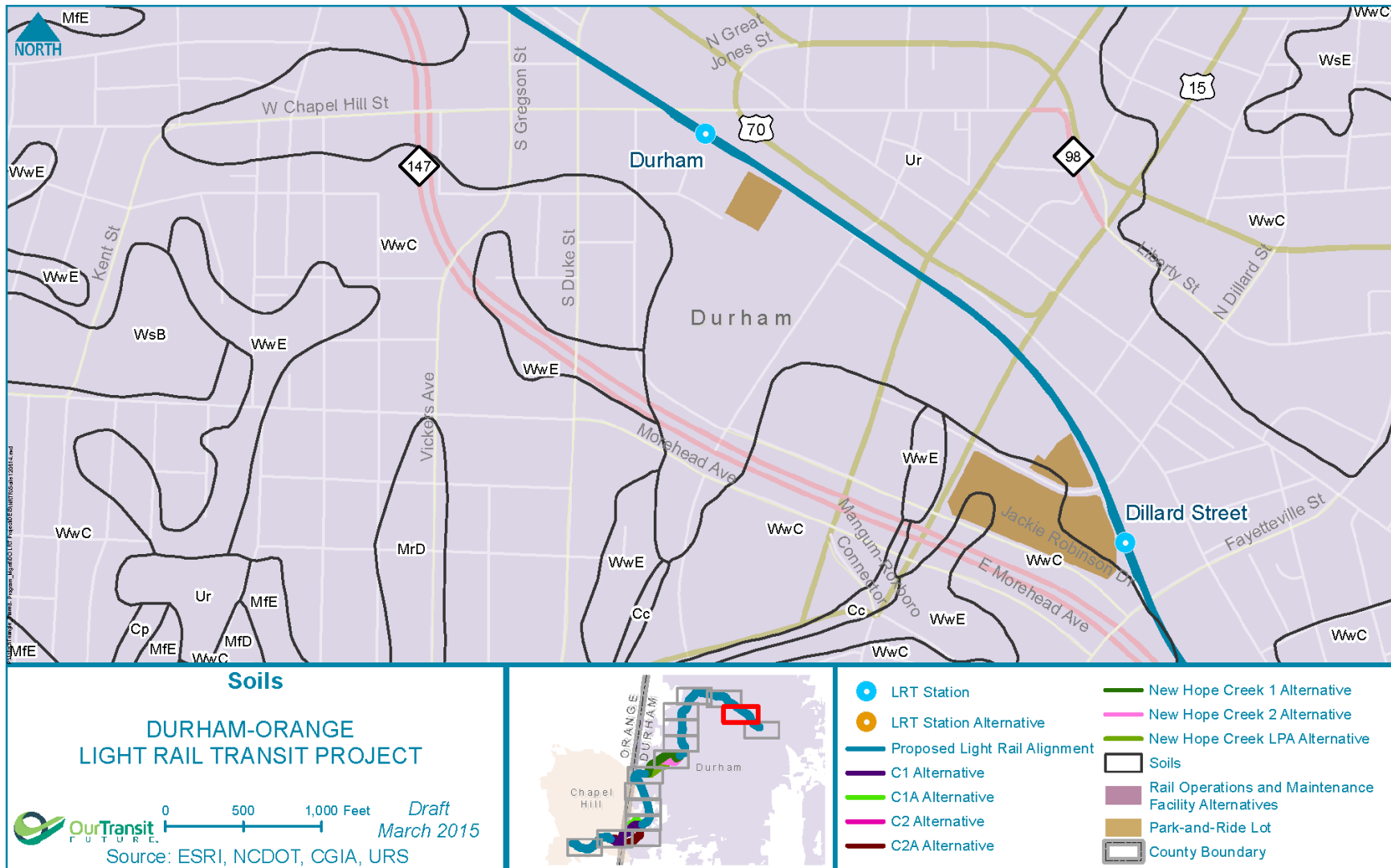


Figure 31: Soils

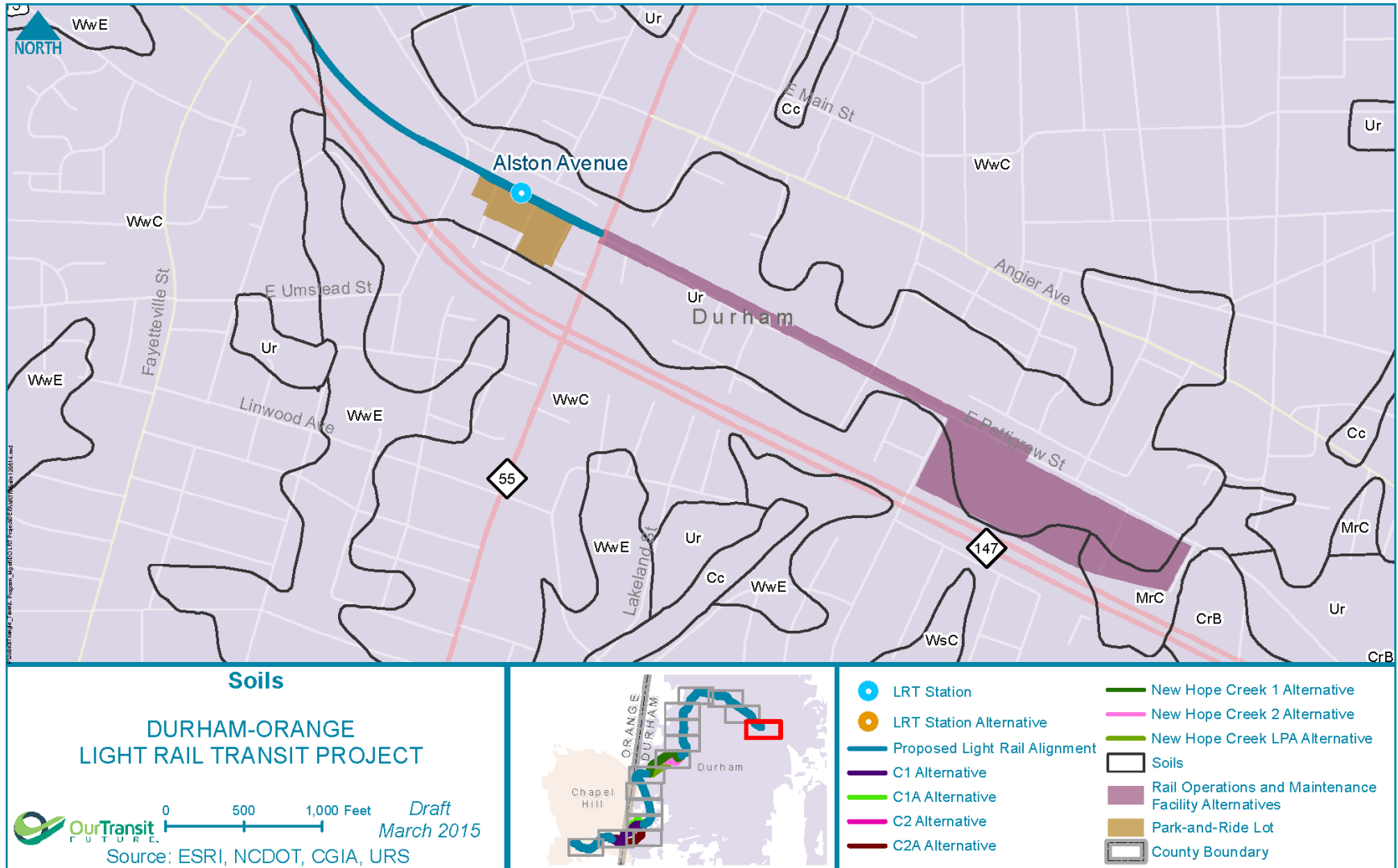


Figure 32: Biotic Communities

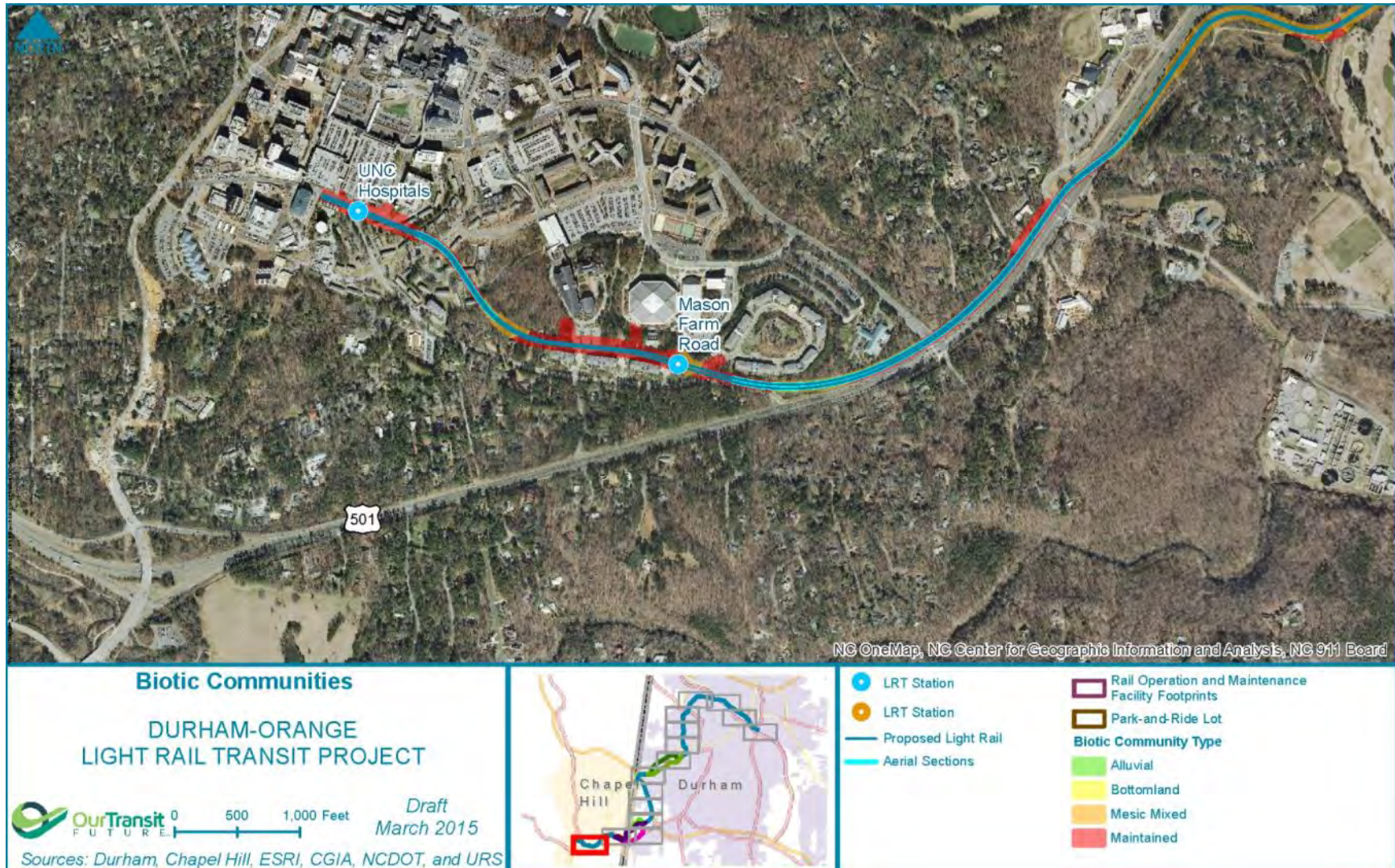


Figure 33: Biotic Communities

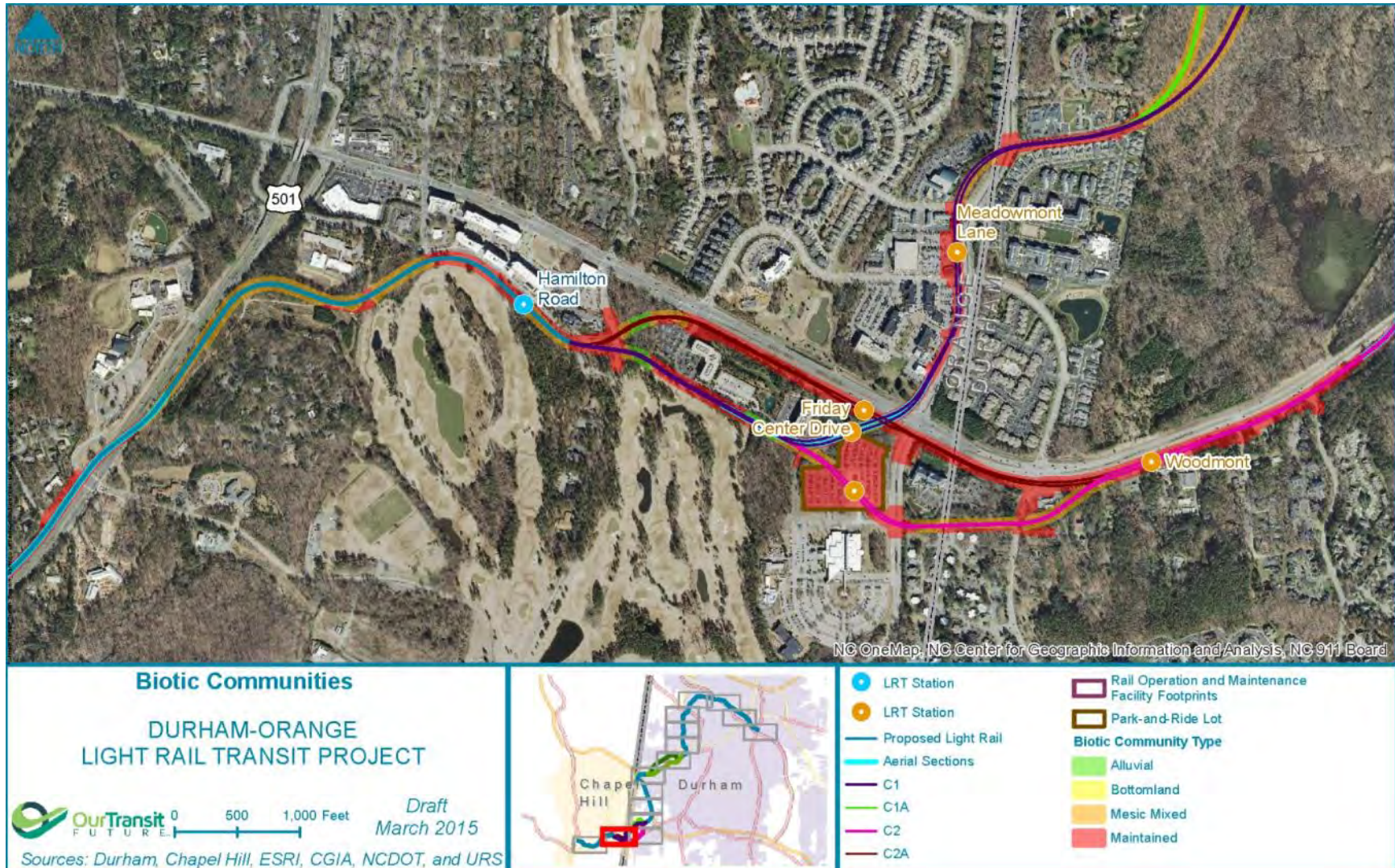


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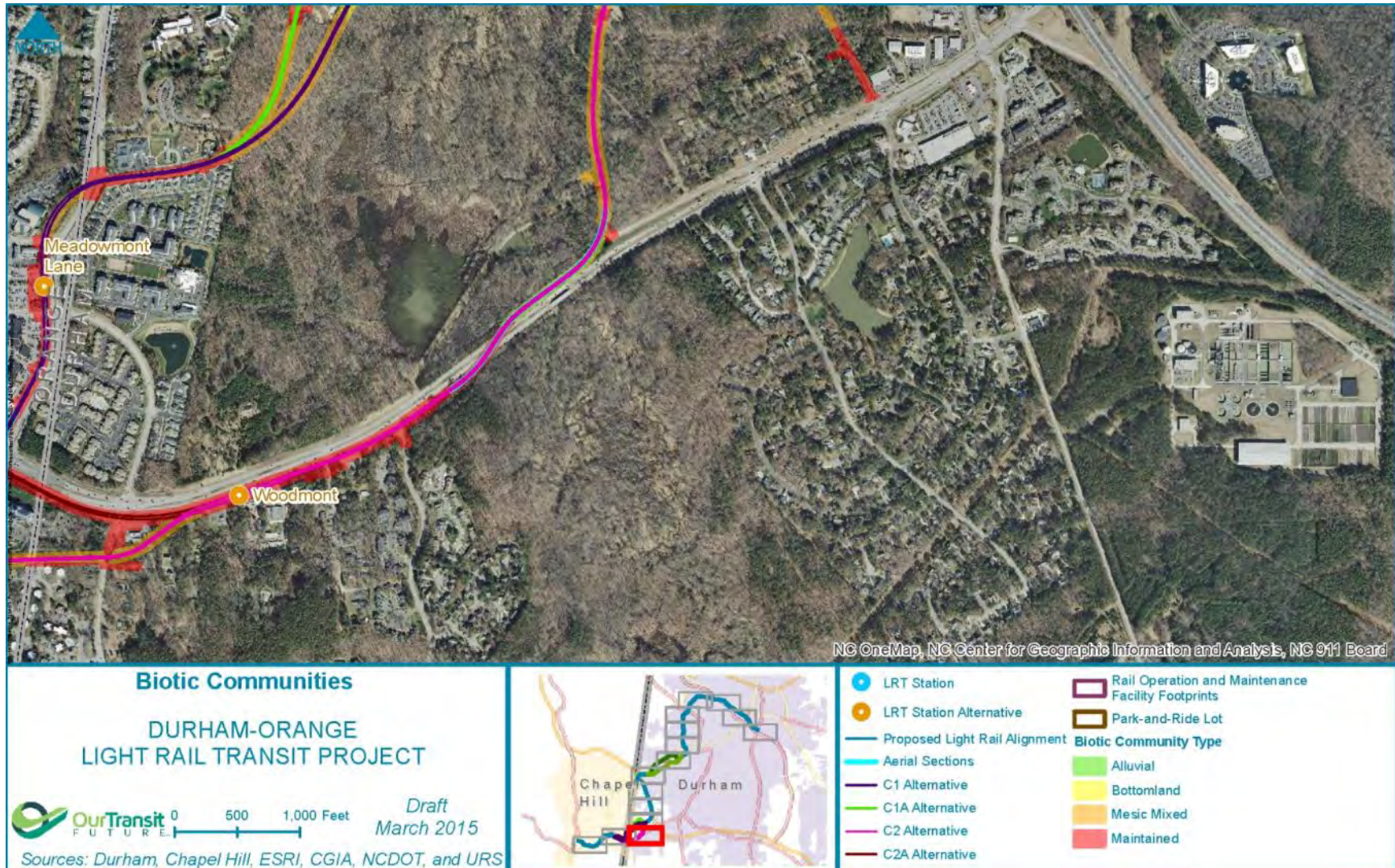


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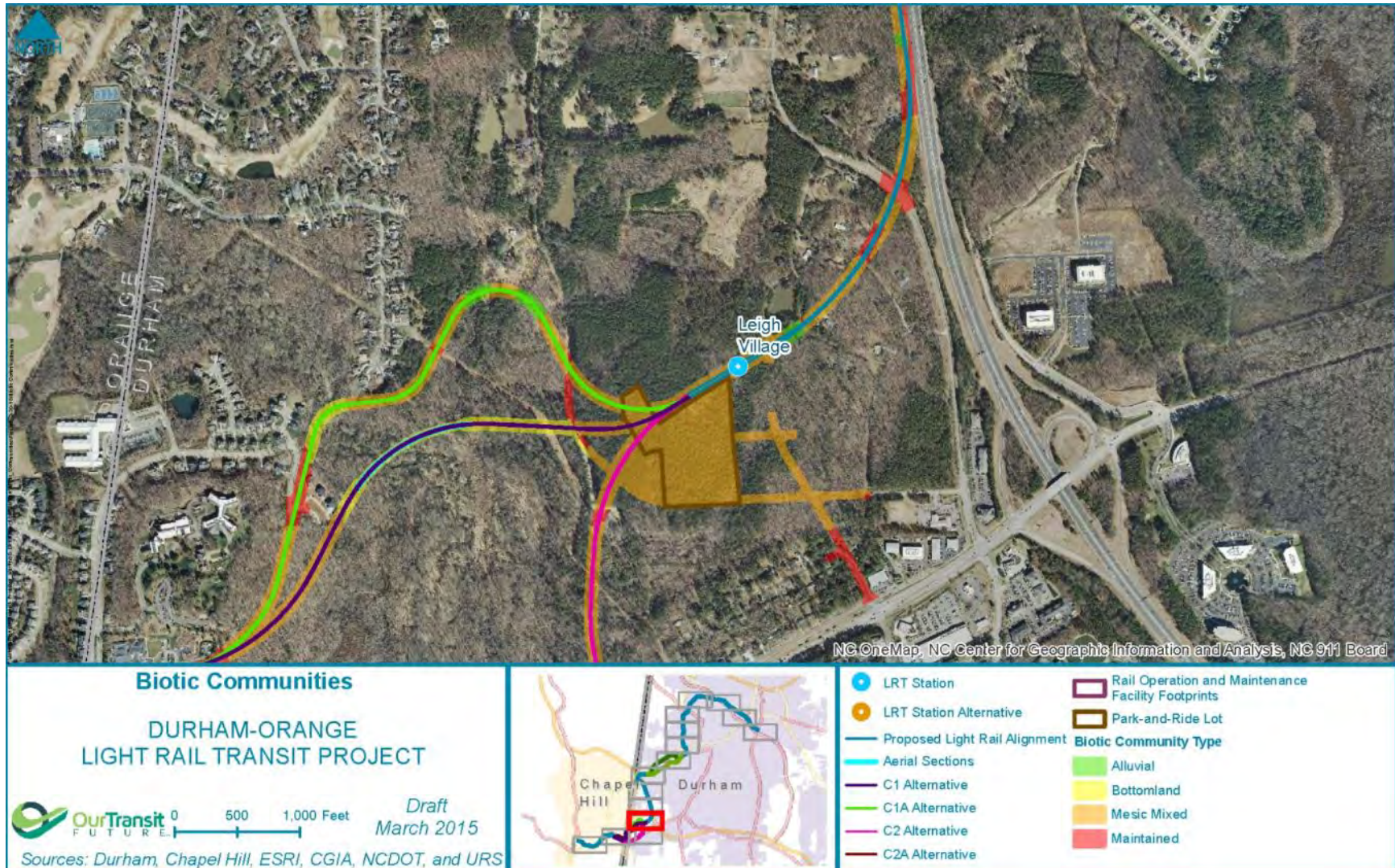


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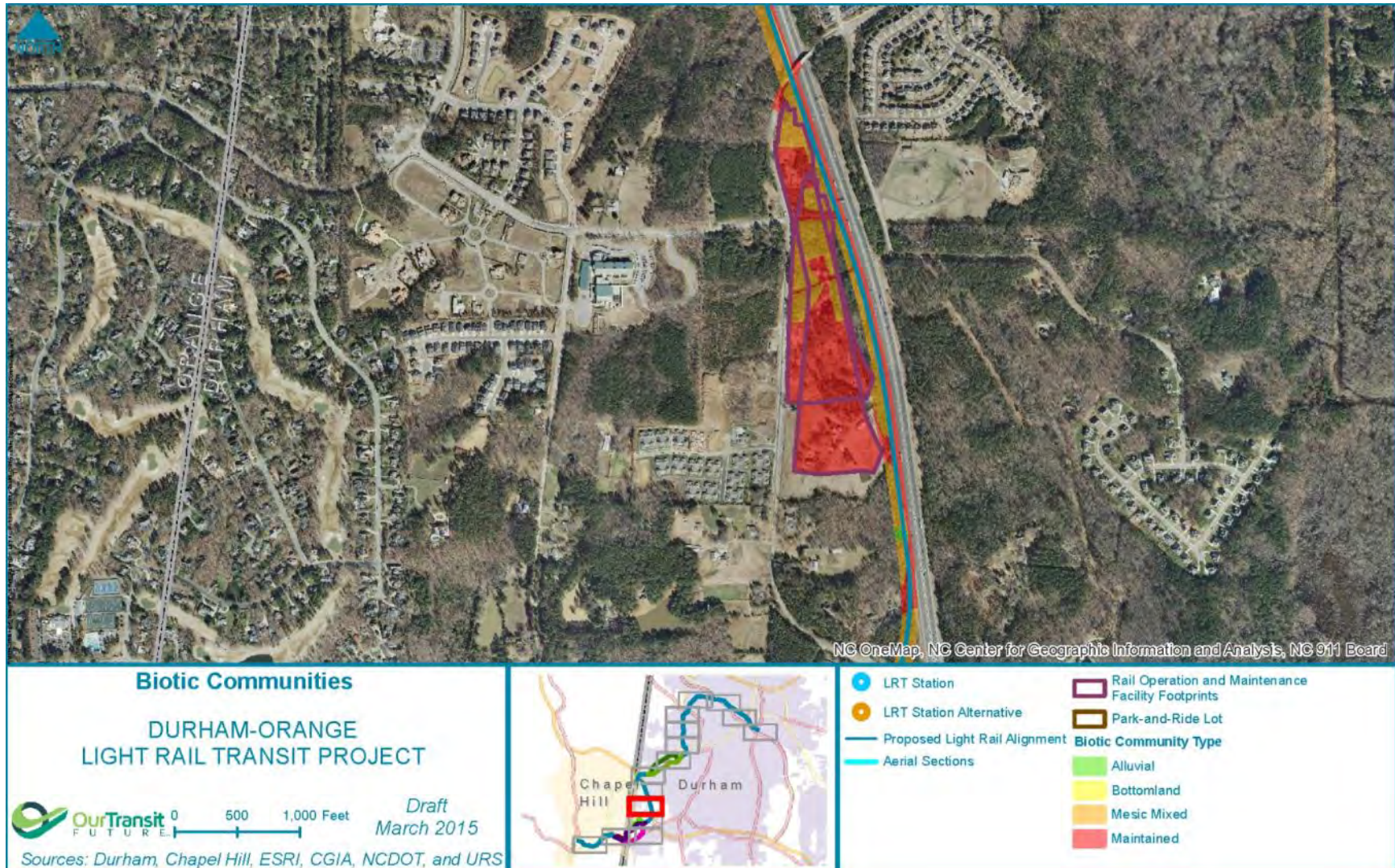


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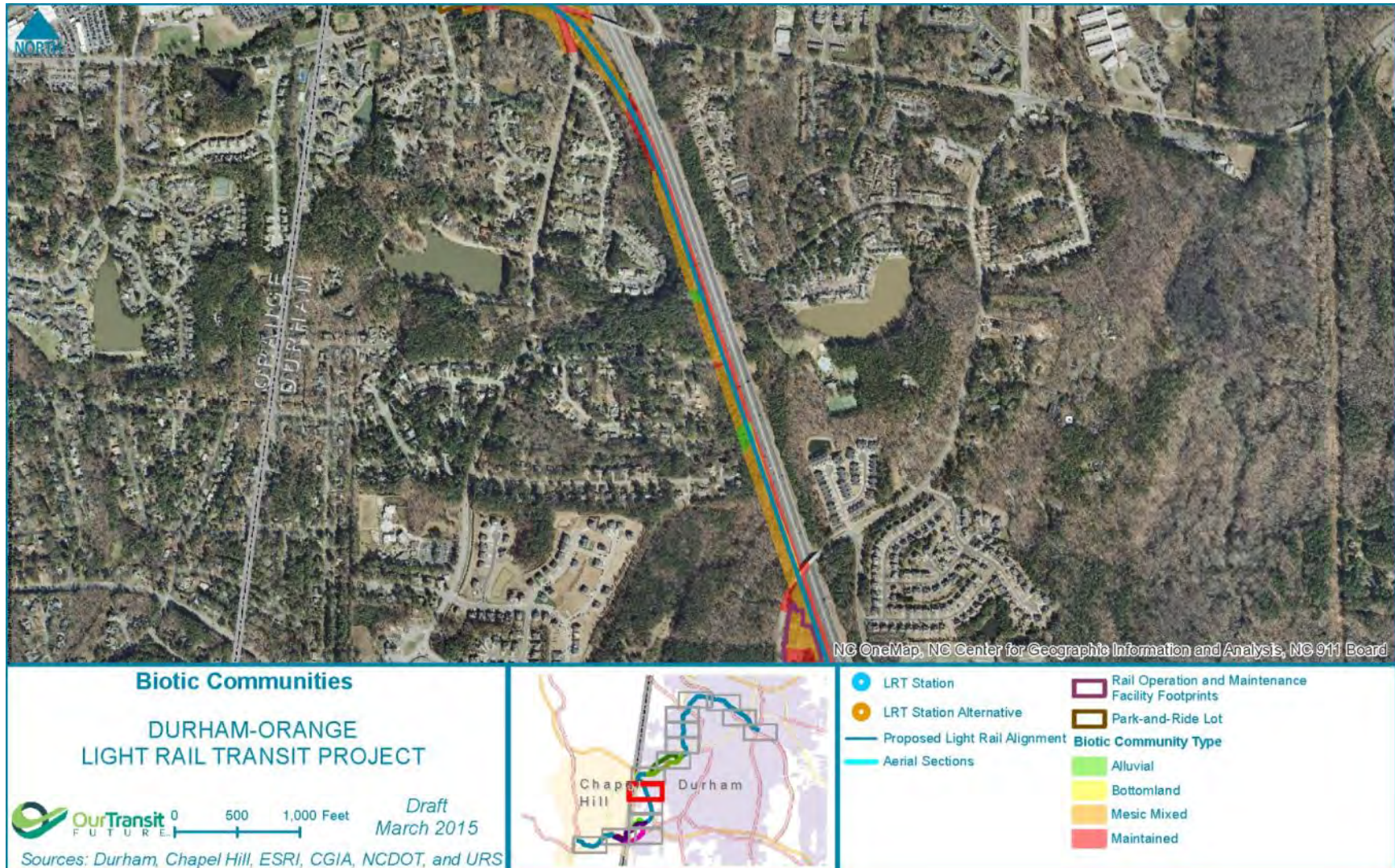


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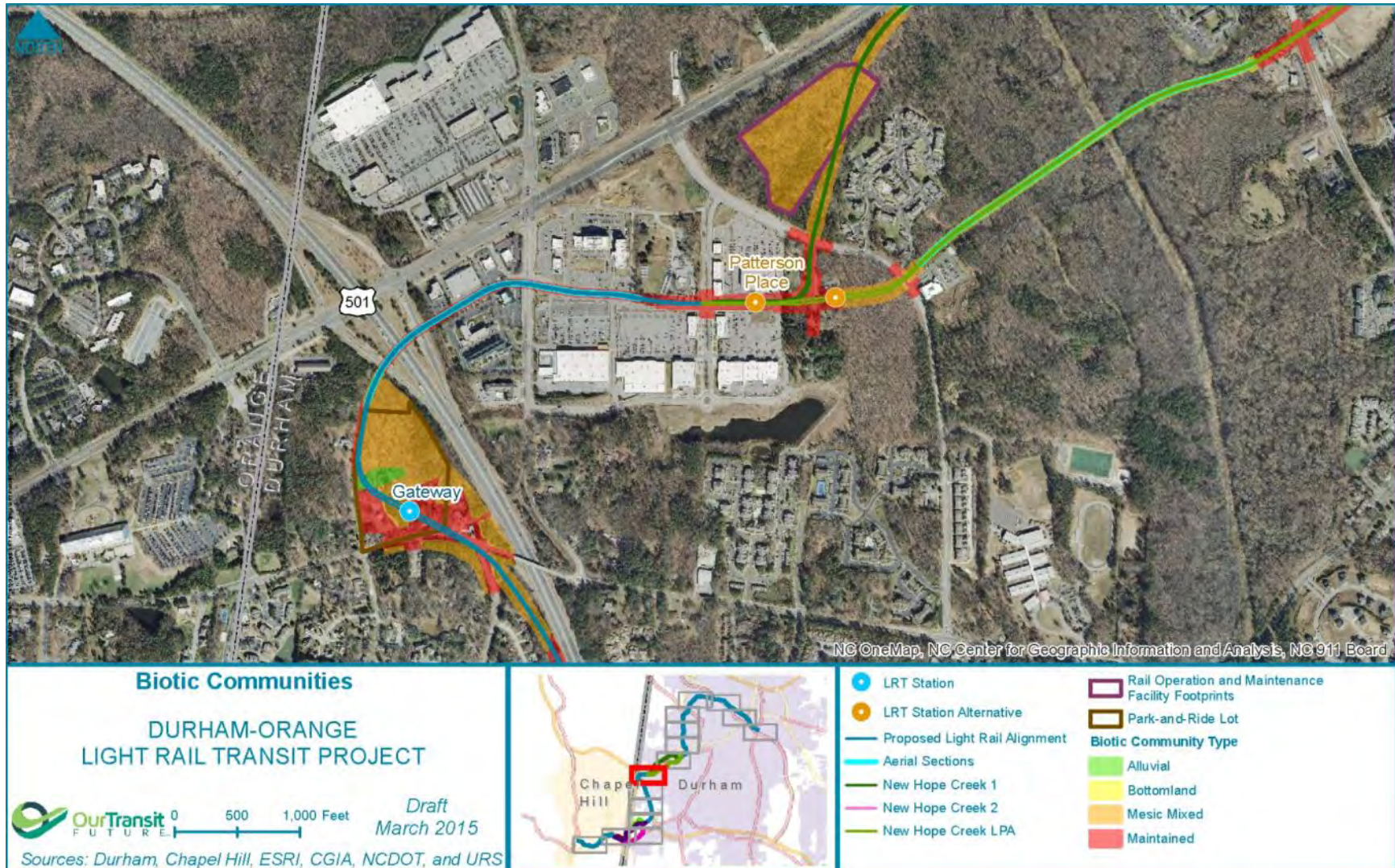


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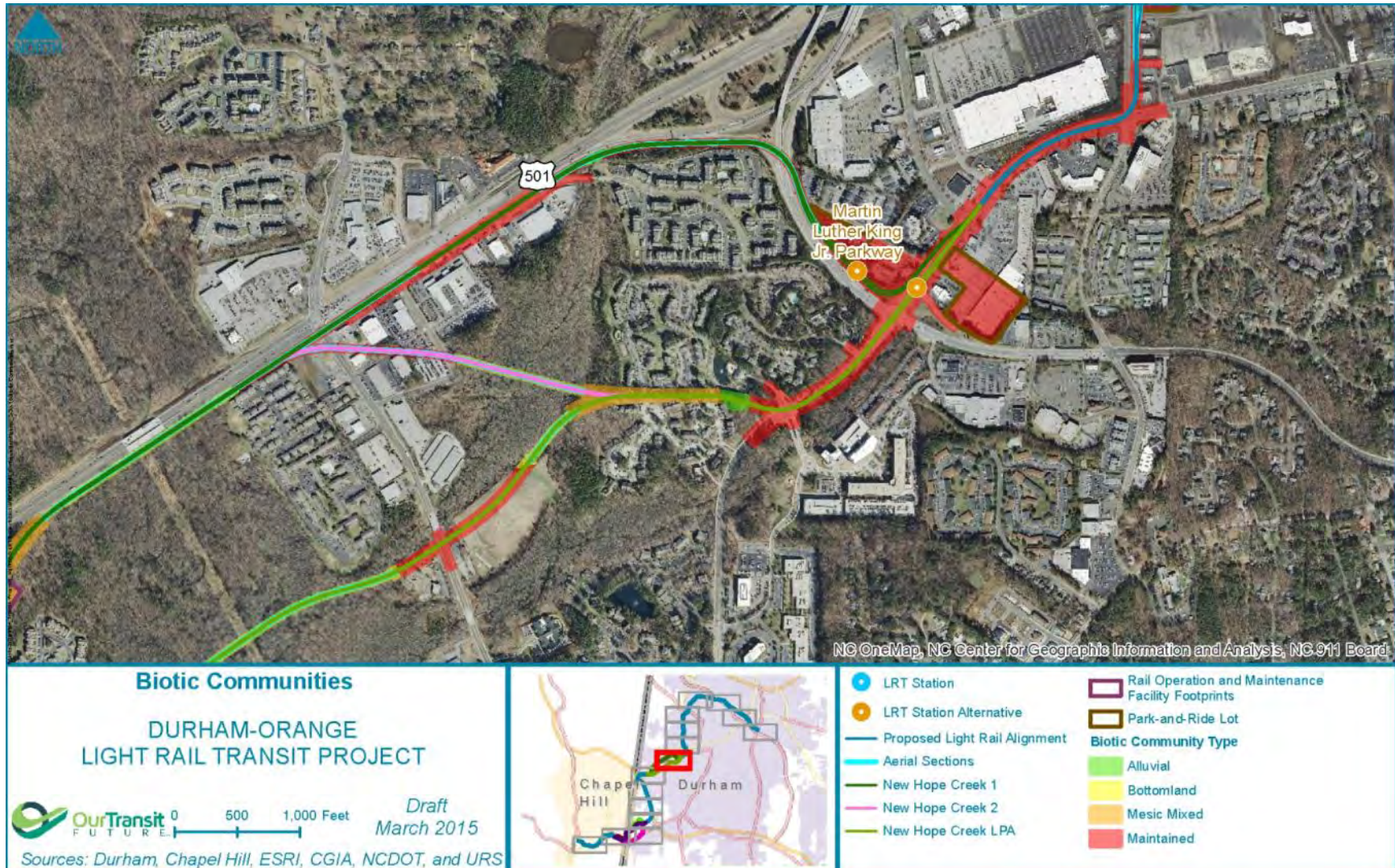


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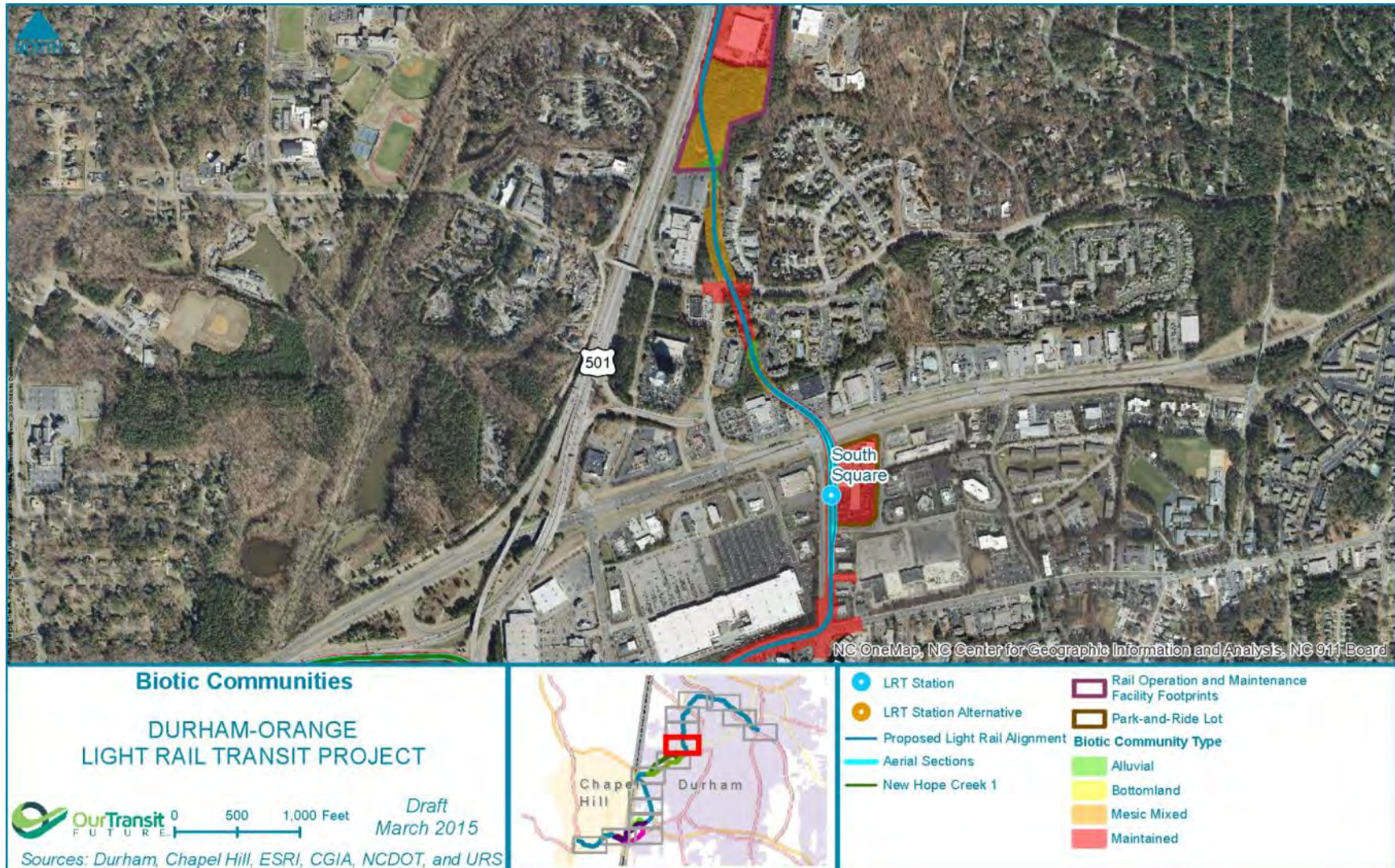


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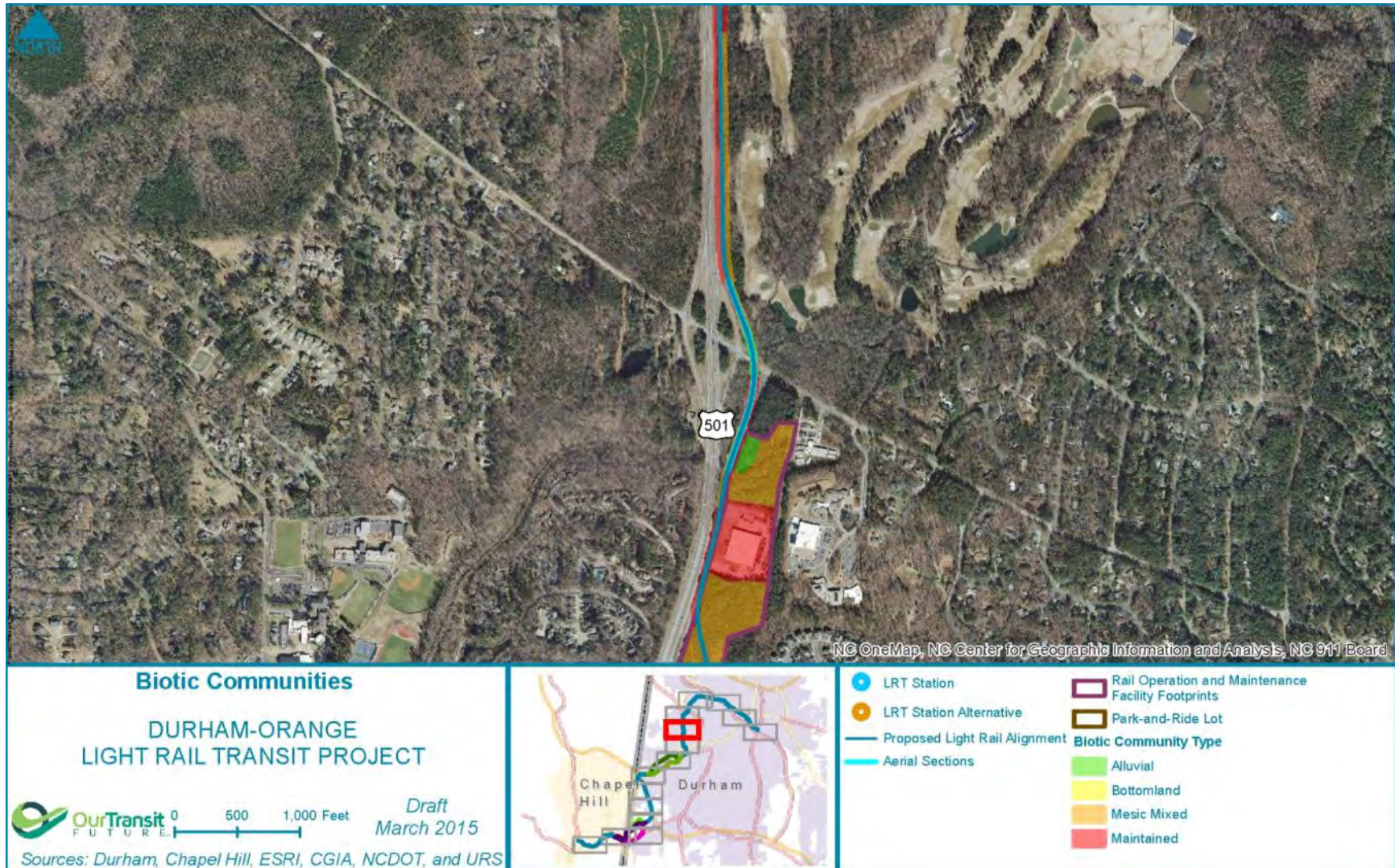


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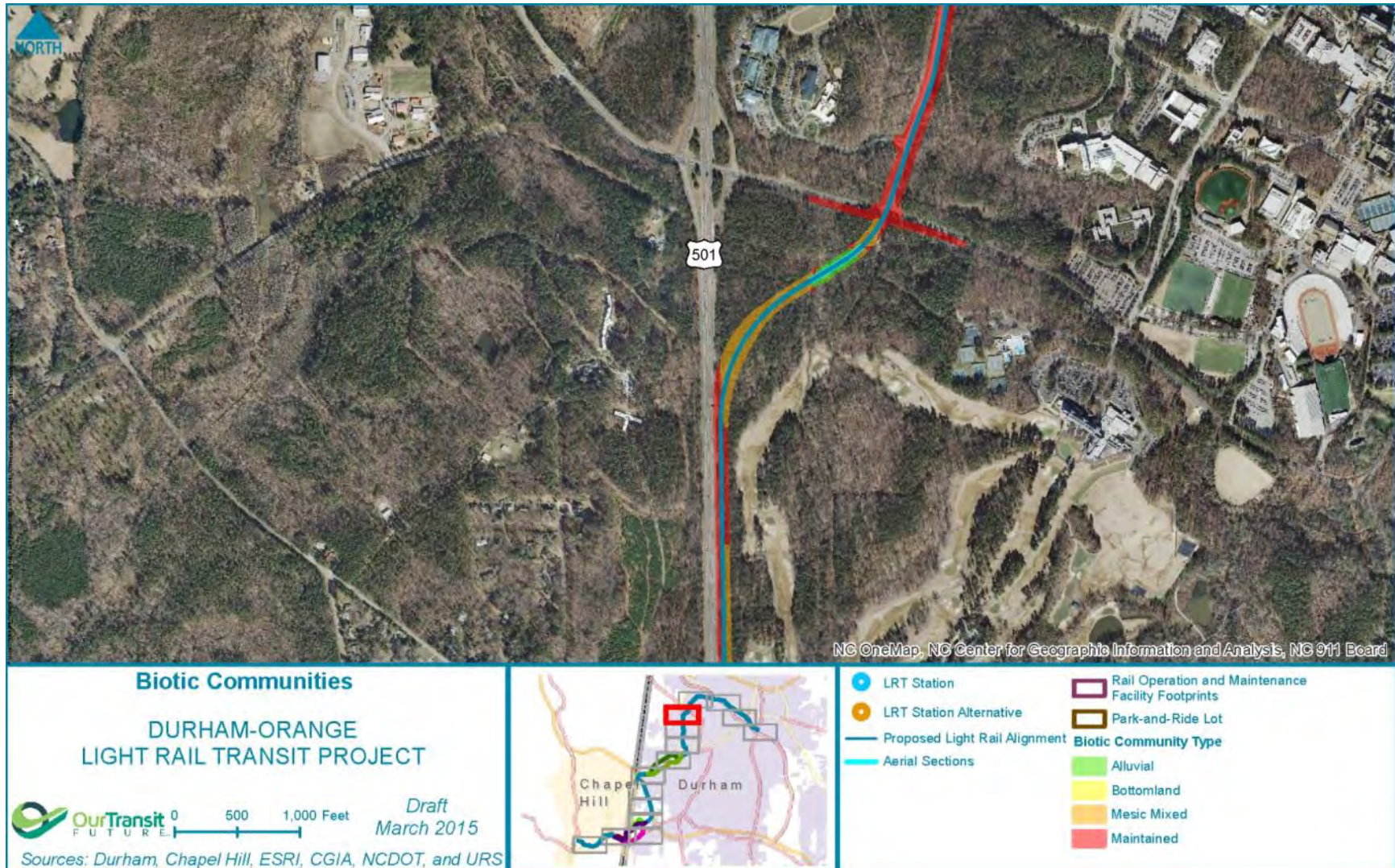


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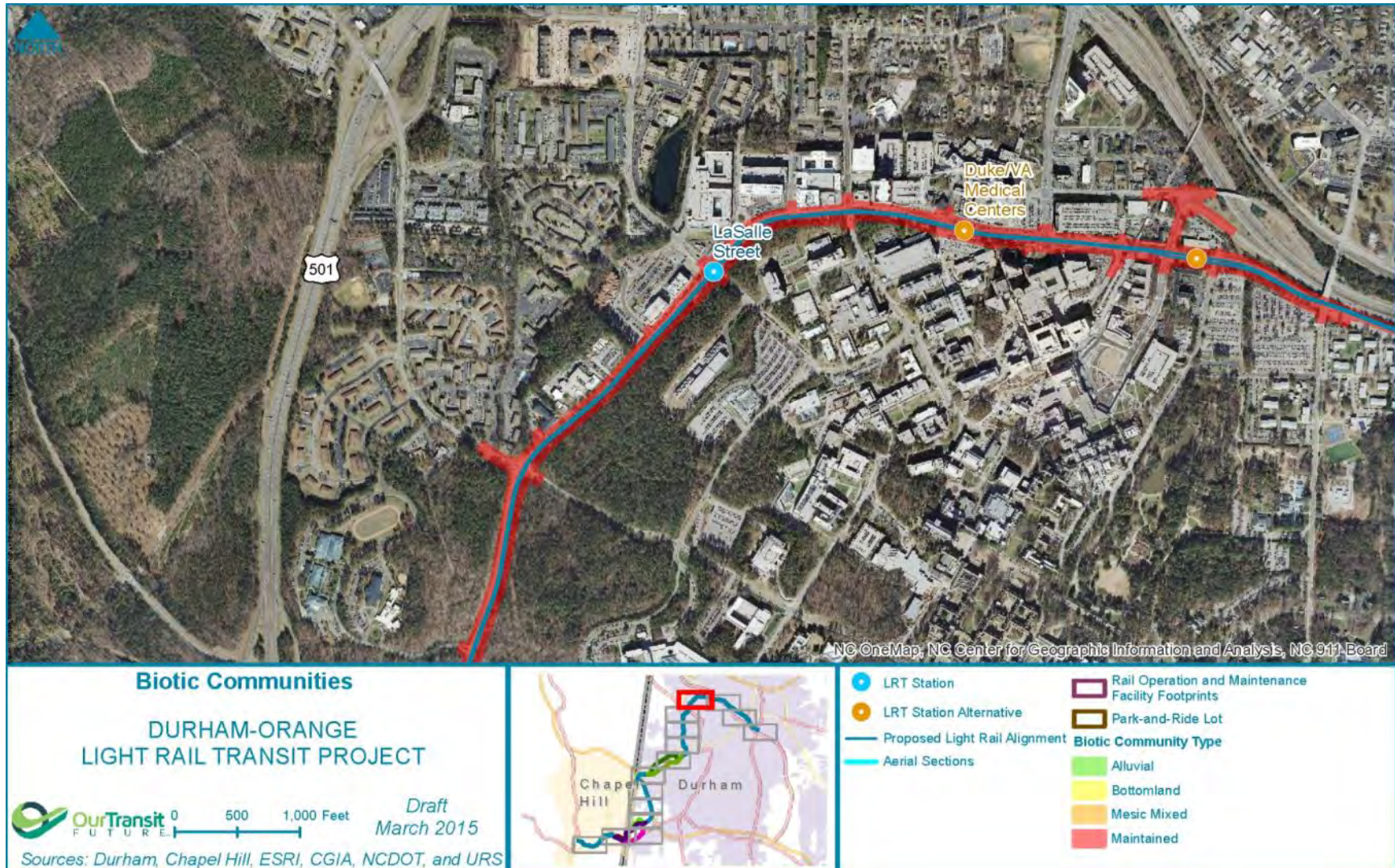


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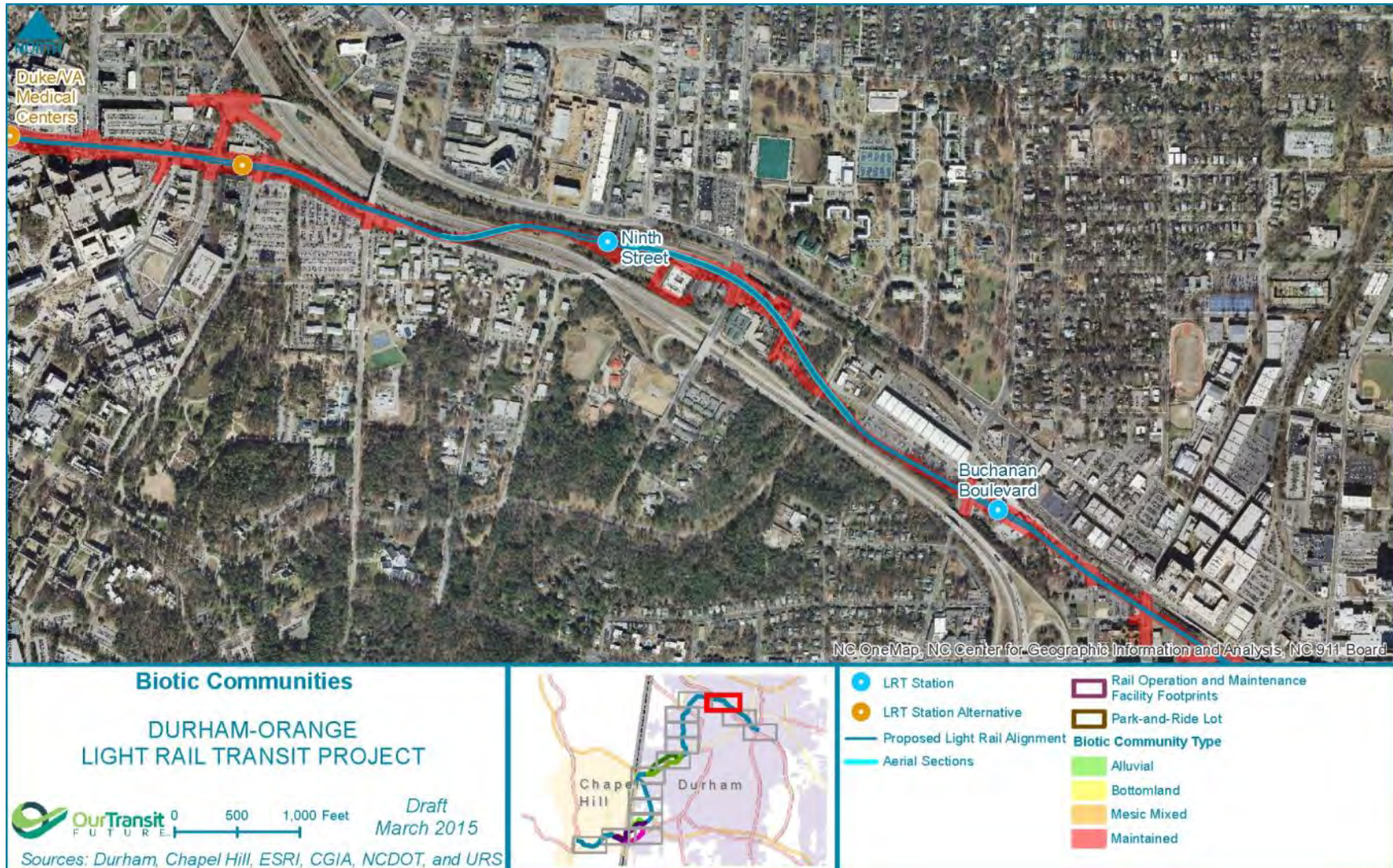


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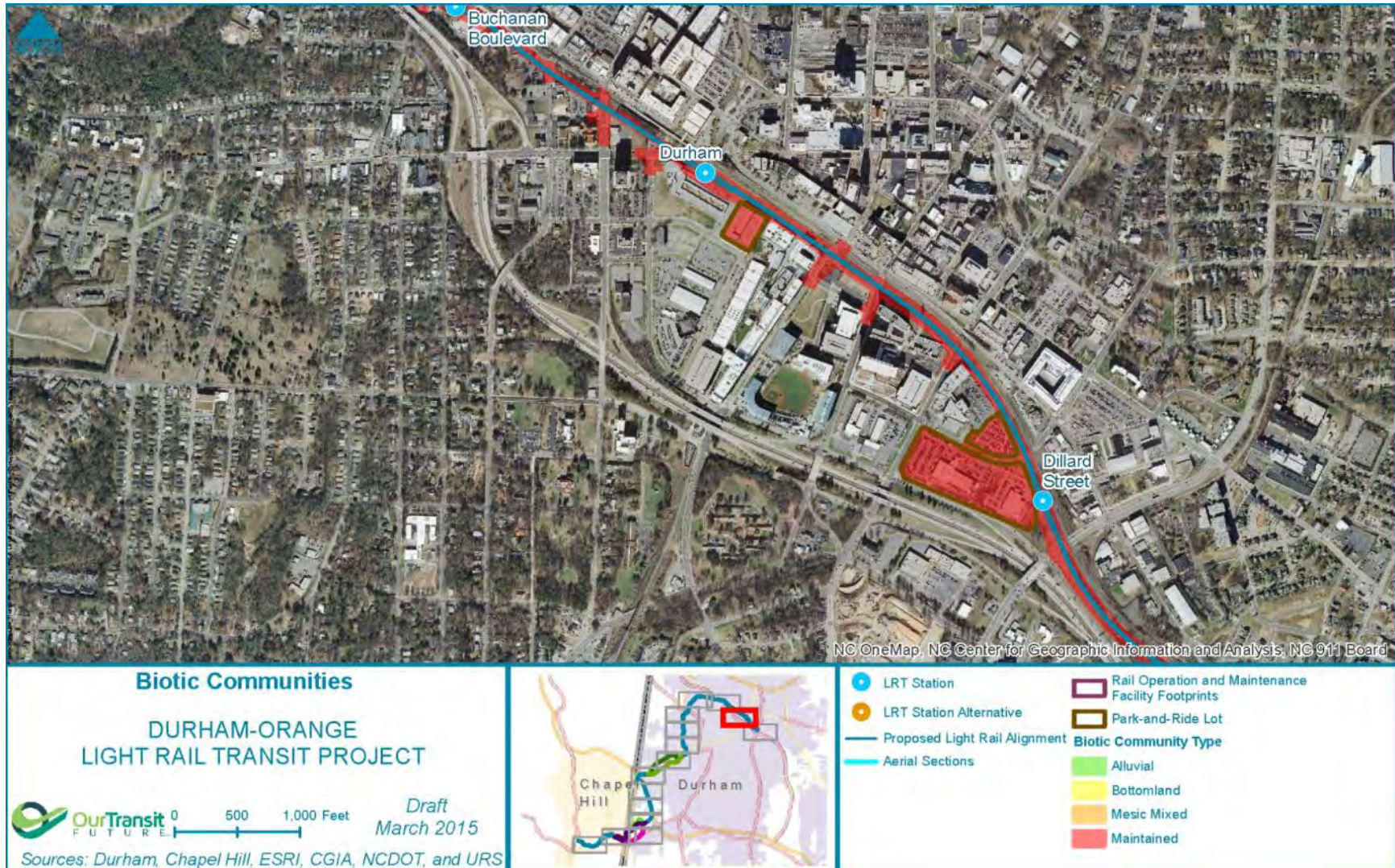


Figure 46: Biotic Communities

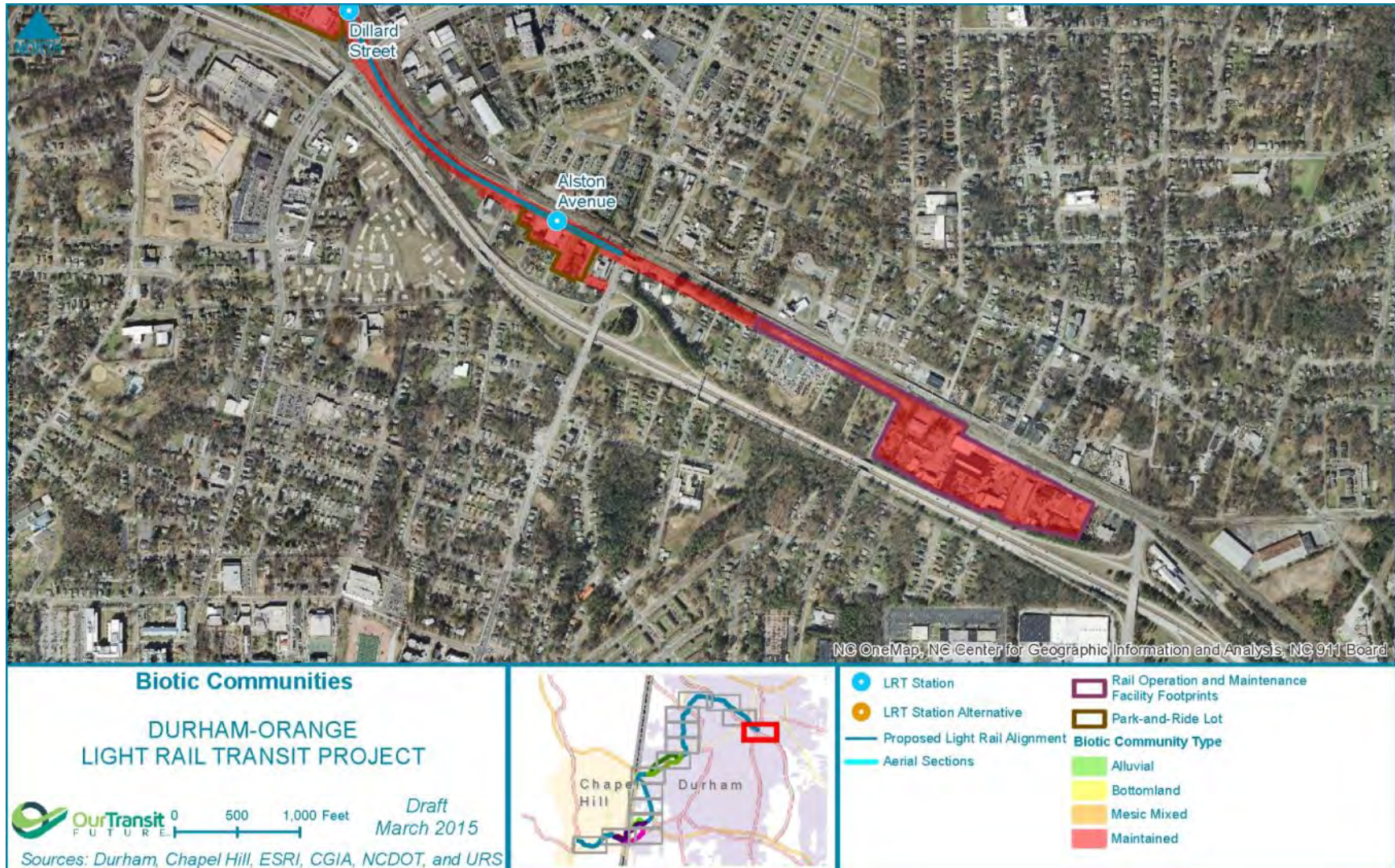


Figure 47: Water Resources

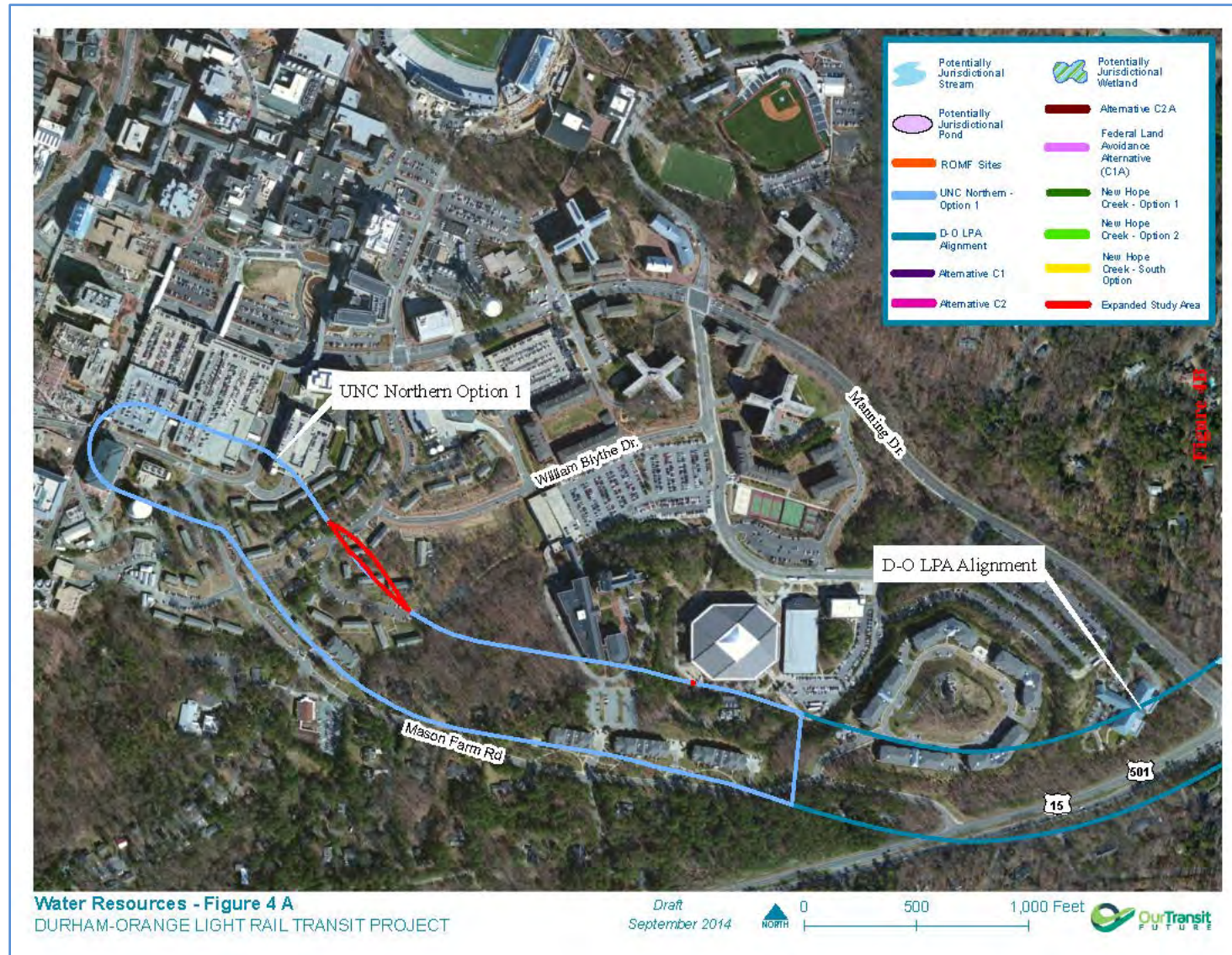


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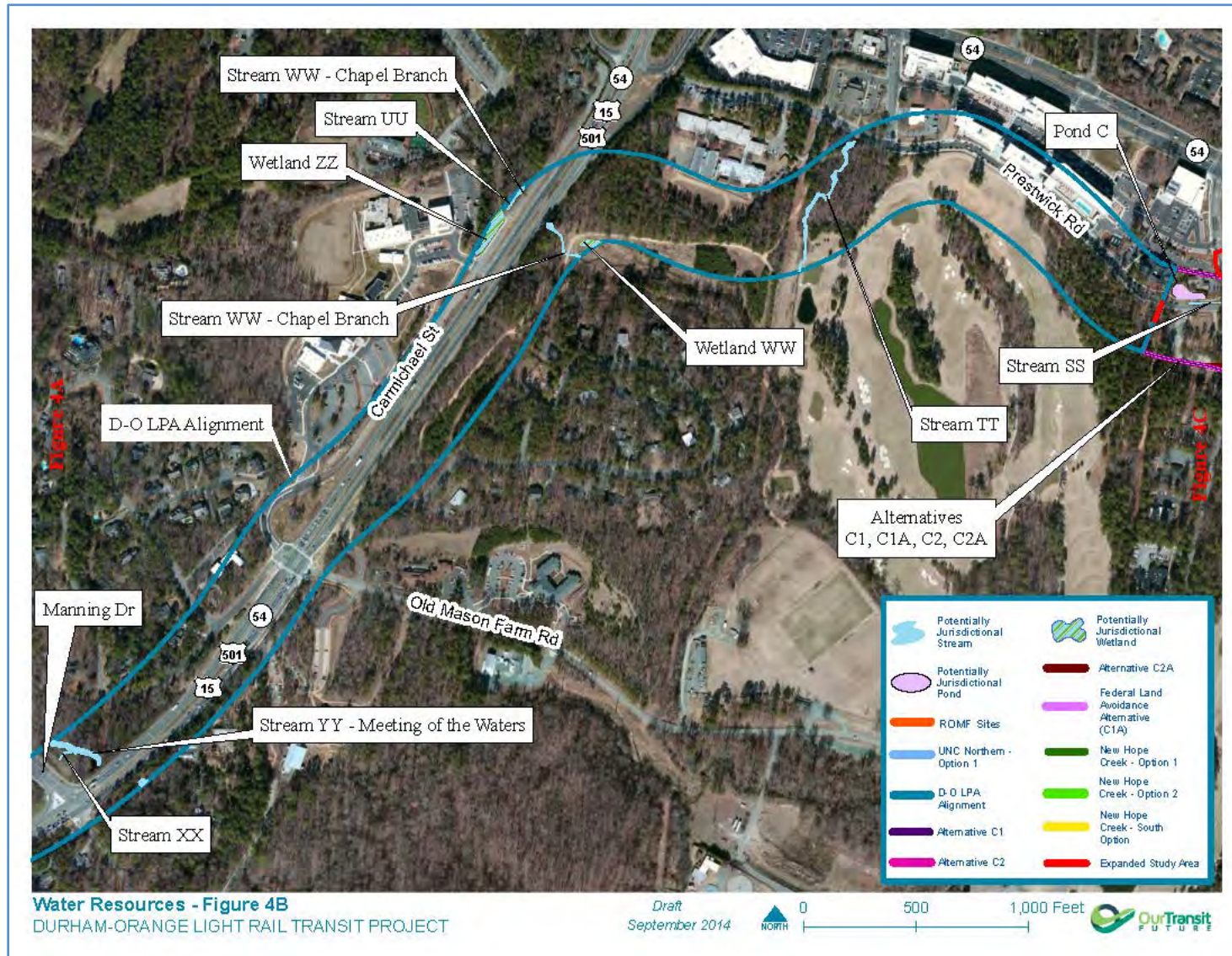


Figure 49: Water Resources

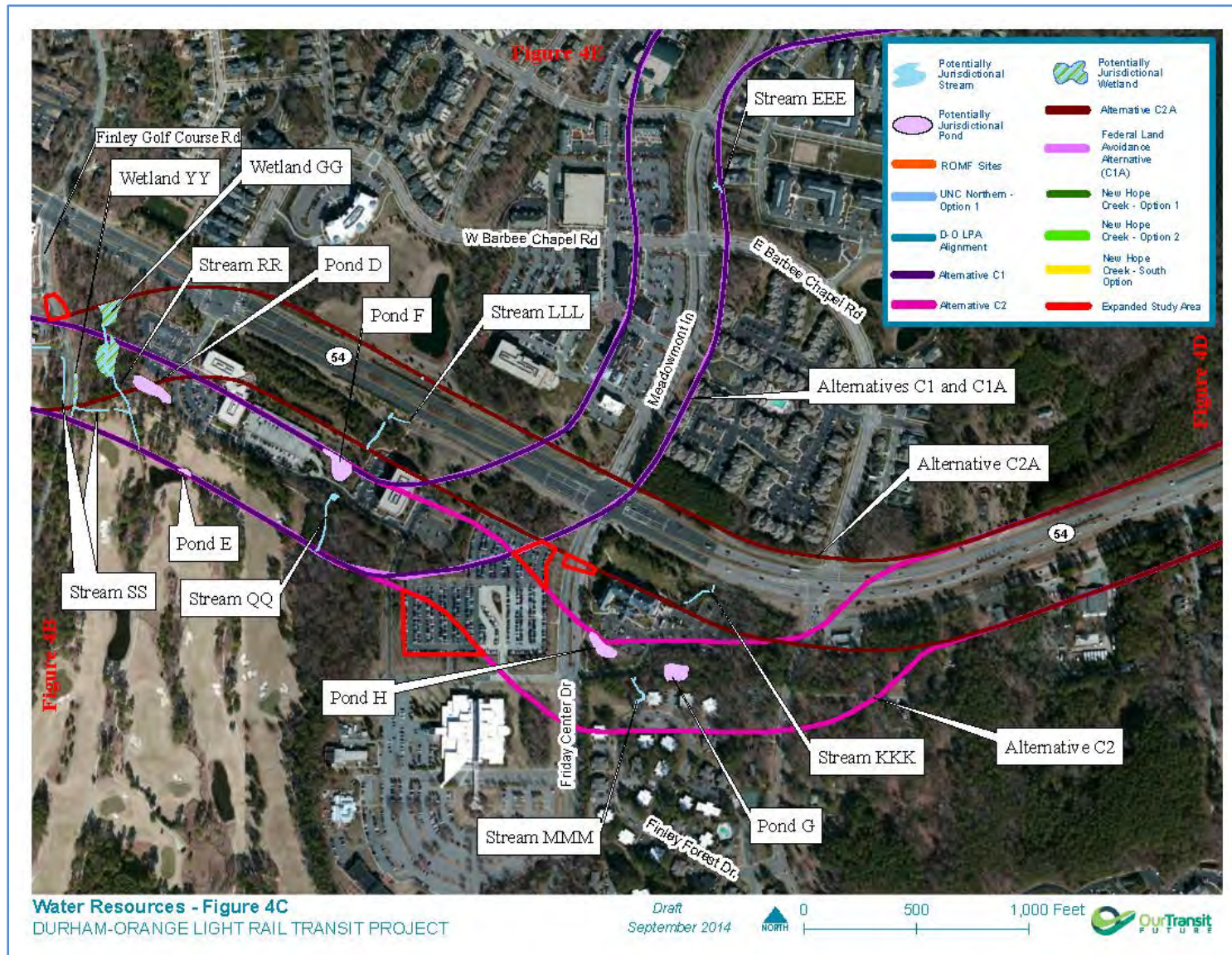


Figure 50: Water Resources

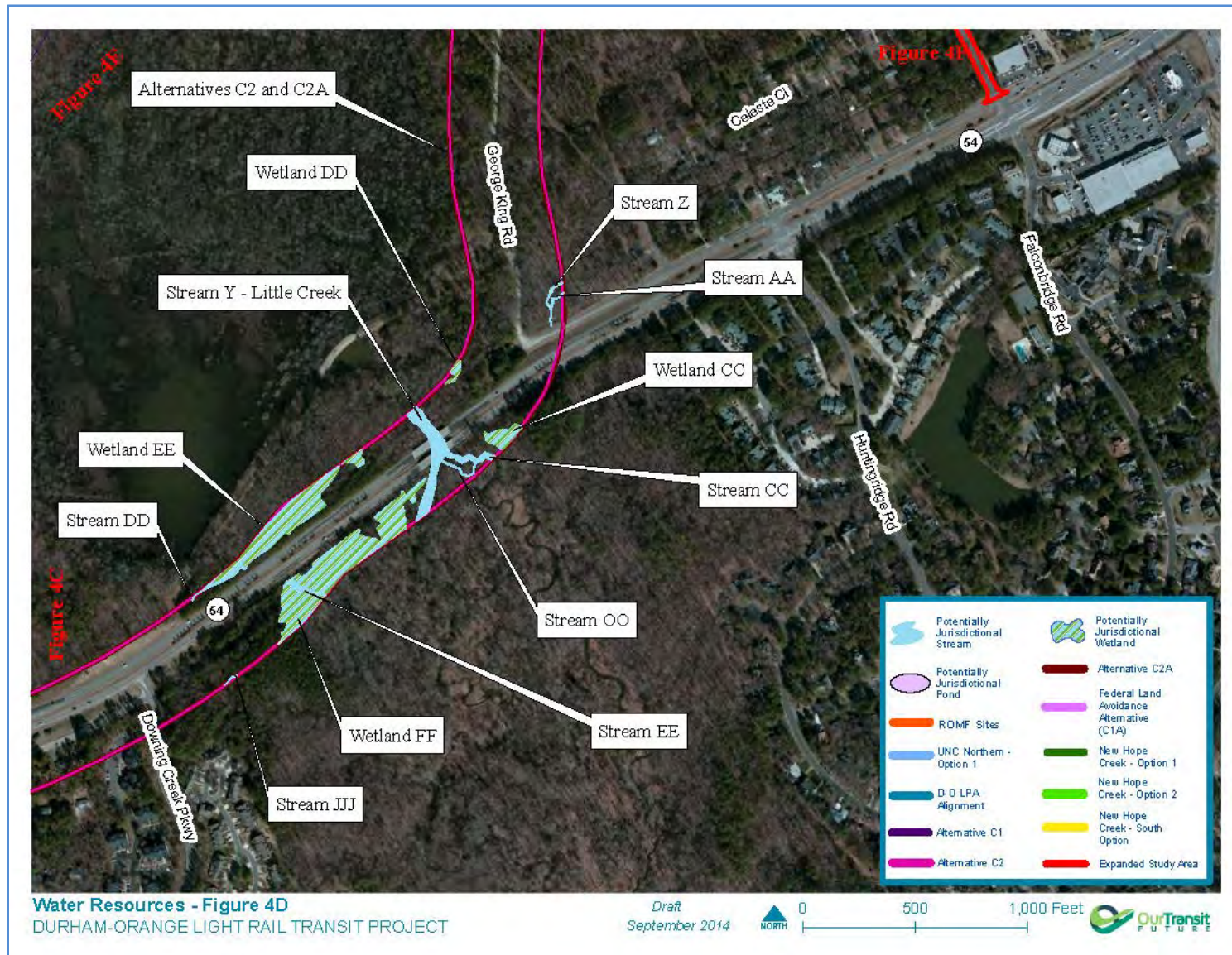


Figure 51: Water Resources

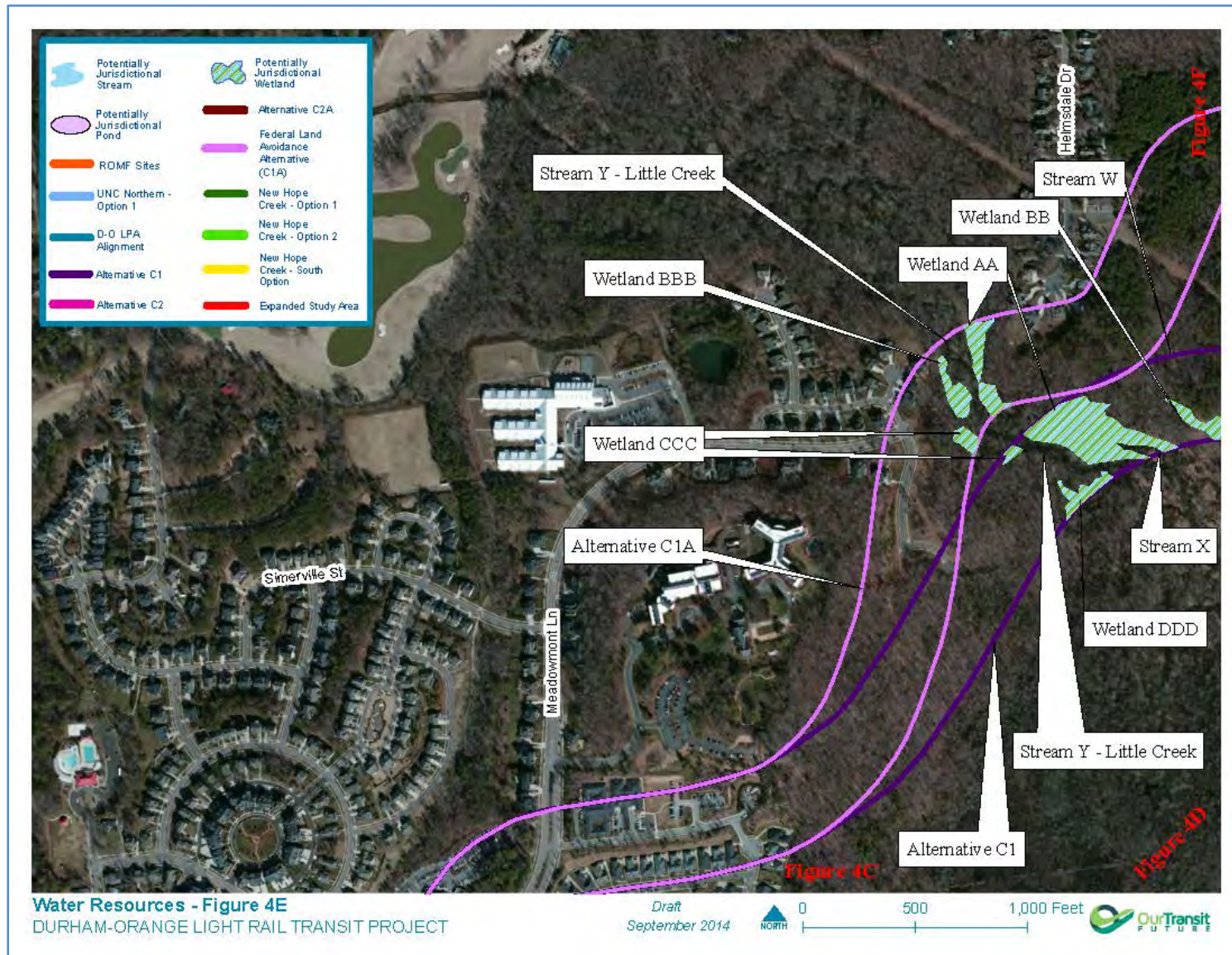


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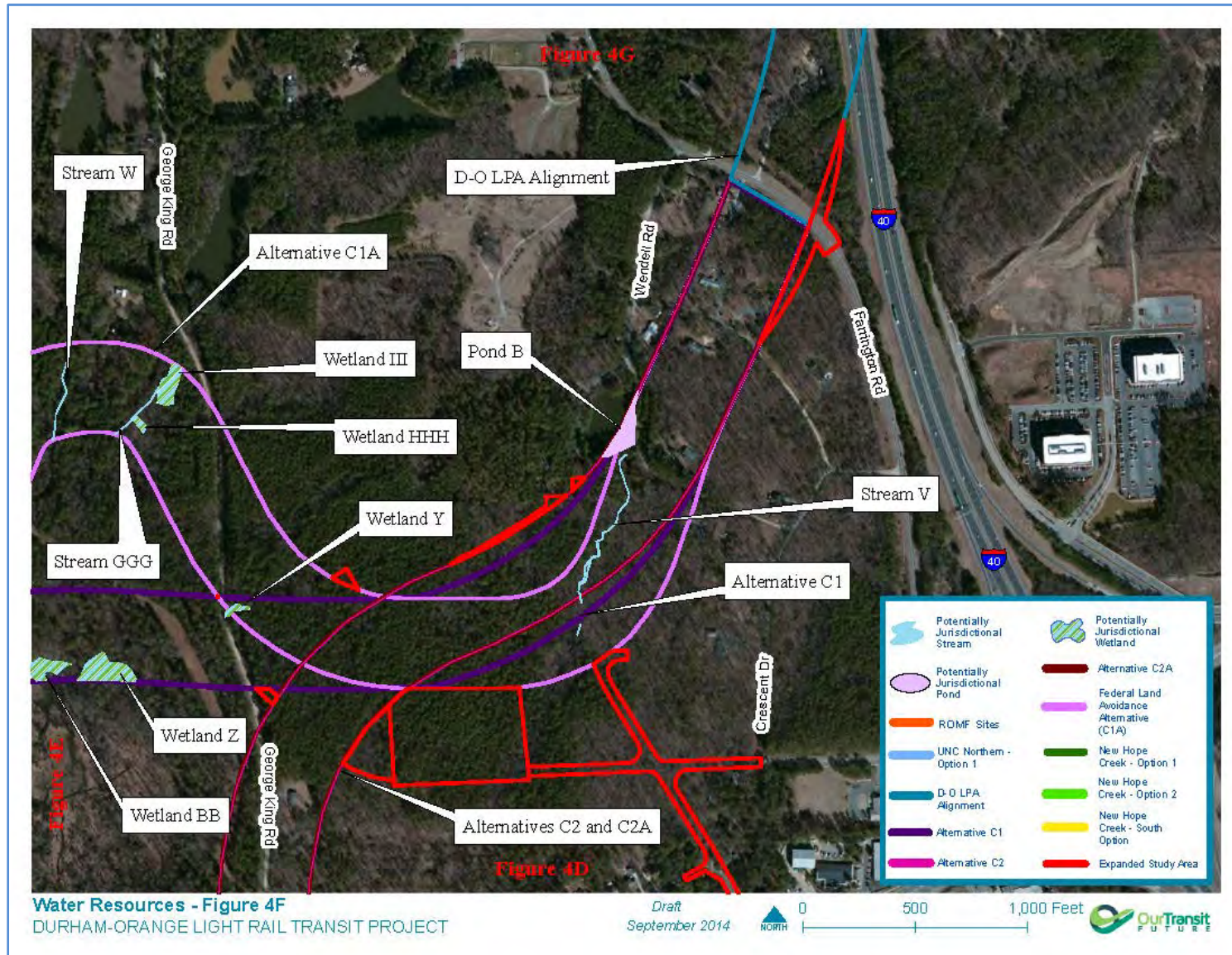


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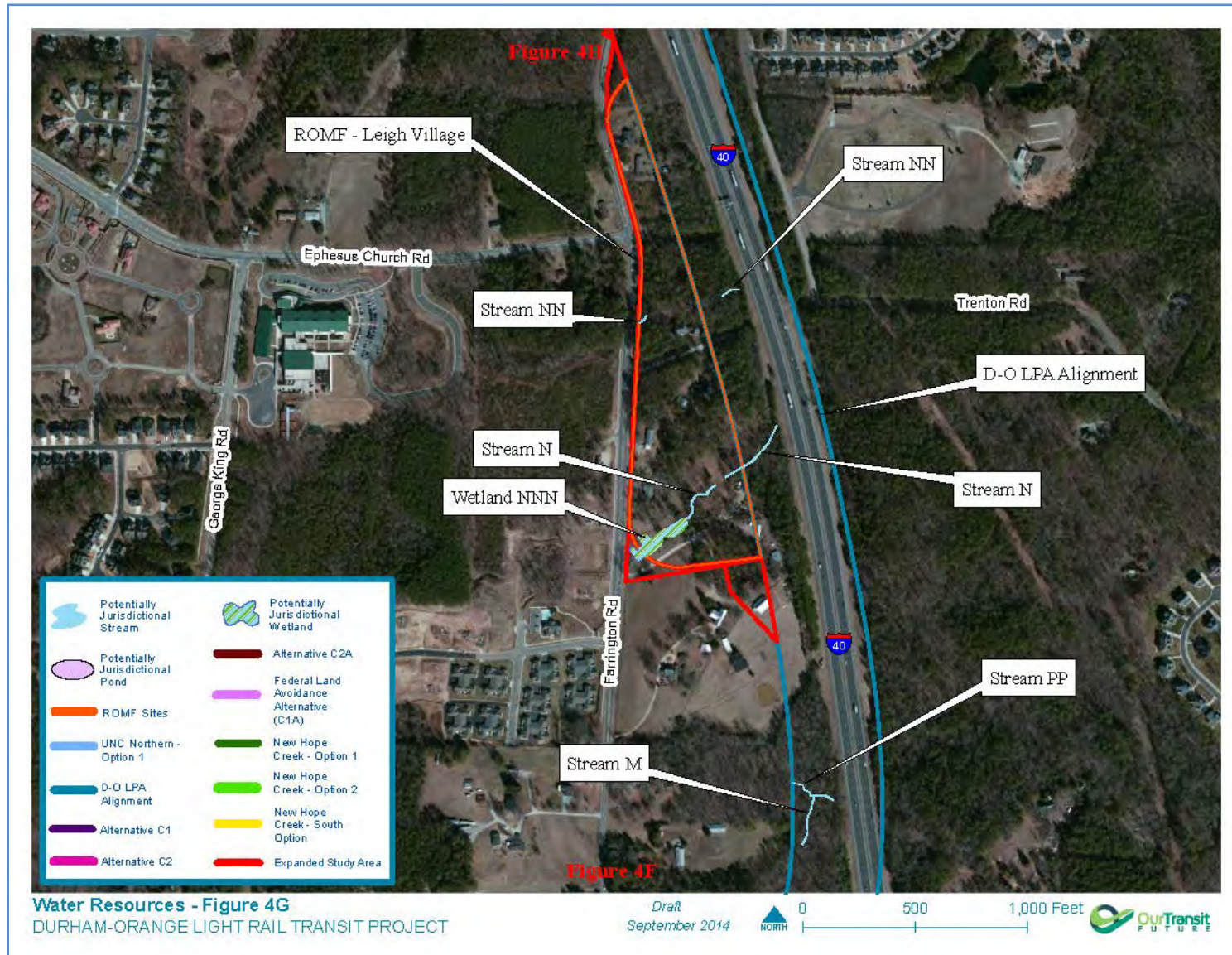


Figure 54: Water Resources



Figure 55: Water Resources

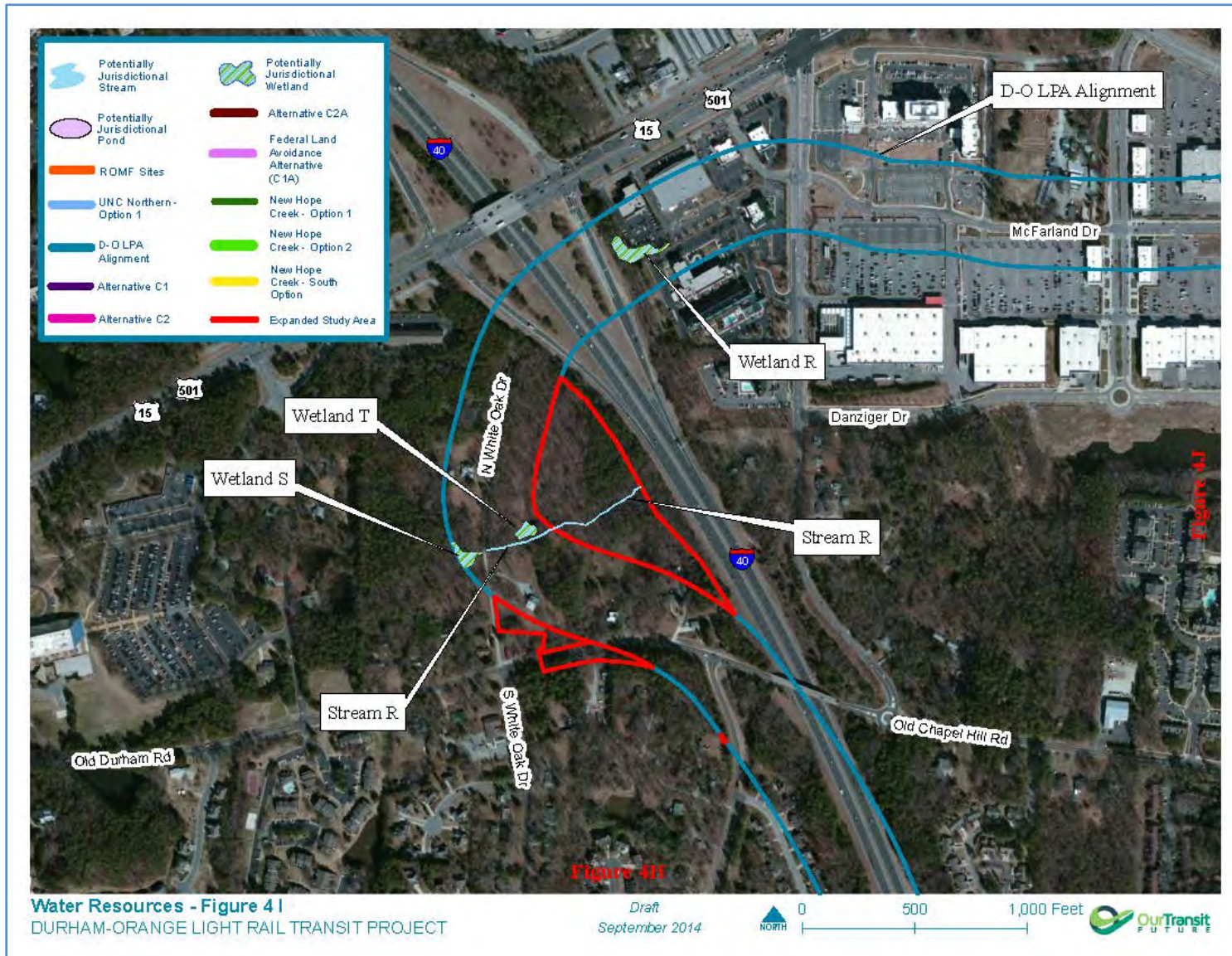


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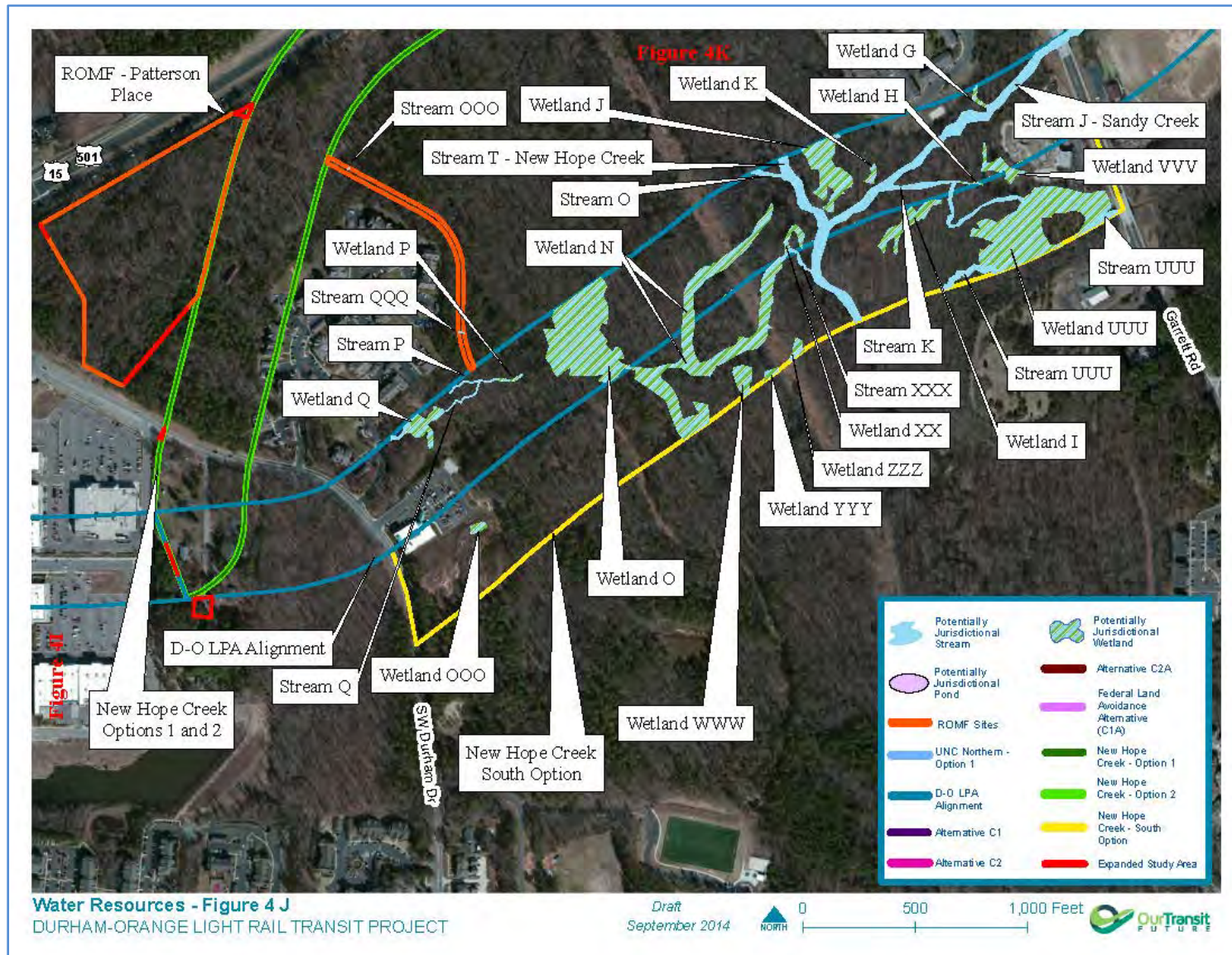


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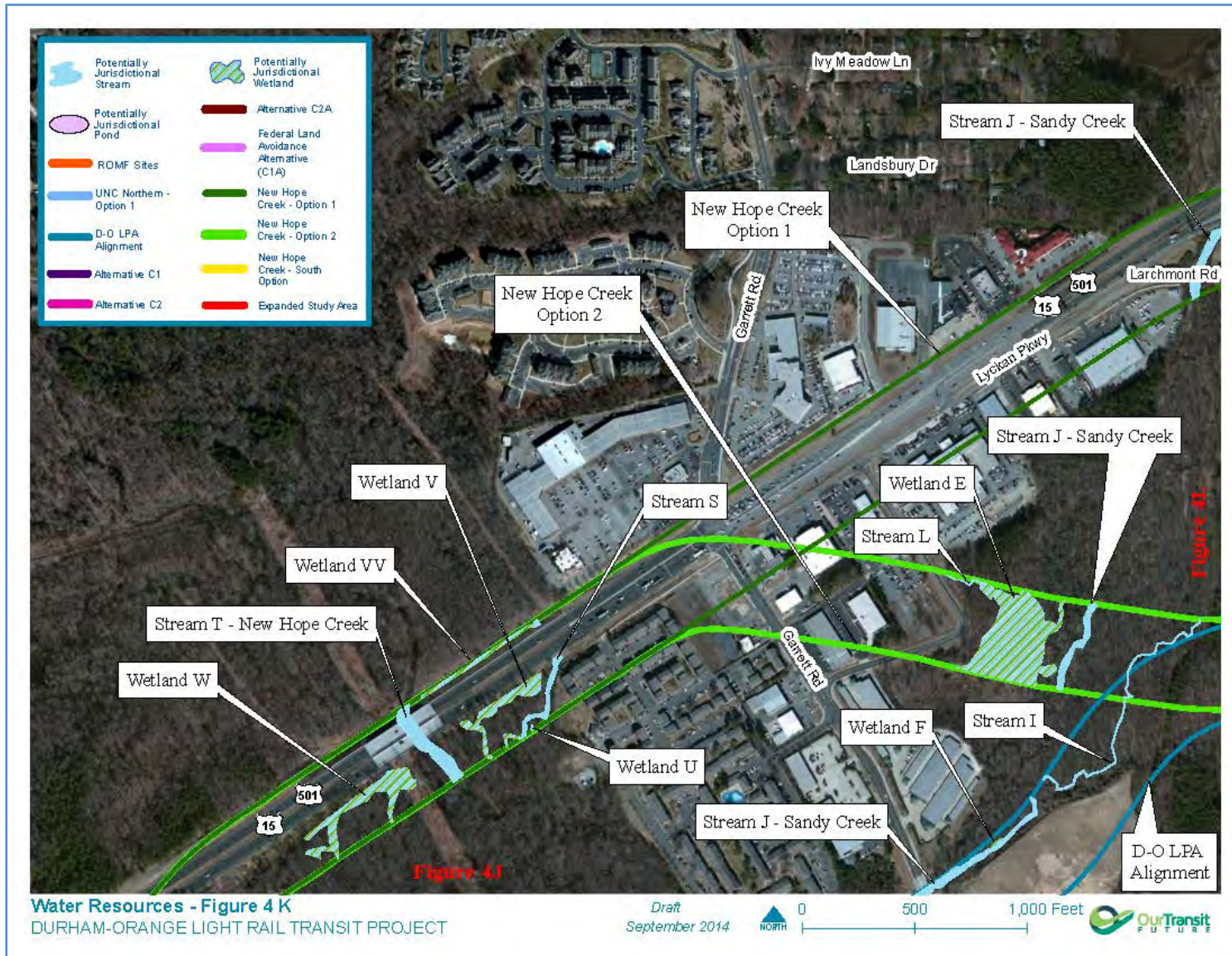


Figure 58: Water Resources



Figure 59: Water Resources

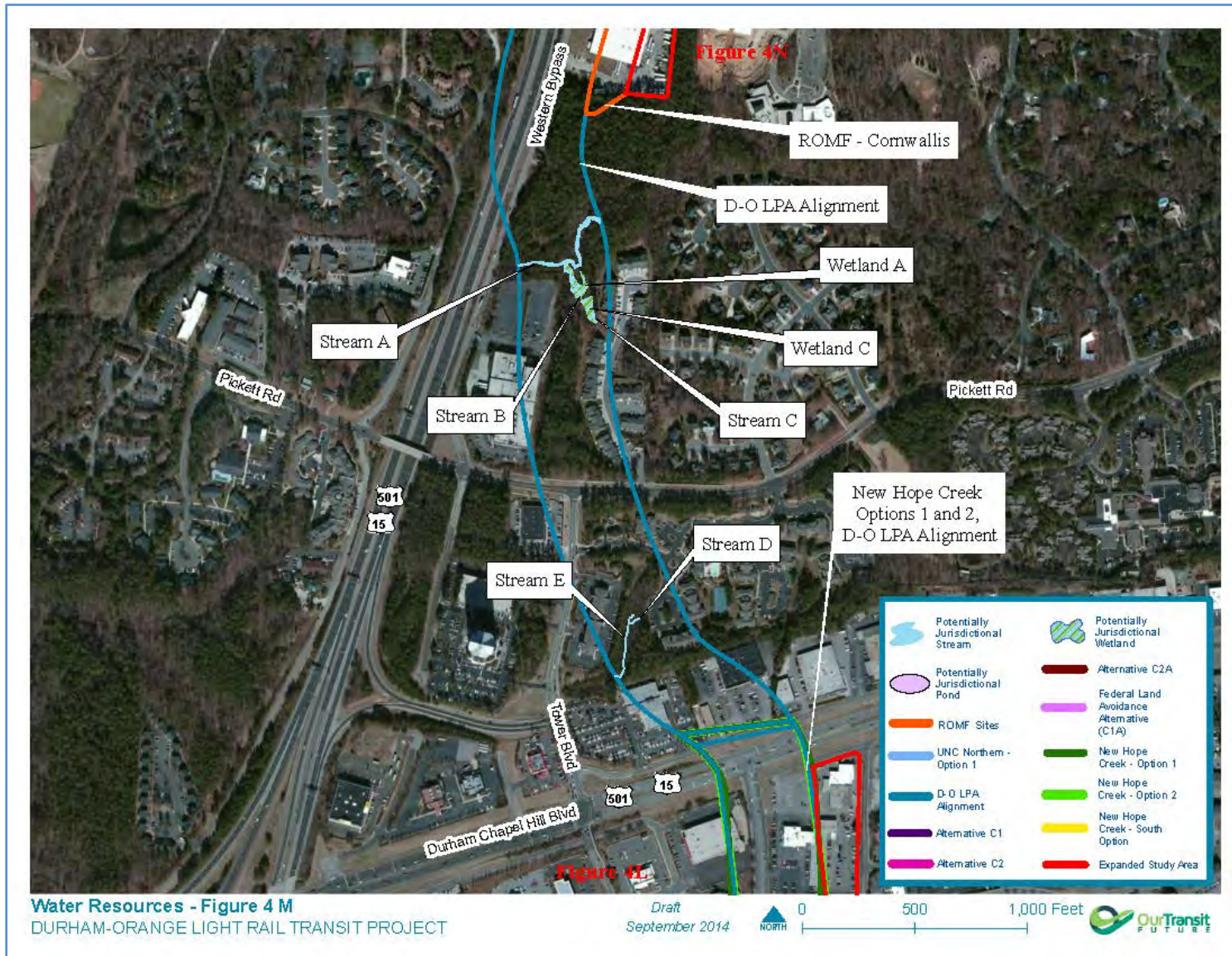


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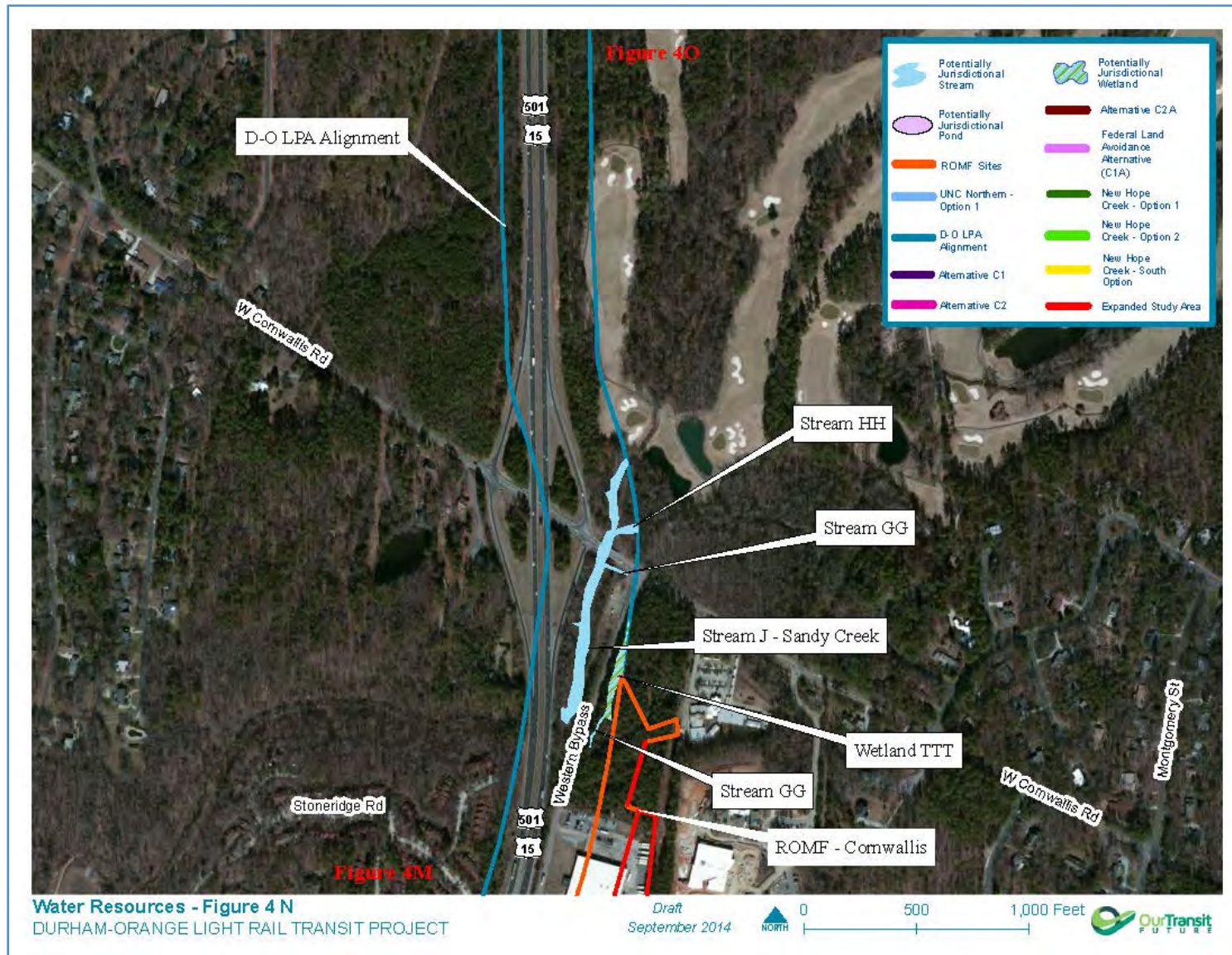


Figure 61: Water Resources



Figure 62: Water Resources



Figure 63: Water Resources

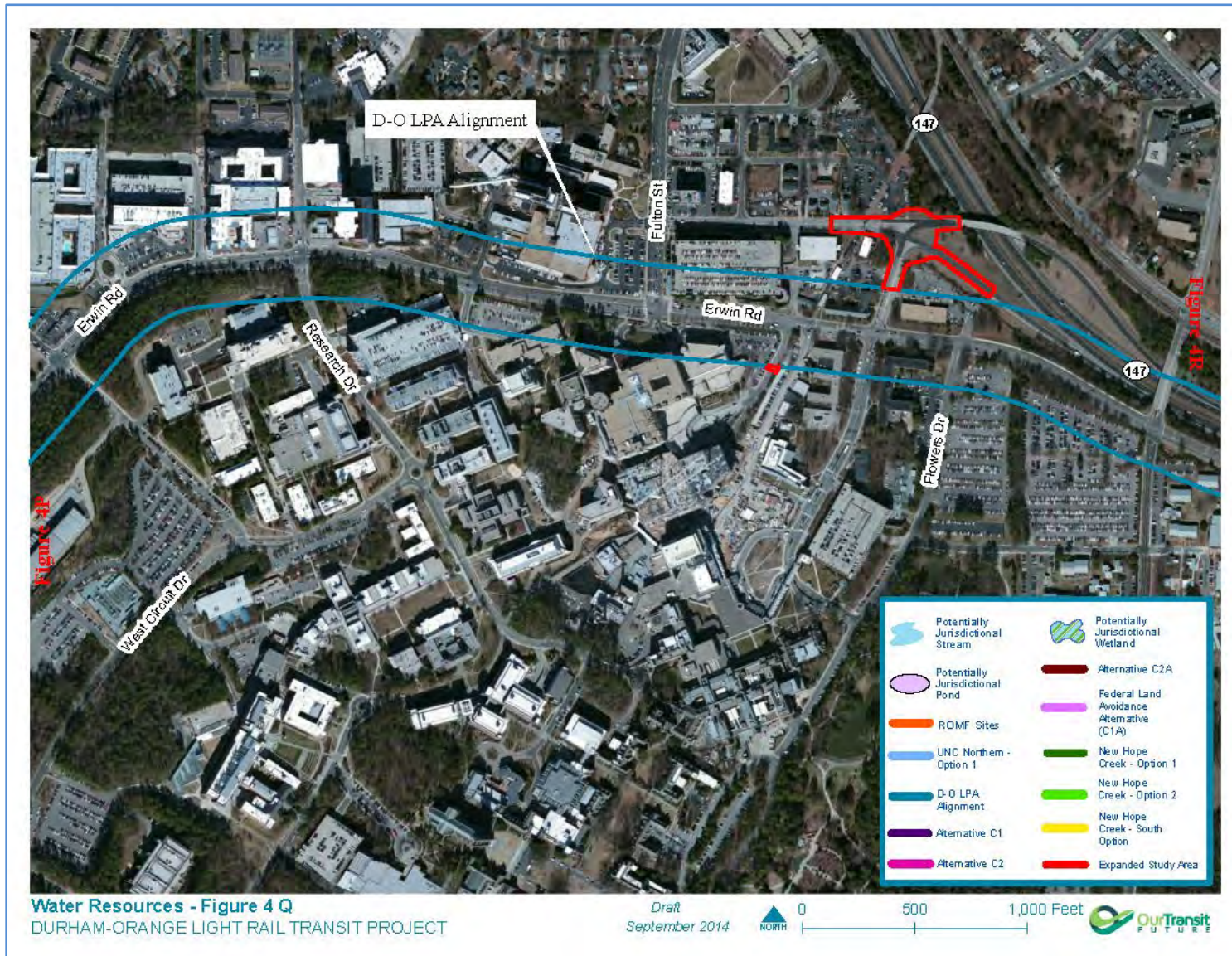


Figure 64: Water Resources



Figure 65: Water Resources



Figure 66: Water Resources



Figure 67: Water Resources



Figure 68: Natural Areas

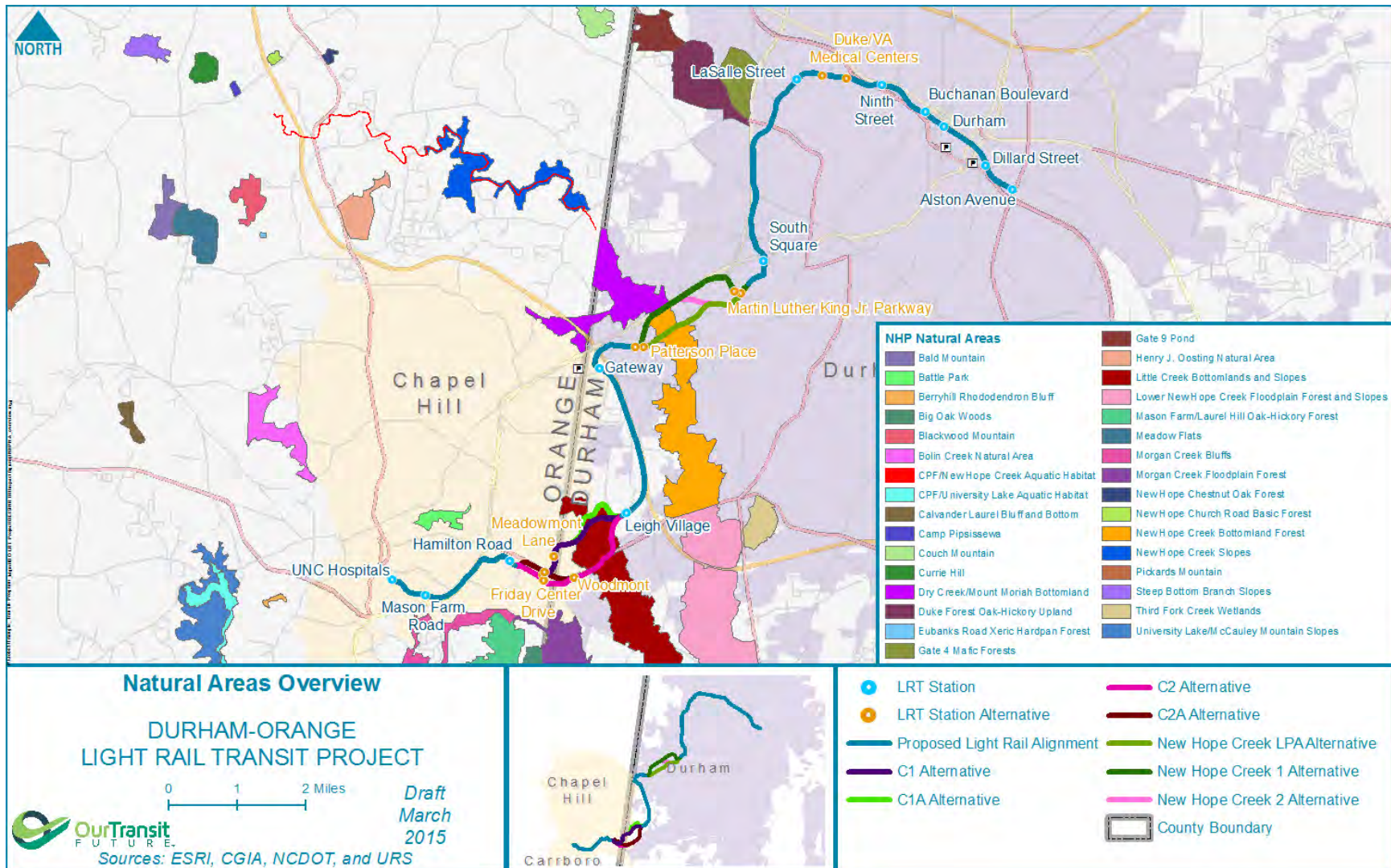


Figure 69: Natural Areas

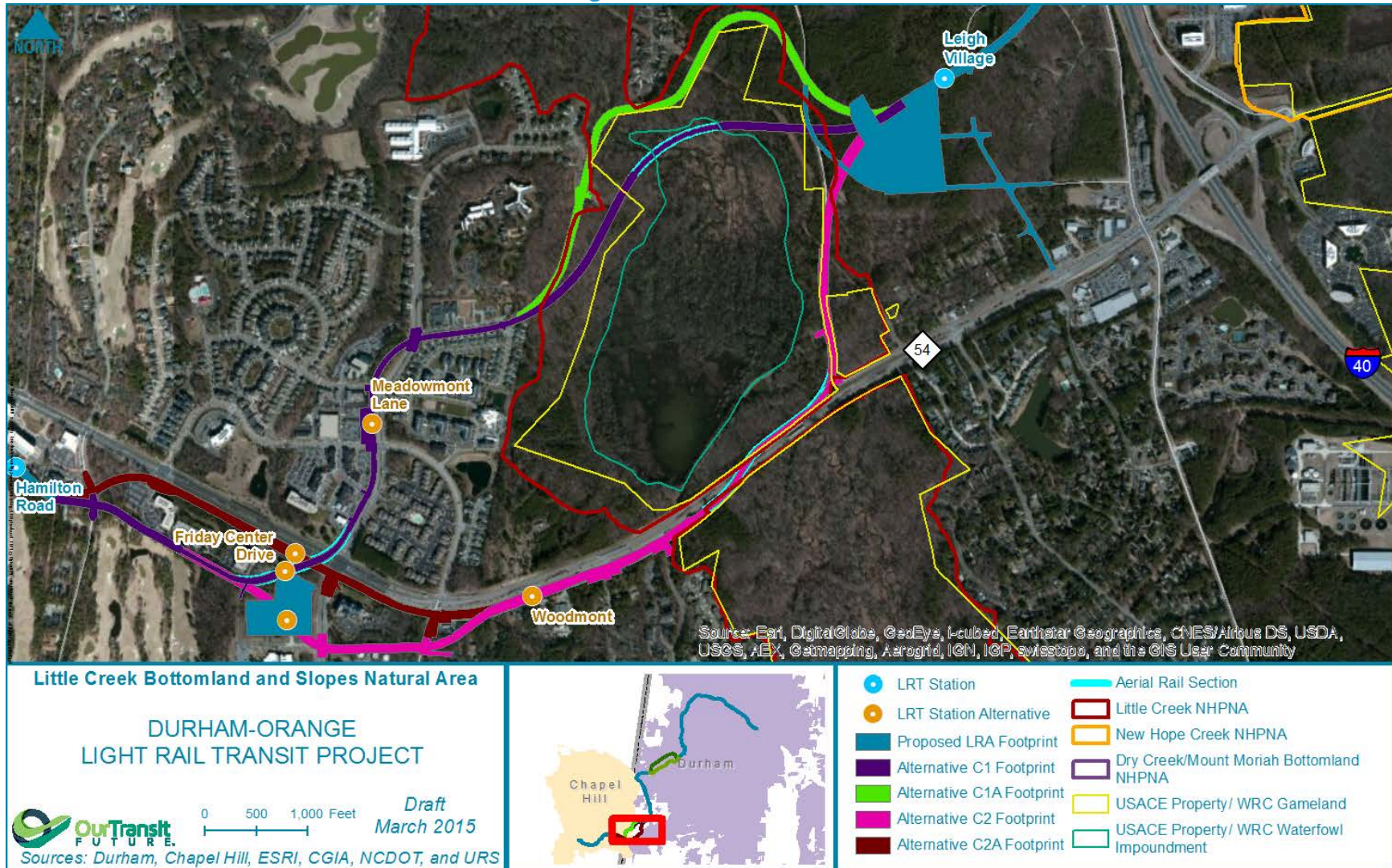
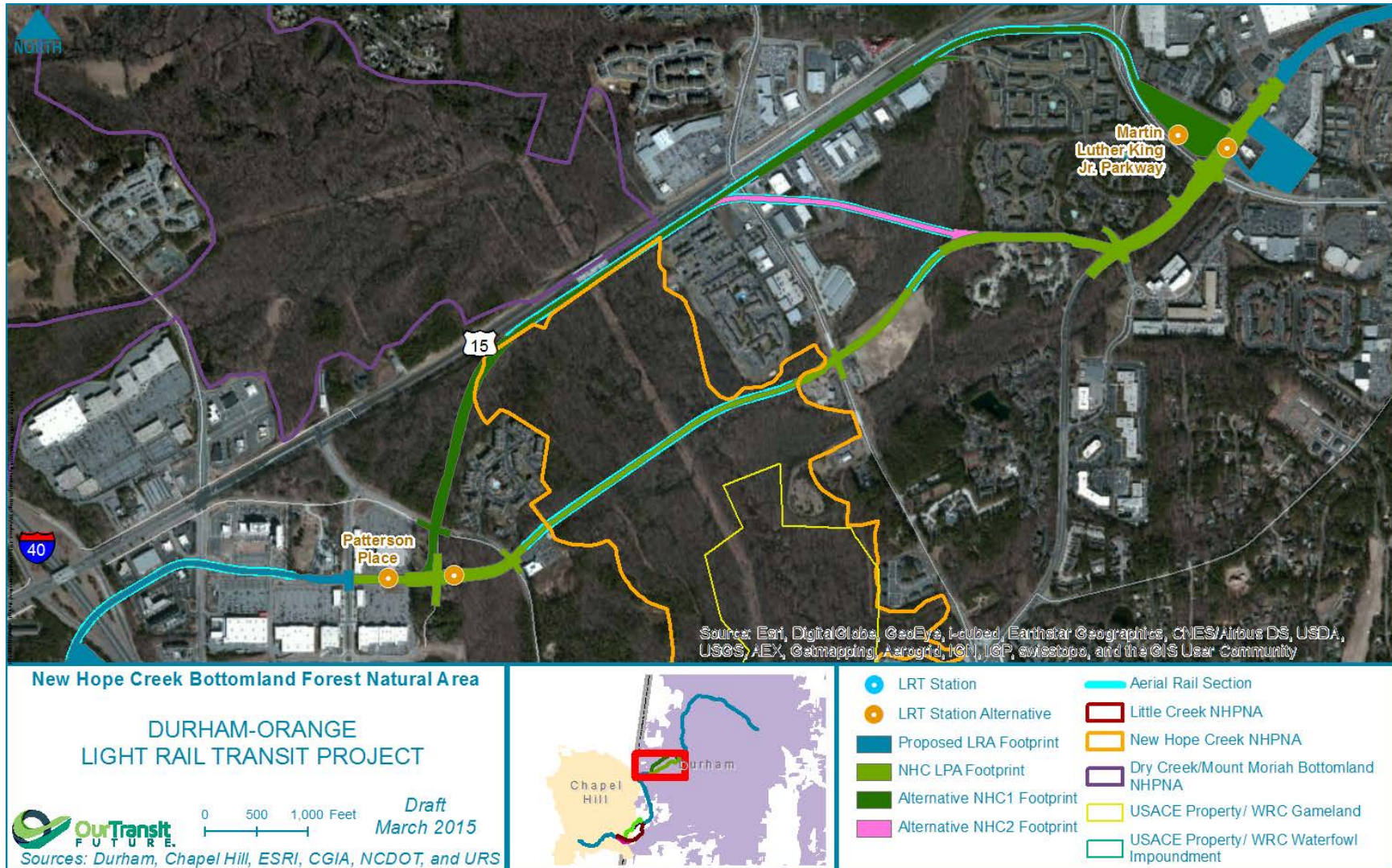


Figure 70: Natural Areas





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Appendix B: List of Scientific Names

List of Scientific Names	
Common Name	Scientific Name
American beech	<i>Fagus grandifolia</i>
American bluehearts	<i>Buchnera Americana</i>
American elm	<i>Ulmus americana</i>
American holly	<i>Ilex opaca</i>
American hornbeam	<i>Carpinus caroliniana</i>
American sycamore	<i>Platanus occidentalis</i>
Asiatic Clam	<i>Corbicula fluminea</i>
Autumn olive	<i>Elaeagnus umbellata</i>
Bamboo	<i>Bambuseae</i> sp.
Beggar ticks	<i>Bidens</i> sp.
Big shellbark hickory	<i>Carya laciniosa</i>
Black cherry	<i>Prunus serotina</i>
Black oak	<i>Quercus velutina</i>
Black walnut	<i>Juglans nigra</i>
Blackberry	<i>Rubus fruticosus</i>
Bloodworm midge	<i>Chironomidae</i>
Box Huckleberry	<i>Gaylussacia brachycera</i>
Boxelder	<i>Acer negundo</i>
Broomsedge	<i>Andropogon</i>
Buffalo clover	<i>Trifolium reflexum</i>
Bush honeysuckle	<i>Diervilla</i> sp.
Caddisfly	<i>Trichoptera</i>
Catbrier (saw, whiteleaf)	<i>Smilax bona-nox, glauca</i>
Chapman's Redtop	<i>Tridens chapmanii</i>
Chinese privet	<i>Ligustrum sinense</i>
Christmas fern	<i>Polystichum acrostichoides</i>
Common pawpaw	<i>Asimina triloba</i>
Crabgrass	<i>Digitaria sanguinalis</i>
Crayfish	<i>Cambarus bartoni</i>
Dog fennel	<i>Eupatorium capillifolium</i>
Douglass's bittercress	<i>Cardamine douglassii</i>
Dragonfly	<i>Odonata</i>
Duckweed	<i>Lemna</i> sp.
Eastern Shiner	<i>Notropis</i> sp.
English ivy	<i>Hedera helix</i>
False nettle	<i>Boehmeria</i>
Fireweed	<i>Epilobium angustifolium</i>
Flowering dogwood	<i>Cornus florida</i>
Glad bluecurls	<i>Trichostema brachiatum</i>
Goldenrod	<i>Solidago</i> sp.
Golden shiner	<i>Notemigonus crysoleucas</i>
Green ash	<i>Fraxinus pennsylvanica</i>

List of Scientific Names	
Common Name	Scientific Name
Hackberry	<i>Celtis occidentalis</i>
Heartleaf	<i>Houttuynia cordata</i>
Hickory	<i>Carya</i> sp.
Hoary puccoon	<i>Lithospermum canescens</i>
Hophornbeam	<i>Ostrya virginiana</i>
Horse nettle	<i>Solanum carolinense</i>
Horseweed	<i>Conyza</i> sp.
Indian Physic	<i>Gillenia stipulate</i>
Ironwood	<i>Carpinus caroliniana</i>
Japanese barberry	<i>Berberis thunbergii</i>
Japanese grass	<i>Microstegium vimineum</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese knotweed	<i>Fallopia japonica</i>
Jewelweed	<i>Impatiens</i> sp.
Kudzu	<i>Pueraria montana</i>
Large-flowered trout lily	<i>Erythronium americanum</i>
Lespedeza	<i>Sericea Lespedeza</i>
Loblolly pine	<i>Pinus taeda</i>
Low Wild-petunia	<i>Ruellia humilis</i>
Maple-leaf viburnum	<i>Viburnum acerifolium</i>
Mayfly	<i>Ephemeroptera</i>
Michaux's sumac	<i>Rhus michauxii</i>
Mimosa	<i>Albizia julibrissin</i>
Mockernut hickory	<i>Carya tomentosa</i>
Mosquito	<i>Diptera</i>
Mosquitofish	<i>Gambusia holbrooki</i>
Multiflora rose	<i>Rosa multiflora</i>
Muscadine	<i>Vitis rotundifolia</i>
Narrow-leaf Aster	<i>Symphyotrichum leave</i>
Northern red oak	<i>Quercus rubra</i>
Oriental bittersweet	<i>Celastrus orbiculatus</i>
Pink Thoroughwort	<i>Fleischmannia incarnate</i>
Pondberry	<i>Lindera melissifolia</i>
Posion ivy	<i>Toxicodendron radicans</i>
Prairie blue wild indigo	<i>Baptisia australis</i>
Princesstree	<i>Paulownia tomentosa</i>
Purple fringeless orchid	<i>Platanthera peramoena</i>
Queen Anne's lace	<i>Daucus carota</i>
Ragweed	<i>Ambrosia</i> sp.
Red maple	<i>Acer rubrum</i>
River birch	<i>Betula nigra</i>
Sedges	<i>Cyperaceae</i> sp.
Shagbark hickory	<i>Carya ovata</i>
Shale-barren skullcap	<i>Scutellaria leonardii</i>

List of Scientific Names	
Common Name	Scientific Name
Shiner	<i>Cyprinella</i> sp.
Shooting star	<i>Primula meadia</i>
Silky dogwood	<i>Cornus amomum</i>
Slippery elm	<i>Ulmus rubra</i>
Smartweed	<i>Polygonum</i> sp.
Smooth coneflower	<i>Echinacea laevigata</i>
Snail	<i>Planorbidae</i>
Soft rush	<i>Juncus effuses</i>
Sourwood	<i>Oxydendrum arboreum</i>
Southern anemone	<i>Anemone berlandieri</i>
Southern red oak	<i>Quercus falcata</i>
Southern rein orchids	<i>Habenaria flava</i>
Southern skullcap	<i>Scutellaria australis</i>
Spicebush	<i>Lindera benzoin</i>
Stonefly	<i>Plecoptera</i>
Sugar maple	<i>Acer saccharum</i>
Sunfish	<i>Lepomis</i> sp.
Swamp chestnut oak	<i>Quercus michauxii</i>
Swamp white oak	<i>Quercus bicolor</i>
Sweetgum	<i>Liquidambar styraciflua</i>
Tall Larkspur	<i>Delphinium exaltatum</i>
Tree-of-heaven	<i>Ailanthus altissima</i>
Trumpet creeper	<i>Campsis radicans</i>
Tulip poplar	<i>Liriodendron tulipifera</i>
Veined skullcap	<i>Scutellaria nervosa</i>
Virginia pine	<i>Pinus virginiana</i>
Water boatman	<i>Corixidae</i>
Watercress	<i>Nasturtium officinale</i>
Water strider	<i>Gerridae</i>
Wax myrtle	<i>Morella cerifera</i>
White ash	<i>Fraxinus americana</i>
White oak	<i>Quercus alba</i>
Willow oak	<i>Quercus phellos</i>
Winged sumac	<i>Rhus copallinum</i>
Wiry panic grass	<i>Panicum flexile</i>
Yellow lady's slipper	<i>Cypripedium parviflorum</i>

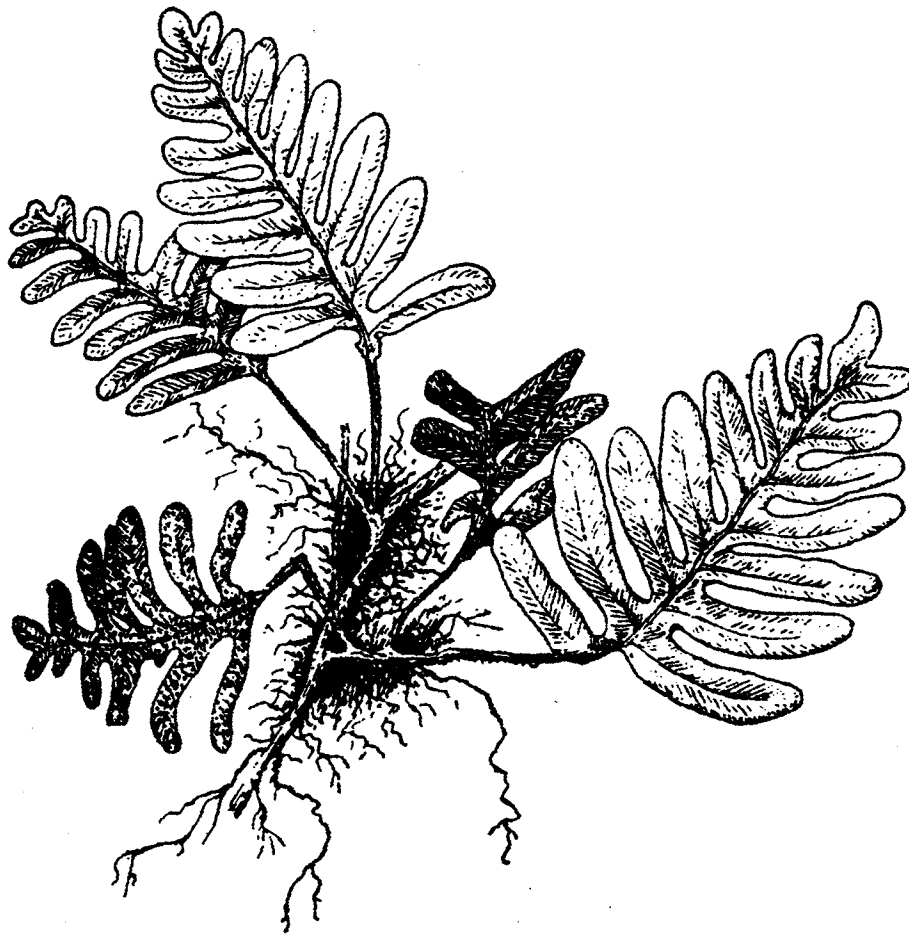


**Appendix C: The Durham County Inventory of Important Natural Areas,
Plants and Wildlife**

DURHAM COUNTY INVENTORY OF IMPORTANT NATURAL AREAS, PLANTS AND WILDLIFE

By

**STEPHEN P. HALL AND ROBERT D. SUTTER
FALL 1999**



**Edited by Elizabeth Pullman and Ann C. Simpson
Maps prepared by Alice C. Wilson**

**NORTH CAROLINA NATURAL HERITAGE PROGRAM
DURHAM COUNTY INVENTORY REVIEW COMMITTEE
TRIANGLE LAND CONSERVANCY
DURHAM COUNTY**

A. New Hope Creek Corridor

2. 15/501 BOTTOMLANDS

SITE DESCRIPTION

County: Durham
Quad: Southwest Durham
Significance: Zoological: Unknown (not surveyed during the nesting season)
Botanical: 4-State
Landscape Function: Zoological: Medium (DURH 1)
Boundary Integrity: Medium
Level of Threat: Zoological: Moderate; Botanical: 3-Medium
Protection Status: Southern section is owned by the Corps of Engineers.
Community Viability: Zoological: Medium (DURH 2); Botanical: 1-Poor

SUMMARY OF SIGNIFICANT FEATURES:

1. Extensive tract of bottomland hardwood forest providing habitat needed by forest-interior species.
2. Critical link in the New Hope and Mud Creek Wildlife Corridors.
3. A portion of this tract is registered as a State Natural Area.

LANDSCAPE FEATURES:

This part of the New Hope floodplain covers approximately 250 acres, most of which supports a fairly mature stand of bottomland hardwoods. Most trees range between 10" - 15" in diameter, but occasional specimens were observed that were over three feet in diameter. In addition to thickets of introduced privet, patches of native cane (*Arundinaria gigantea*) are also present, providing shelter for several species of bottomland birds.

As is characteristic of Triassic Basin floodplains, the terrain within this site is quite flat and contains numerous oxbows, floodplain pools and anastomosing channels. However, this tract is the first section of the New Hope Bottomlands upstream from Jordan Lake that is situated above the 100 year floodpool. Judging by the depth of the leaf litter on some of the higher terraces, floods may not completely sweep through over this tract, even though they may be fairly frequent during the late winter.

As is true for the Mt. Moriah Bottomlands located on the opposite side of US 15-501, this site occupies a highly strategic location within the New Hope Wildlife Corridor. The weakest link in this system, which provides a connection between the New Hope Gamelands and the Korstian and Durham Divisions of Duke Forest, is the point crossed by US 15-501. The ever-growing vehicular traffic along this highway, together with the increasing demands to develop this strip,

threaten to ultimately close this corridor off to all but raccoons, opossums and other species able to coexist with urbanization.

Currently, this site is fairly intact. The adjoining slopes, particularly to the west, are only sparsely populated and are covered primarily in mixed second growth woodlands. Apart from the roads located at the northern and southern ends, the main source of habitat disturbance is a powerline cut that runs down the center of the floodplain. Even with the tract divided in two by this strip of old-field vegetation, however, the forests on either side are still wide enough to provide habitat for many species restricted to forest interiors.

DESCRIPTION OF THE FAUNA:

This site was visited only during the winter, and the list of animals is incomplete. Judging from its habitat features, it probably supports a fauna quite comparable to both the Mt. Moriah Bottomlands (including its powerline species) and the Old Chapel Hill Road Bottomlands, which adjoin this tract up and downstream. Twenty or more forest-interior species were recorded on both those tracts, as well as a few rarer species such as four-toed salamanders (*Hemidactylum scutatatum*) and dwarf waterdogs (*Necturus punctatus*).

One significant species confirmed at this site is river otter (*Lutra canadensis*). A regularly used sprainting site was discovered along the main channel about halfway between the northern and southern ends of this section, and a probable den was found under the roots of a fallen tree less than 100 feet away. Residence of otters in this area is an indication both of the undisturbed qualities of this bottomland, as well as a substantial supply of fish and other aquatic species upon which they prey.

Water quality in this section of the New Hope, once rated as Poor (DEM, 1985), has in fact improved significantly since the wastewater plant on Sandy Creek was closed. Muskrat middens containing fresh shells of the Asiatic clam (*Corbicula fluminea*) were observed along both the main channel, as well as some of the deeper side channels. Although this bivalve is quite tolerant of siltation and disturbed bottom conditions, it is intolerant of chemical pollution and has probably recolonized the area following the abandonment of the wastewater plant. Although normally not a positive sign, its presence suggests that conditions are also improving for the native aquatic species, at least those capable of dealing with sedimentation.

DESCRIPTION OF THE FLORA:

The plant list includes the large-flowered trout lily (*Erythronium americanum*), yellow lady's slipper (*Cypripedium calceolus*) and southern rein orchids (*Platanthera flava*) found in some of the low areas. The rarest plant is Big Shellbark Hickory (*Carya laciniosa*), a species listed by NHP as a candidate for the endangered and threatened list due to the small numbers found in N.C. There is a thriving population of small trees and one "patriarch" tree present. This whole area has been seriously affected by the increased run-off from development along US 15-501. In the past, the creek and the immediate area were probably as rich in spring ephemerals as

the better areas up and down stream. The vegetation is similar to the floodplain above the Boulevard, except there are many indications of more intensive use as farmlands. Loblolly pines indicating secondary succession frequently intrude all the way down the slopes, and there are indications that the lowlands were used as pasture. The botanically rich areas to the north and south are not repeated along this section. A few scattered trees with impressive diameters occur, and some of the higher areas support spring ephemerals.

PROTECTION STATUS AND THREATS:

Most of this tract is privately owned but a section at the southern end is part of the Corps lands extending north of Jordan Lake and is registered as a State Natural Area. The entire tract, however, is potentially subject to timbering. The registry agreement does not exclude all forestry uses, and elsewhere within the New Hope Gamelands the NC Wildlife Resources Commission, which leases these tracts as gamelands, uses clearcuts to provide openings for deer, bobwhite and other species that benefit from edge habitat. Due to the large powerline clearing already present on this site, however, there is probably not an urgent need for game management.

A more significant threat than timbering is development of the surrounding uplands. Not only will this increase intrusion into this area by humans, domestic animals and urban-tolerant wildlife, but more sewerlines will be needed to serve the growing population in this area and will likely be routed downstream along the New Hope toward the South Durham Wastewater Plant. Increases in impervious surfaces, particularly parking areas serving office complexes and retail centers, threaten to reverse whatever water quality gains have been made in this reach. The expansion of US 15-501, along with the development of frontage roads and shopping centers, will make upstream and downstream movement by animals even more hazardous.

CONSERVATION RECOMMENDATIONS:

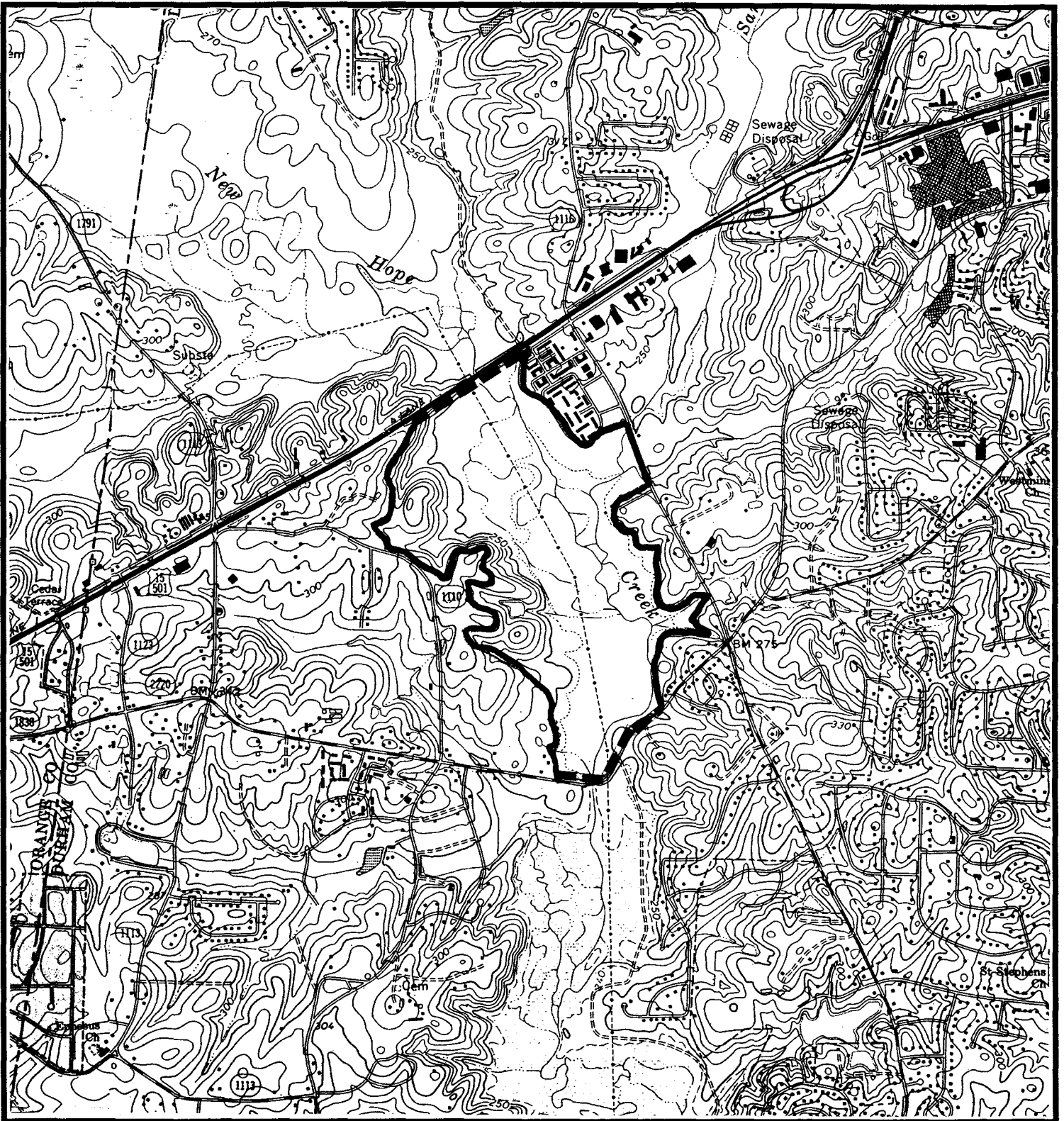
Landowners should be informed about the significance of this tract as a natural area. Conservation easements, Natural Heritage Program Registry or management according to a Forest Stewardship plan would all be appropriate means of protecting this site. Conservation efforts should be directed not only toward preserving the bottomland forest, but should also include the wooded buffers on the adjoining slopes, particularly along areas adjacent to the US 15-501 corridor and Old Chapel Hill Road.

County planning efforts should include measures to control stormwater runoff from adjoining developments, especially the large commercial enterprises projected for the US 15-501 corridor. A high priority should be given for the control of sedimentation and runoff from construction sites in the vicinity of all tributaries of New Hope Creek.

In order to maintain the wildlife corridor function of New Hope Creek, the NC Department of Transportation should be strongly urged to make any bridge replacements using similar structures on piers or pilings, rather than box or pipe culverts. If riprap must be used to prevent erosion, strips of bare earth should be left at the base of the slope to provide a more easily

traversed passageway for deer and other terrestrial species. Creation of additional wildlife crossings through the US 15-501 causeway over New Hope Creek would greatly improve wildlife movements while at the same time reducing the chances of potentially dangerous collisions between vehicles and wildlife.

An expanding deer population in the vicinity of the major highways of US 15-501 and I-40, as well as the heavily traveled thoroughfare along Old Chapel Hill Road, would present a threat not only to traffic but to public support for the New Hope Wildlife Corridor. Bow hunting, which is permitted in the gamelands portion of this tract, should be encouraged by the conservation community. Conversely, management practices such as clearcutting or planting powerline cuts with forage plants preferred by deer should be discouraged.



DURHAM COUNTY MERGED INVENTORY	
15-501 Bottomlands	
	SITE BOUNDARY
	ADJACENT TO OTHER SITE(S)
USGS QUAD: SOUTHWEST DURHAM	
SCALE: 1" = 2000feet - 1:24,000	

ZOOLOGICAL SURVEY REPORT

I. LOCATION

USGS Quad: Southwest Durham

Site Boundaries: Primary boundaries enclose floodplains and adjoining slopes along New Hope Creek between US 15-501 downstream to Old Chapel Hill Road; secondary boundaries include areas of second-growth forest and other disturbed habitats located on the uplands that buffer the site along Garrett Road to the east and Watkins Road to the west.

Relationship to Previous Inventory Sites: This area was not included in earlier inventories.

II. TERRESTRIAL HABITATS

NHP Element Species:

None recorded

Regionally Rare Species:

None recorded

Indicator Guilds:

Forest Interior Species:

Terrapene carolina
Pseudacris triseriata

Forest/Edge Species:

Sciurus carolinensis
Glaucomys volans
Procyon lotor
Odocoileus virginianus
Melanerpes carolinus
Picoides pubescens
Colaptes auratus
Parus carolinensis
Parus bicolor
Sitta carolinensis
Cardinalis cardinalis
Pipilo erythrophthalmus

Long-Distance Migrants:

(not sampled during the nesting season)

Low-nesting Species:

Cardinalis cardinalis
Pipilo erythrophthalmus

Big-tree Species:

Glaucomys volans
Sitta carolinensis

Wide-ranging Species:

Lutra canadensis

Carnivores/Raptors:

Procyon lotor
Lutra canadensis

Human-sensitive Species:

Lutra canadensis
Terrapene carolina

Field/Residential Species:

Melanerpes
erythrocephalus
Turdus migratorius
Sturnus vulgaris

Invaders:

Sturnus vulgaris

Habitat Features:

Total Site: 435 acres

Size of Primary Area: 250 acres

Habitat Heterogeneity: Moderate; wide floodplain with numerous oxbows and floodplain pools; forested slopes and ravines; powerline cut with old-field vegetation

Forest Structural Diversity: Hardwood forest with well-developed canopy and sub-canopy; scattered stands of cane and occasionally dense thickets of privet; herb layer not seen during the growing season; floodplain does not appear to be frequently swept by floods.

Water Sources: New Hope Creek is perennial; numerous floodplain pools occur in the bottomlands; springs and seeps exist along the base of the slopes.

Amphibian Breeding Sites: Pools were covered with ice when the site visit was made; habitat is potentially present for *Ambystoma spp.* as well as *Hemidactylum*; chorus frogs heard calling.

Denning Sites: A moderately fresh den was found dug under fallen tree roots located fairly close to an otter sprainting site; no tracks were observed, and there was a large pile of *Sciurus*- and *Glaucomys*-opened hickory nuts outside; no evidence for groundhogs seen; slopes above the bottomlands provide sites for upland dens.

Big Trees/Large Cavities: Majority of hardwoods were between 8 - 10" dbh; one water oak seen over 3' dbh and one southern red oak over 4' dbh, probably an old boundary tree; large cavity present in the large southern red oak.

Snags and Logs: Fallen logs are fairly plentiful; snags not noted.

Mast-producing Species: Plentiful—southern sugar maples, hackberries and ash-leaf maple provide soft mast; hickories (mockernut and northern shagbark) and oaks supply hard mast.

Nectar Sources: Probably present in the powerline cut; sapsucker observed feeding on fresh wells on old sugar maple.

Landscape Features:

Refuge Shape: Broad oblong, following boundaries of the floodplain

Refuge Integrity/Fragmentation: A powerline cut transects the entire site from north to south; a sewerline was noted on the slopes at the southeastern end.

Proximity to Other Refuges/Existence of Corridors: A section of the New Hope Gamelands extends into the southeastern corner of this site and continues downstream to Jordan Lake; upstream, this site is connected to the Korstian and Durham Divisions of Duke Forest, but the bottomlands become fragmented and constrained by development upstream from the Mt. Moriah Bottomlands.

Threats and Disturbances:

Evidence of Past Land Uses: Old boundary trees contain remnant strands of barbed wire, indicating previous use as pasture.

Level of Human Intrusion: Southern end is used as archery-only gamelands; access road comes down from slope on the southwest side of the site and dead-ends at the powerline—possibly used for right-of-way maintenance; recent timbering activities have taken place adjacent to the powerline.

Distance to Nearest Road: Bordered by US 15-501 on the north and Old Chapel Hill Road on the south; Garrett road parallels the tract on the east and Watkins Road on the west.

Potential for Habitat Loss or Fragmentation: Moderate; US 15-501 is planned to be upgraded; bottomland hardwoods are subject to timbering; new roads and sewerlines that could transect portions of this bottomland are also possible.

Potential for Changes in Adjoining Land Use: High; adjoining uplands occur within close proximity to I-40/US 15-501 interchange, a region where intensive development has been targeted.

Species Records:

Sciurus carolinensis (94-01-25/h)
Glaucomys volans (94-01-25/s)
Castor canadensis (94-01-25/s)
Ondatra zibethicus (94-01-25/s)
Procyon lotor (94-01-25/h)
Lutra canadensis (94-01-25/s)
Odocoileus virginianus (94-01-25/h)
Melanerpes erythrocephalus
(94-01-25/o)
Melanerpes carolinus (94-01-25/o)

Sphyrapicus varius (94-01-25/o)
Picoides pubescens (94-01-25/o)
Colaptes auratus (94-01-25/o)
Parus carolinensis (94-01-25/o)
Parus bicolor (94-01-25/o)
Sitta carolinensis (94-01-25/o)
Regulus calendula (94-01-25/o)
Turdus migratorius (94-01-25/o)
Bombycilla cedrorum (94-01-25/o)
Sturnus vulgaris (94-01-25/o)

Dendroica coronata (94-01-25/o)
Cardinalis cardinalis (94-01-25/o)
Pipilo erythrophthalmus (94-01-25/o)
Zonotrichia albicollis (94-01-25/o)
Terrapene carolina (94-01-25/r)
Pseudacris triseriata (94-01-25/o)

Additional Survey Needs:

Visits need to be made during the peak of the avian nesting season to compile a more complete list of the species that are present within this site.

III. AQUATIC HABITATS

NHP Element Species:

None recorded

Regionally Rare Species:

Etheostoma serriferum (record shared with Mt. Moriah Bottomlands)

Indicator Guilds:

Water-quality Sensitive

Species:
Lucilus albeolus
Percina crassa
Elliptio complanata

WO Tolerant Species:

Anguilla rostrata
Ameiurus nebulosus

Invading Species:

Corbicula fluminea

Habitat Features:

Lotic/Lentic: New Hope Creek is perennial; side channels might dry up during the summer.

Depth/Width: Channel is ca. 30' wide, probably 3-4' deep.

Flow Rate: Moderate

Water Quality/Clarity: Turbid when visited; no foam seen

Bank Condition: Good, except for sections under the powerline cut

Insolation: Stream channels are covered by closed canopy except for powerline cut.

Substrate(s): Sand and silt

Emergent Vegetation: None recorded

Woody Debris: Present

Other Shelter: Negligible

Landscape Features:

Stream Classification: 3rd order creek (1-5 m)

Connections to Other Intact Reaches: Sandy Creek is channelized and has had a past history of heavy pollution; upstream portions of New Hope Creek are still in good condition.

Integrity of Adjoining Forests: Slopes are mainly forested in fairly mature pine stands with hardwoods intermixed.

Threats and Disturbances:

DEM Water Quality Ratings: Previously rated as Poor below confluence with Sandy Creek (DEM, 1985) but upgraded to Fair? in 1991 following the closure of the Sandy Creek Wastewater Plant

Sources of Pollution: Although the Sandy Creek Wastewater Plant has been closed, fifteen smaller package plants still exist within the upper New Hope drainage; runoff from impervious surfaces and construction sites will become ever more important.

Barriers to Migration: Bridges at US 15-501 and Old Chapel Hill Road allow passage for aquatic species.

Potential for Impoundment, Flow Alteration or Draining: Increased flooding is likely due to intensive development projected for the adjoining areas.

Species Records:

Castor canadensis (94-01-25/s)
Ondatra zibethicus (94-01-25/s)
Lutra canadensis (94-01-25/s)
Anguilla rostrata (MENH)
Esox americanus (MENH)
Esox niger (MENH)
Notemigonus crysoleucas (MENH)
Semotilus atromaculatus (MENH)

Luxilus albeolus (MENH)
Notropis altipinnis (MENH)
Notropis alborus (MENH)
Maxostoma anisurum (MENH)
Ameiurus nebulosus (MENH)
Noturus insignis (MENH)
Aphredoderus sayanus (MENH)
Micropterus salmoides (MENH)

Lepomis macrochirus (MENH)
Lepomis gibbosus (MENH)
Percina crassa (MENH)
Etheostoma olmstedii (MENH)
Etheostoma serraferum (MENH)
Elliptio complanata (94-01-25/r)
Corbicula fluminea (94-01-25/r)

Additional Survey Needs:

Aquatic sampling is needed to determine current status of fish and waterdog populations.

BOTANICAL SURVEY REPORT

SITE NAME: 15-501 Bottomlands (New)

County: Durham
Quad: Southwest Durham
Acreage: 435
Province: Piedmont
Significance: 4 - State
Integrity: 1 - Poor
Landscape Value: No Special Merit
Threat Status 3 - Medium
Ownership: Private, County and Corps of Engineers

Summary List of Special Plant Species: *Carya laciniosa*
Cypripedium calceolus
Erythronium americanum
Platanthera flava

Significant Features: A large area remains with a mature Piedmont Bottomland Forest community. A thriving population of Big Shellbark Hickory (*Carya laciniosa*) makes this a significant state site.

Priorities and Further Investigation Needed: Plants not well documented except in spring.

Reconnaissance Dates: Spring 1994 and 1995, several earlier trips in 1970's and 1980's.

Surveyors: Jim and Liz Pullman, Harry LeGrand

Location: Site is south of US 15-501 and north of Old Chapel Hill Road (CR1127) and includes all of the floodplain.

Access to Site: Park along Garrett Road (CR1116) and enter via the sewer line, or park at bridge over New Hope Creek and walk north on Corps land.

Physical and Biological Description

Slope: Various

Grade: Flat to 6%

Topo Position: South of US15-501 along New Hope Creek.

Elevation: 250' - 270'

Hydrology: Seasonally wet

Watershed: New Hope Creek - Jordan Lake - Cape Fear River

Soil: Chewacla, Wehadkee in the floodplain, slopes mainly White Store sandy loam with small areas of Altavista silt loam and Creedmoor sandy loam.

Natural Community: Piedmont Bottomland Forest

Plant Community Types: 1. Piedmont Bottomland Forest:
mixed bottomland hardwoods/
mixed subcanopy and shrubs/
mixed herbs/

Description of Flora: See Site Description

Plant Species List: See following page.

New Hope Creek Corridor
A.2.a. 15/501 Bottomlands (New)

15/501 Bottomlands, New

CANOPY

Acer negundo
Acer rubrum
Acer saccharum
Betula nigra
Carya laciniata
Carya ovata
Carya tomentosa
Celtis laevigata
Liquidambar styraciflua
Liriodendron tulipifera
Pinus echinata
Pinus taeda
Quercus lyrata
Quercus michauxii
Quercus phellos
Quercus rubrum
Ulmus sp.

SUBCANOPY, SHRUBS,

VINES

Aesculus sylvatica
Arundinaria sp.
Asimina triloba
Cornus florida
Ilex decidua
Ligustrum sinense
Lindera benzoin
Lonicera japonica
Staphylea trifolia
Viburnum prunifolium
Viburnum rafinesquianum

FERNS

Asplenium platyneuron
Botrychium biternatum
Ophioglossum vulgatum
Polystichum acrostichoides
Thelypteris novboracensis
Woodwardia virginica

HERBS

Amsonia tabernaemontana
Arisaema triphyllum
Asarum canadense
Cardamine concatenata
Cardamine angustata
Chaerophyllum tainturieri
Claytonia virginica
Clematis sp.
Cypripedium calceolus
Erythronium americanum
Erythronium umbilicatum
Galium sp.
Geum spp.
Glecoma hederacea
Goodyera pubescens
Hedyotis caerulea
Hexastylis arifolia
Impatiens capensis
Platanthera flava
Podophyllum peltatum
Ranunculus spp.
Sparganium americanum
Stellaria media
Thalictrum thalictoides
Tipularia discolor
Viola affinis
Viola eriocarpa
Viola papilionacea
Zephyranthes atamasco

A. New Hope Creek Corridor

7. LITTLE CREEK BOTTOMLANDS

SITE DESCRIPTION

County: Durham
Quad: Southwest Durham, Chapel Hill
Significance: Zoological: County (DURH 1); Botanical: 1 - County
Landscape Function: Zoological: Medium (DURH 1)
Boundary Integrity: Medium
Level of Threat: Zoological: Low; Botanical: 3 - Medium
Protection Status: High
Community Viability: Zoological: Low (DURH 1); Botanical: 2 - Medium

SUMMARY OF SIGNIFICANT FEATURES:

1. Presence of regionally-rare species: marsh rabbit (*Sylvilagus palustris*), bowfin (*Amia calva*) and (historically) flier sunfish (*Centrarchus macropterus*).
2. Large tract of bottomland hardwood forest that provides habitat for many species of forest-interior and other disturbance-sensitive animals.

LANDSCAPE FEATURES:

Little Creek is one of the larger tributaries of New Hope Creek, with branches extending west and north through Chapel Hill and Carrboro as far as Calvander Crossroads. Although portions of the headwaters were identified as significant natural areas in the Orange County Inventory (see Bolin Creek and Battle Park; Sather and Hall, 1988), these sites are separated from the bottomlands in Durham County by a wide area of dense development in the vicinity of University Mall. Portions of the stream have been channelized along this reach, further reducing any function this stream valley has as a corridor for wildlife movements between Orange and Durham Counties.

Just east of the county line, however, Little Creek enters the 100 year floodplain of Jordan Lake, where its wildlife habitats receive some degree of protection as part of the New Hope Gamelands. The broad floodplain that occupies virtually the entire Durham section of this watershed is typical of Triassic Basin streams, and together with the confluent bottomlands along New Hope Creek creates an unbroken tract of forest nearly 1.5 miles wide.

Like neighboring sections of New Hope Creek, subimpoundments have been constructed above the two roads that cross Little Creek in Durham County (NC 54 and Farrington Road) in order to create winter foraging habitat for wood ducks. The lower reach, extending perhaps half a mile upstream from the confluence with New Hope Creek, is also flooded at least occasionally

from water backing up from Jordan Lake. Other areas have been flooded by beavers. One large pond with a completely cleared canopy exists within a backwater of the subimpounded area just north of NC 54; the dam on the southern border of this pond is formed by the subimpoundment levee, the remainder by beaver construction.

DESCRIPTION OF THE FAUNA:

The terrestrial and riparian fauna inhabiting this tract is essentially the same as that of the adjoining habitats along New Hope Creek (see Stagecoach Road Bottomland Forest). Characteristic bottomland species observed during the two early spring visits to this site include red-shouldered hawk (*Buteo lineatus*), wood duck (*Aix sponsa*), otter (*Lutra canadensis*), mink (*Mustela vison*), muskrat (*Ondatara zibethica*) and beaver (*Castor canadensis*). The presence of pileated woodpeckers (*Dryocopus pileatus*), along with the red-shouldered hawks, is indicative of the extensive nature and relative maturity of the hardwood forest. Several large flocks of evening grosbeaks (*Coccothraustes vespertinus*) were observed feeding on the abundant spring crop of maple and elm seeds, reflecting the importance to migratory, as well as resident animals of the large number of soft mast trees that are found in these bottomlands.

The most notable animal observed on this tract, the marsh rabbit (*Sylvilagus palustris*), is also undoubtedly shared with adjoining tracts along the New Hope, although it was not recorded there during this inventory; historical records exist from Sandy Creek on the Duke University Campus (Duke Vertebrate Collection), and it also occurs in similar swampy habitats along Morgan Creek (see Morgan Creek Bottomland Forest). This species is one of a suite of essentially Coastal Plain species that occur above the Fall Line only within the extensive floodplains along Triassic Basin streams.

As with other members of this group, its future survival in this region appears to be precarious due to severe fragmentation of its habitat by the construction of Jordan Lake and other impoundments. While the tracks or scat of the related eastern cottontail (*Sylvilagus floridanus*) were found in nearly all the areas surveyed in this inventory, the distinctive tracks of the marsh rabbit, with their smaller size, narrower footprints, sharper claws and curious walking gait, were observed only at the extreme lower end of the Little Creek floodplain, in a mucky area where the winter floodwaters from Jordan Lake had only recently withdrawn.

The survival of another member of the Coastal Plain group, the bowfin (*Amia calva*), seems more assured; this hardy predator, locally called a "grinnel," is frequently hooked by fishermen in the vicinity of the subimpoundment on Farrington Road. Based on water quality considerations, other aquatic species belonging to the Coastal Plain/Triassic Basin guild may also have some chance of surviving in this creek. Despite flowing through urban areas in Orange County, the water quality of Little Creek as it crosses the county line has been rated as Good in terms of its chemical parameters and Fair in terms of its biological rating (DEM, 1985). Unlike

New Hope, Third Fork, Morgan and Northeast Creeks no large wastewater plants empty into Little Creek (it does, however, receive stormwater runoff from large tracts of impervious surfaces in Chapel Hill).

The winter flooding of the wood duck subimpoundments, along with backup of water from Jordan Lake, may mitigate any benefits due to water quality. Although the voracious "grinnel" may prosper in these flooded areas, smaller species such as the mudminnow (*Umbra pygmaea*), blue-spotted sunfish (*Enneacanthus gloriosus*) and swamp darter (*Etheostoma fusiforme*)—all recorded from the lower New Hope watershed—may be at increased risk due to predation as their shallow water or isolated pool habitat becomes more deeply inundated, and thus more accessible to bass, crappie, channel catfish, as well as the "grinnel" itself. On the other hand, at least some refuges can still be found in the non-impounded areas, as indicated by the presence of larval marbled salamanders (*Ambystoma opacum*) in at least a few pools: small larvae of this species cannot survive in the presence of fish even as seemingly insignificant as the mosquitofish.

DESCRIPTION OF THE FLORA:

Little Creek has no extensive botanical survey. Short excursions into the floodplain have not produced many special plants. The higher areas and floodplain edges have yielded the usual spring ephemerals, although not in great numbers. One unusual occurrence is the presence of swamp white oak (*Quercus bicolor*) downstream from the crossing at CR 1108. The site is potentially as good as Stagecoach Bottomlands, but heavy use of surrounding lands for tobacco cultivation in the past 100 years may have been detrimental to the vegetation. Above NC 54, the floodplain is adjacent to several areas of Iredell loam—the area should be checked for basophilic plants.

PROTECTION STATUS AND THREATS:

The Little Creek Bottomlands are part of the Corps lands extending north of Jordan Lake and are leased to the NC Wildlife Resources Commission as gamelands. Although protected from development, they are still subject to timbering and other management activities directed towards just a few species of game animals, primarily wood duck and white-tailed deer.

Privately owned lands adjoin the bottomland along both slopes, parts of which are becoming developed right down to the boundary of the Corps lands, particularly along Farrington Road. The large Meadowmont mixed-use development in eastern Chapel Hill will contain some 50 acres of Town parkland in the Durham County portion of the Little Creek floodplain, much of which is wetlands. In the Durham portion of this park, the only use permitted by the Town will be nature trails, short boardwalks, and a wildlife observation platform, with no wetland fill allowed.

CONSERVATION RECOMMENDATIONS:

Conservation recommendations for this tract are the same as for other tracts of the New Hope Gamelands. Management of the subimpounded areas should give more weight to the needs of non-game species and perhaps less to that of the wood duck, which is thriving throughout the region. Some regulation of rabbit hunting or fur-bearer trapping should also be considered if the population of marsh rabbits is to survive within this area.

As is true for the other sites in the New Hope Creek Basin, preservation of upland buffers along the edges of the bottomlands should be given a high priority. These slopes provide denning areas for terrestrial species, as well as refuges during periods of high water. Conservation easements, Natural Heritage Program Registry and Forest Management Plans would all be appropriate means to conserve these strips of uplands.

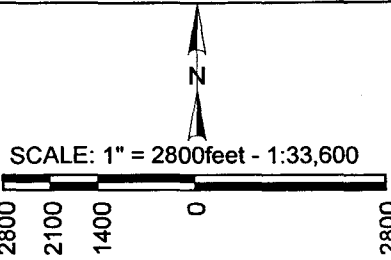


DURHAM COUNTY MERGED INVENTORY

Little Creek Bottomlands

-  SITE BOUNDARY
-  ADJACENT TO OTHER SITE(S)

USGS QUAD: SOUTHWEST DURHAM, CHAPEL HILL, GREEN LEVEL, FARRINGTON



ZOOLOGICAL SURVEY REPORT

I. LOCATION

USGS Quad: Chapel Hill, Southwest Durham

Site Boundaries: Primary boundaries follow the Corps property line and include the bottomlands and adjoining slopes on both sides of Little Creek from just west of the Orange County line downstream from Jordan Lake; secondary boundaries include undeveloped tracts on the uplands adjoining the Little Creek floodplain

Relationship to Previous Inventory Sites: Not included in previous inventories

II. TERRESTRIAL HABITATS

NHP Element Species:

None recorded

Regionally Rare Species:

Sylvilagus palustris

Indicator Guilds:

Forest Interior Species:

Buteo lineatus
Dryocopus pileatus
Polioptila caerulea
Hylocichla mustelina
Vireo flavifrons
Parula americana
Seiurus aurocapillus
Ambystoma opacum
Bufo americanus
Polygonia interrogationis
Polygonia comma
Haplotrema concavum

Forest/Edge Species:

Sciurus carolinensis
Glaucomys volans
Ochrotomys nuttalli
Urocyon
cinereoargenteus
Procyon lotor
Odocoileus virginianus
Melanerpes
erythrocephalus
Melanerpes carolinus

Picoides pubescens
Cyanocitta cristata
Parus carolinensis
Parus bicolor
Sitta carolinensis
Sitta pusilla
Thryothorus ludovicianus
Dendroica dominica
Cardinalis cardinalis
Carduelis tristis
Coluber constrictor
Pseudacris crucifer
Erynnis juvenalis
Papilio glaucus

Long-Distance Migrants

(not sampled during the nesting season):
Polioptila caerulea
Hylocichla mustelina
Vireo flavifrons
Seiurus aurocapillus

Low-nesting Species:

Seiurus aurocapillus
Cardinalis cardinalis

Big-tree/Snag Species:

Glaucomys volans
Aix sponsa
Buteo lineatus
Dryocopus pileatus
Sitta carolinensis

Wide-ranging Species:

Urocyon
cinereoargenteus
Mustela vison
Lutra canadensis
Buteo lineatus
Dryocopus pileatus

Carnivores/Raptors:

Urocyon
cinereoargenteus
Procyon lotor
Mustela vison
Lutra canadensis

Buteo lineatus

Human-sensitive Species:

Mustela vison
Lutra canadensis
Aix sponsa
Coluber constrictor

Non-forest Species:

Sayornis phoebe
Corvus brachyrhynchos
Turdus migratorius
Sturnus vulgaris
Vireo griseus
Quiscalus quiscula
Molothrus ater
Everes comyntas

Invaders:

Canis familiaris
Sturnus vulgaris
Molothrus ater

Habitat Features:

Size of Primary Area: 1,578 acres

Habitat Heterogeneity: Moderate—slopes are wooded in hardwoods and pine stands and vary from steep to gentle; bottomland are wooded almost completely in hardwoods; floodplain pools and old oxbows are widespread, beaver ponds are occasional but well-developed in some areas; subimpoundments limit availability of large areas of the bottomlands during the winter; Jordan Lake also appears to flood the lower reach of Little Creek during the winter; farmland and old fields border the watershed along significant portions of its boundary.

Forest Structural Diversity: Well-developed in non-impounded areas, with levees supporting large patches of *Claytonia*, *Erythronium* and other wildflowers

Water Sources: Abundant -- seasonally flooded impoundment; perennial stream; intermittent tributaries; floodplain pools; beaver pond

Amphibian Breeding Sites: Abundant ranid tadpoles seen throughout the bottomland; *Ambystoma opacum* larvae were found in one backwater next to the creek but had probably been washed-in from a more isolated pool upstream.

Denning Sites: Bank dens noted for beaver; uplands provide sites for other species.

Big Trees/Large Cavities: Most trees are 1' dbh or less; trees between 2' to 3' dbh were also noted (e.g., *Carya ovata*, *Quercus rubra*); scattered stands are composed of individuals ranging between 18" - 24" dbh.

Snags and Logs: Numerous

Mast-producing Species: Oaks, maples, hickories, beeches, hornbeams, elms are all abundant.

Nectar Sources: No butterfly plants noted

Landscape Features:

Refuge Shape: Oblong, following contours of the bottomland

Refuge Integrity/Fragmentation: Bottomland is crossed by two roads in Durham County: NC 54 and Farrington Road (SR 1110); wildlife subimpoundments exist on the upstream side of both roads; riprap beneath these bridges probably impedes travel by some species (e.g., deer).

Proximity to Other Refuges/Existence of Corridors: Contiguous with the Stage Coach Bottomlands downstream and other tracts of the Jordan Lake gamelands; headwaters upstream in Orange County are fragmented by dense development.

Threats and Disturbances:

Evidence of Past Land Uses: Remnants of barbed wire fencing and old farm ponds are present, indicating that pasturage may have been a significant land use in the past.

Level of Human Intrusion: Moderate; hunting occurs during the winter.

Distance to Nearest Road: NC 54 and Farrington Road cross the bottomlands; secondary, residential and farm roads occur on the adjoining uplands.

Potential for Habitat Loss or Fragmentation: High; prolonged winter flooding is altering the ground cover, shrub layer and perhaps the canopy composition in the subimpoundments.

Potential for Changes in Adjoining Land Use: Residential development is encroaching on the bottomlands along Farrington Road.

Species Records:

Sylvilagus palustris (94-04-06/t)
Sylvilagus sp. (94-04-06/s)
Sciurus carolinensis (94-04-06/t)
Sciurus carolinensis (94-04-07/t)
Glaucomys volans (94-04-06/t)
Castor canadensis (94-04-06/s)
Castor canadensis (94-04-07/t)
Ochrotomys nuttalli (94-04-06/n)
Ondatra zibethicus (94-04-06/t)
Ondatra zibethicus (94-04-07/t)
Urocyon cinereoargenteus
(94-04-06/t)
Canis familiaris (94-04-06/t)
Canis familiaris (94-04-07/t)
Procyon lotor (94-04-06/t)
Procyon lotor (94-04-07/t)
Mustela vison (94-04-06/t)
Lutra canadensis (94-04-06/t)
Odocoileus virginianus (94-04-06/s)
Odocoileus virginianus (94-04-07/t)
Ardea herodias (94-04-06/t)
Branta canadensis (94-04-07/o)
Aix sponsa (94-04-06/o)
Aix sponsa (94-04-07/o)
Anas platyrhynchos (94-04-06/o)
Anas platyrhynchos (94-04-07/o)
Buteo lineatus (94-04-06/o)
Buteo lineatus (94-04-07/o)
Melanerpes erythrocephalus
(94-04-06/o)
Melanerpes erythrocephalus
(94-04-07/o)
Melanerpes carolinus (94-04-06/o)

Melanerpes carolinus (94-04-07/o)
Picoides pubescens (94-04-06/o)
Picoides pubescens (94-04-07/o)
Dryocopus pileatus (94-04-06/o)
Sayornis phoebe (94-04-06/o)
Cyanocitta cristata (94-04-06/o)
Cyanocitta cristata (94-04-07/o)
Corvus brachyrhynchos (94-04-06/o)
Corvus brachyrhynchos (94-04-07/o)
Parus carolinensis (94-04-07/o)
Parus bicolor (94-04-06/o)
Parus bicolor (94-04-07/o)
Sitta carolinensis (94-04-07/o)
Sitta pusilla (94-04-06/o)
Thryothorus ludovicianus
(94-04-06/o)
Thryothorus ludovicianus
(94-04-07/o)
Regulus satrapa (94-04-06/o)
Regulus calendula (94-04-06/o)
Regulus calendula (94-04-07/o)
Polioptila caerulea (94-04-06/o)
Polioptila caerulea (94-04-07/o)
Hylocichla mustelina (94-04-07/o)
Turdus migratorius (94-04-06/o)
Sturnus vulgaris (94-04-07/o)
Vireo griseus (94-04-07/o)
Vireo flavifrons (94-04-07/o)
Parula americana (94-04-06/o)
Parula americana (94-04-07/o)
Dendroica coronata (94-04-06/o)
Dendroica coronata (94-04-07/o)
Dendroica dominica (94-04-06/o)
Dendroica dominica (94-04-07/o)
Sciurus aurocapillus (94-04-06/o)

Cardinalis cardinalis (94-04-06/o)
Cardinalis cardinalis (94-04-07/o)
Zonotrichia albicollis (94-04-06/o)
Zonotrichia albicollis (94-04-07/o)
Quiscalus quiscula (94-04-06/o)
Quiscalus quiscula (94-04-07/o)
Molothrus ater (94-04-06/o)
Carduelis tristis (94-04-06/o)
Coccothraustes vespertinus
(94-04-06/o)
Chelydra serpentina (94-04-06/o)
Pseudemys concinna (94-04-06/?)
Coluber constrictor (94-04-07/o)
Ambystoma opacum (94-04-06/l)
Bufo americanus (94-04-07/o)
Acris crepitans (94-04-06/o)
Pseudacris crucifer (94-04-06/o)
Pseudacris crucifer (94-04-07/o)
Rana clamitans (94-04-06/o)
Erynnis juvenalis (94-04-06/o)
Erynnis juvenalis (94-04-07/o)
Papilio glaucus (94-04-06/o)
Everes comyntas (94-04-06/o)
Polygonia interrogationis
(94-04-07/o)
Polygonia comma (94-04-06/o)
Polygonia comma (94-04-07/o)
Haplotrema concavum (94-04-07/o)

Additional Survey Needs:

Not surveyed during the avian nesting season. Presence of species such as Kentucky warbler should be determined in order to assess the impacts of the flooding from the sub-impoundments on habitat suitability.

III. AQUATIC HABITATS

NHP Element Species:

None recorded

Regionally Rare Species:

Amia calva
Centrarchus macropterus

Indicator Guilds:

Water-quality Sensitive

Species:

Lucilus albeolus
Notropis amoenus
Elliptio complanata

WO Tolerant Species:

Gambusia affinis
holbrooki

Invading Species:

Corbicula fluminea

Habitat Features:

Lotic/Lentic: Little Creek is perennial; large areas are seasonally impounded for wood duck management; deep oxbows and beaver ponds provide lentic habitat throughout the year.

Depth/Width: Channel ranges between 15' - 35' wide; probably from 3' - 4' deep

Flow Rate: Moderate to slow

Water Quality/Clarity: Turbid when examined

Bank Condition: Appears to be in good condition

Insolation: Canopy is closed except for a large beaver pond located within the NC 54 subimpoundment.

Substrate(s): Sand and silt; no riffles seen

Emergent Vegetation: Cattails and other emergent vegetation are developing in the large beaver impoundment; small areas of emergents were noted in some of the better insolated backwaters.

Woody Debris: Present
Other Shelter: Negligible

Landscape Features:

Stream Classification: 2nd order, small river (5-25 m)
Connections to Other Intact Reaches: Confluent with New Hope Creek
Integrity of Adjoining Forests: Good

Threats and Disturbances:

DEM Water Quality Ratings: Biological Rating of Fair; Water Quality Index of Good at the county line (DEM, 1985)
Sources of Pollution: Falconbridge Wastewater Treatment Plant and a few small package treatment plants discharge into Little Creek or its tributaries upstream in Orange County; runoff from residential and commercial districts in Chapel Hill are significant non-point sources.
Barriers to Migration: Upstream movements through the subimpoundments are probably blocked for all but the strongest swimming fish during the winter when the sluice gates are partially closed; however, travel is probably unrestricted during most of the year, including spring and summer spawning seasons.
Potential for Impoundment, Flow Alteration or Draining: Natural hydrology has been completely altered due to seasonal impounding.

Species Records:

Castor canadensis (94-04-06/s)
Castor canadensis (94-04-07/t)
Ondatra zibethicus (94-04-06/t)
Ondatra zibethicus (94-04-07/t)
Mustela vison (94-04-06/t)
Lutra canadensis (94-04-06/t)
Chelydra serpentina (94-04-06/o)
Pseudemys concinna (94-04-06/o?)

Rana clamitans (94-04-06/o)
Ambystoma calva (94-04-06/o)
Notemigonus crysoleucas (MEHN)
Luxilus albeolus (MEHN)
Notropis amoemus (MEHN)
Notropis altipinnis (MEHN)
Gambusia affinis holbrooki
(94-04-06/o)

Gambusia affinis holbrooki
(94-04-07/o)
Centrarchus macropterus (MEHN)
Lepomis macrochirus (94-04-06/o)
Lepomis gibbosus (MEHN)
Ellipso complanata (94-04-06/r)
Corbicula fluminea (94-04-07/t)

Additional Survey Needs:

An aquatic survey is needed in order to determine the population status of several Coastal Plain species that have previously been recorded in the area.

BOTANICAL SURVEY REPORT

SITE NAME: Little Creek Bottomlands (New)

County: Durham
Quad: Southwest Durham, Chapel Hill
Acreage: 1,578
Province: Piedmont
Significance: 1 - County
Integrity: 2 - Medium
Landscape Value: No Special Merit
Threat Status: 3 - Medium
Ownership: Public; Corps of Engineers

Summary List of Special Plant Species: *Quercus bicolor*

Significant Features: Some of this Piedmont Bottomland Forest has not been impacted by sub-impoundments and/or Jordan Lake and remains in good condition.

Priorities and Further Investigation: Plants need extensive documentation.

Reconnaissance Dates: Cursory visits 1986 through 1996.

Surveyors: Jim and Liz Pullman

Location: Site extends from the entrance of Little Creek along the Orange County Line and includes the floodplain and low slopes to the Chatham County line.

Access to Site: Park at the sub-impoundment parking areas either at NC54 or at Farrington Road (CR1110).

New Hope Creek Corridor
A.7.a. Little Creek Bottomlands (New)

Grade: Flat to 25%

Topo Position: Along Little Creek north and south of NC54 and south of CR1110

Elevation: 220 to 240'

Hydrology: Seasonally wet. partly flooded in winter

Watershed: Little Creek - Jordan Lake - Cape Fear River

Soil: Chewacla, Wehadkee in the floodplain with slopes of White Store and Cecil sandy loam, Altavista and Roanoke silt loam, Iredell and Wahee loam.

Natural Community: Piedmont Bottomland Forest

Plant Community Types: 1. Piedmont Bottomland Forest:
mixed bottomland hardwoods/
mixed subcanopy and shrubs/
sparse herbs

Description of Flora: See Site Description

Plant Species List: Little Creek Bottomlands (New)

CANOPY

Acer spp.

Carya ovata

Carya spp.

Fagus grandifolia

Quercus bicolor

Quercus rubra

Quercus spp.

Ostrya virginiana

Ulmus spp.

SUBCANOPY, SHRUBS,

VINES

None recorded

HERBS

Aster divaricatus

Claytonia virginica

Erythronium umbilicatum



Appendix D: USACE / DWQ Wetland and Stream Data Forms

USACE Wetland Determination Data Forms

Map ID	NCWAM Classification
A	PF01/04
AA	PF01/EM
B	PF01/04
BB	PF01
BBB	PF01/EM
C	PF01/EM
CC	PF01
CCC	PEM
D	PF01/04/EM
DD	PF01
DDD	PF01
E	PF01
EE	PF01
F	PEM
FF	PF01/PEM
G	PF01
GG	PF01
H	PEM
HHH	PEM
I	PF01
III	PF01
J	PF01
K	PF01
N	PF01
NNN	PEM
O	PF01
OOO	PEM
P	PF01
Q	PF01
R	PF01/04
S	PF01
T	PSS1
TTT	PF01/04
U	PF01
UUU	PF01
V	PF01
VV	PEM
VVV	PF01
W	PF01/PEM
WW	PF01/EM
WWW	PF01
XX	PF01
Y	PF01
YY	PEM
YYY	PF01
Z	PF01
ZZ	PF01/EM
ZZZ	PF01

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-04-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland A - DP#1
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Concave Slope (%): ~5
 Subregion (LRR or MLRA) LRR P Lat: 35.976203 Long: -78.957812 Datum: NAD 83
 Soil Map Unit Name: Mayodan sandy loam, 10 to 15% slopes NWI classification: PF01/04

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#1 (Wetland A) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#1	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>14"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (Includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland A.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland A - DP#1

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Acer rubrum</i>	70	Yes	FAC
2. <i>Pinus taeda</i>	20	Yes	FAC
3.			
4.			
5.			
6.			
7.			

90 = Total Cover
 50% of total cover: 45 20% of total cover: 18

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Carpinus caroliniana</i>	35	Yes	FAC
2. <i>Liquidambar styraciflua</i>	15	No	FAC
3. <i>Ligustrum sinense</i>	10	No	FACU
4. <i>Ilex opaca</i>	10	No	FACU
5. <i>Ulmus rubra</i>	10	No	FAC
6. <i>Elaeagnus angustifolia</i>	10	No	FACU
7.			
8.			
9.			

90 = Total Cover
 50% of total cover: 45 20% of total cover: 18

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			

= Total Cover
 50% of total cover: _____ 20% of total cover: _____

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			

= Total Cover
 50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 3 (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of _____ Multiply by:
 OBL species _____ x 1 = _____
 FACW species _____ x 2 = _____
 FAC species _____ x 3 = _____
 FACU species _____ x 4 = _____
 UPL species _____ x 5 = _____
 Column Totals: _____ (A) _____ (B)
 Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
 ___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
 ___ 3 - Prevalence Index is $\leq 3.0^1$
 ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 ___ Problematic Hydrophytic Vegetation¹ (Explain)
¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata:
Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height
Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall
Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes X No _____

Remarks: (Include photo numbers here or on a separate sheet)
Hydrophytic vegetation identified within Wetland A.

SOIL

Sampling Point: Wetland A - DP#1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	7.5 YR 4/3	100					SCL	
3-6	10 YR 5/4	100					Sand	
6-20	7.5 YR 5/1	70	2.5 YR 4/6	30	C	PL	CL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

<p>Hydric Soil Indicators:</p> <p><input type="checkbox"/> Histosol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Stratified Layers (A5)</p> <p><input type="checkbox"/> 2 cm Muck (A10) (LRR N)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)</p> <p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p>	<p><input type="checkbox"/> Dark Surface (S7)</p> <p><input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)</p> <p><input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input checked="" type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input type="checkbox"/> Redox Depressions (F8)</p> <p><input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)</p> <p><input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)</p> <p><input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p><input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)</p> <p><input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (TF12)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<p>Restrictive Layer (if observed):</p> <p>Type: _____</p> <p>Depth (inches): _____</p>	<p>Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____</p>
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Remarks:

Hydric soils identified within Wetland A.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 7-31-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland AA - DP#30
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.915304 Long: -79.001425 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01/EM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#30 (Wetland AA) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#30	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required, check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches) _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>2"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland AA.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland AA - DP#30

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species _____ x 1 = _____

FACW species _____ x 2 = _____

FAC species _____ x 3 = _____

FACU species _____ x 4 = _____

UPL species _____ x 5 = _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A = _____

Sapling/Shrub Stratum (Plot size: 10')

1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0¹

___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Definitions of Four Vegetation Strata:

- Tree** – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
- Sapling/Shrub** – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
- Herb** – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
- Woody vine** – All woody vines greater than 3.28 ft in height.

Herb Stratum (Plot size: 1.5 m)

1. <i>Saururus cernuus</i>	<u>60</u>	<u>Yes</u>	<u>OBL</u>
2. <i>Carex sp.</i>	<u>10</u>	<u>No</u>	<u>V</u>
3. <i>Lonicera japonica</i>	<u>10</u>	<u>No</u>	<u>FAC</u>
4. <i>Juncus effusus</i>	<u>10</u>	<u>No</u>	<u>FACW</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____

Hydrophytic Vegetation Present? Yes No _____

_____ = Total Cover
 50% of total cover: 45 20% of total cover: 18

Woody Vine Stratum (Plot size: 1 m)

1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland AA. A variable indicator rating "V" is for the unidentified species. Data point taken in emergent portion of wetland.

SOIL

Sampling Point: Wetland AA - DP#30

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 6/1	85	7.5 YR 4/6	15	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

<p>Hydric Soil Indicators:</p> <p><input type="checkbox"/> Histosol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Stratified Layers (A5)</p> <p><input checked="" type="checkbox"/> 2 cm Muck (A10) (LRR N)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)</p> <p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p>	<p><input type="checkbox"/> Dark Surface (S7)</p> <p><input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)</p> <p><input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input checked="" type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input checked="" type="checkbox"/> Redox Depressions (F8)</p> <p><input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)</p> <p><input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)</p> <p><input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p><input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)</p> <p><input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (TF12)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p> <p>³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic</p>
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<p>Restrictive Layer (if observed):</p> <p>Type: _____</p> <p>Depth (inches): _____</p>	<p>Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____</p>
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Remarks:

Hydric soil identified within Wetland AA.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-04-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland B - DP#2
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): Concave Slope (%) 0
 Subregion (LRR or MLRA): LRR P Lat. 35.976683 Long: -78.958088 Datum NAD 83
 Soil Map Unit Name: White Store clay loam, 10 to 25% slopes, moderately eroded NWI classification: PF01/04

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#2 (Wetland B) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#2	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>12"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland B.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland B - DP#2

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <i>Liquidambar styraciflua</i>	40	Yes	FAC	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. <i>Pinus taeda</i>	40	Yes	FAC	
3. <i>Acer rubrum</i>	20	Yes	FAC	
4. _____				
5. _____				
6. _____				
7. _____				
_____ = Total Cover 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. <i>Carpinus caroliniana</i>	35	Yes	FAC	
2. <i>Liquidambar styraciflua</i>	15	No	FAC	
3. <i>Ligustrum sinense</i>	10	No	FACU	
4. <i>Ilex opaca</i>	10	No	FACU	
5. <i>Ulmus rubra</i>	10	No	FAC	
6. <i>Elaeagnus angustifolia</i>	10	No	FACU	
7. _____				
8. _____				
9. _____				
_____ = Total Cover 50% of total cover: <u>45</u> 20% of total cover: <u>18</u>				
Herb Stratum (Plot size: <u>1.5 m</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Woody Vine Stratum (Plot size: <u>1 m</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall Woody vine – All woody vines greater than 3.28 ft in height
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				
Remarks: (Include photo numbers here or on a separate sheet) <p style="text-align:center;">Hydrophytic vegetation identified within Wetland B.</p>				

SOIL

Sampling Point: Wetland B - DP#2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	7.5 YR 4/3	100					SCL	
3-6	10 YR 5/4	100					Sand	
6-20	7.5 YR 5/1	70	10 YR 5/4	30	C	PL	CL	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains					² Location: PL=Pore Lining, M=Matrix			

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) (LRR N) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)
	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.	

Restrictive Layer (if observed): Type _____ Depth (inches) _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

Hydric soil identified within Wetland B.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 7-31-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland BB - DP#41
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.914080 Long: -78.998049 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#41 (Wetland BB) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#41	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>3"</u> Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland BB.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland BB - DP#41

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <i>Platanus occidentalis</i>	60	Yes	FACW
2 <i>Acer rubrum</i>	40	Yes	FAC
3 _____			
4 _____			
5 _____			
6 _____			
7 _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

50% of total cover: 50 100 = Total Cover
20% of total cover: 20

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____			
2 _____			
3 _____			
4 _____			
5 _____			
6 _____			
7 _____			
8 _____			
9 _____			

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____	(A) _____ (B) _____

Prevalence Index = B/A = _____

50% of total cover: _____ _____ = Total Cover
20% of total cover: _____

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <i>Microstegium vimineum</i>	80	Yes	FAC
2 <i>Juncus effusus</i>	10	No	FACW
3 <i>Lonicera japonica</i>	10	No	FAC
4 _____			
5 _____			
6 _____			
7 _____			
8 _____			
9 _____			
10 _____			
11 _____			

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

50% of total cover: 40 80 = Total Cover
20% of total cover: 16

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____			
2 _____			
3 _____			
4 _____			
5 _____			

50% of total cover: _____ _____ = Total Cover
20% of total cover: _____

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland BB.

Hydrophytic Vegetation Present? Yes No

SOIL

Sampling Point: Wetland BB - DP#41

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 7/1	85	7.5 YR 4/6	15	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

- | | | |
|--|--|---|
| Hydric Soil Indicators: | | Indicators for Problematic Hydric Soils³: |
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Dark Surface (S7) | <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) | <input type="checkbox"/> Coast Prairie Redox (A16) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) | (MLRA 147, 148) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) |
| <input type="checkbox"/> Stratified Layers (A5) | <input checked="" type="checkbox"/> Depleted Matrix (F3) | (MLRA 136, 147) |
| <input type="checkbox"/> 2 cm Muck (A10) (LRR N) | <input type="checkbox"/> Redox Dark Surface (F6) | <input type="checkbox"/> Very Shallow Dark Surface (TF12) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) | <input type="checkbox"/> Other (Explain in Remarks) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input checked="" type="checkbox"/> Redox Depressions (F8) | |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) | <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) | |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) | |
| <input type="checkbox"/> Sandy Redox (S5) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) | ³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic. |
| <input type="checkbox"/> Stripped Matrix (S6) | <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147) | |

Restrictive Layer (if observed):	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Type: _____	
Depth (inches): _____	

Remarks:

Hydric soil identified within Wetland BB.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 12-09-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland BBB - DP#32
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.914571 Long: -79.002095 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PFO1/EM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Hydric Soil Present? Yes <u>X</u> No _____	
Wetland Hydrology Present? Yes <u>X</u> No _____	

Remarks: **DP#32 (Wetland BBB) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#32**

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Geomorphic Position (D2)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	
<input type="checkbox"/> Presence of Reduced Iron (C4)	
<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	
<input type="checkbox"/> Thin Muck Surface (C7)	
<input type="checkbox"/> Other (Explain in Remarks)	

Field Observations:	Wetland Hydrology Present? Yes <u>X</u> No _____
Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____	
Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>2"</u>	
Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0"</u> (Includes capillary fringe)	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland BBB.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland BBB - DP#32

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				
1				
2				
3				
4				
5				
6				
7				
				Dominance Test worksheet:
				Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)
				Total Number of Dominant Species Across All Strata: <u>1</u> (B)
				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
				Prevalence Index worksheet:
				Total % Cover of: _____ Multiply by:
				OBL species _____ x 1 = _____
				FACW species _____ x 2 = _____
				FAC species _____ x 3 = _____
				FACU species _____ x 4 = _____
				UPL species _____ x 5 = _____
				Column Totals: _____ (A) _____ (B)
				Prevalence Index = B/A = _____
				Hydrophytic Vegetation Indicators:
				<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation
				<input checked="" type="checkbox"/> 2 - Dominance Test is >50%
				<input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹
				<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
				<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
				Definitions of Four Vegetation Strata:
				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height
				Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall
				Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
				Woody vine – All woody vines greater than 3.28 ft in height.
				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Herb Stratum (Plot size: <u>1.5 m</u>)				
1	<u>Saururus cernuus</u>	<u>60</u>	<u>Yes</u>	<u>OBL</u>
2	<u>Carex sp.</u>	<u>10</u>	<u>No</u>	<u>V</u>
3	<u>Lonicera japonica</u>	<u>10</u>	<u>No</u>	<u>FAC</u>
4				
5				
6				
7				
8				
9				
10				
11				
				<u>80</u> = Total Cover
				50% of total cover: <u>40</u> 20% of total cover: <u>16</u>
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1				
2				
3				
4				
5				
				_____ = Total Cover
				50% of total cover: _____ 20% of total cover: _____
Remarks: (Include photo numbers here or on a separate sheet.)				
<p>Hydrophytic vegetation identified within Wetland BBB. A variable indicator rating "V" is for the unidentified species. Data point taken in emergent portion of wetland.</p>				

SOIL

Sampling Point: Wetland BBB - DP#32

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 6/1	85	7.5 YR 4/6	15	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soil identified within Wetland BBB.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-04-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland C - DP#3
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.975664 Long: -78.957633 Datum: NAD 83
 Soil Map Unit Name: Mayodan sandy loam, 10 to 15% slopes NWI classification: PF01/EM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#3 (Wetland C) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#3	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (Includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available.	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland C.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland C - DP#3

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Platanus occidentalis</i></u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>
2 <u><i>Pinus taeda</i></u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>
3 <u><i>Acer rubrum</i></u>	<u>15</u>	<u>No</u>	<u>FAC</u>
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
<u>80</u> = Total Cover			
50% of total cover: <u>40</u>		20% of total cover: <u>16</u>	

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Alnus serrulata</i></u>	<u>75</u>	<u>Yes</u>	<u>OBL</u>
2 <u><i>Quercus phellos</i></u>	<u>15</u>	<u>No</u>	<u>FAC</u>
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
<u>90</u> = Total Cover			
50% of total cover: <u>45</u>		20% of total cover: <u>18</u>	

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Ligustrum sinense</i></u>	<u>5</u>	<u>Yes</u>	<u>FACU</u>
2 <u><i>Lonicera japonica</i></u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>
3 <u><i>Smilax rotundifolia</i></u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>
4 <u><i>Toxicodendron radicans</i></u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
10 _____	_____	_____	_____
11 _____	_____	_____	_____
<u>20</u> = Total Cover			
50% of total cover: <u>10</u>		20% of total cover: <u>4</u>	

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____		20% of total cover: _____	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC	<u>6</u>	(A)
Total Number of Dominant Species Across All Strata:	<u>7</u>	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>86</u>	(A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____	(A) _____ (B)
Prevalence Index = B/A = _____	

- Hydrophytic Vegetation Indicators:**
- ___ 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - ___ 3 - Prevalence Index is $\leq 3.0^1$
 - ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - ___ Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland C.

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	7.5 YR 3/2	100					CL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Type _____ Depth (inches): _____	

Remarks:

Hydric soil identified within Wetland C.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site TTA Light Rail Transit City/County: Durham Sampling Date: 11-05-13
 Applicant/Owner Triangle Transit State: NC Sampling Point: Wetland CC - DP#19
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.906439 Long: -78.994569 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#19 (Wetland CC) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#19	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
---	--

Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
---	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland CC.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland CC - DP#19

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Fraxinus pennsylvanica</i></u>	<u>45</u>	<u>Yes</u>	<u>FACW</u>
2 <u><i>Acer rubrum</i></u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>
3 <u><i>Ulmus americana</i></u>	<u>15</u>	<u>No</u>	<u>FACW</u>
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 50 20% of total cover: 20

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Ligustrum sinense</i></u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 7.5 20% of total cover: 3

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Lonicera japonica</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
2 <u><i>Carex sp.</i></u>	<u>10</u>	<u>Yes</u>	<u>V</u>
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
10 _____	_____	_____	_____
11 _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 10 20% of total cover: 4

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of:	_____	Multiply by:	_____
OBL species	_____	x 1 =	_____
FACW species	_____	x 2 =	_____
FAC species	_____	x 3 =	_____
FACU species	_____	x 4 =	_____
UPL species	_____	x 5 =	_____
Column Totals:	_____ (A)	_____ (B)	

Prevalence Index = B/A = _____

- Hydrophytic Vegetation Indicators:**
- ___ 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - ___ 3 - Prevalence Index is ≤3.0¹
 - ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - ___ Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland CC. A variable indicator rating "V" is for the unidentified species.

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-7	7.5 YR 4/3	100					SCL	
7-20	10 YR 6/2	70	7.5 YR 4/6	30	C	PL	SCL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input checked="" type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)		

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

Hydric soil identified within Wetland CC.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 12-09-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland CCC - DP#33
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.913820 Long: -79.001718 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: DP#33 (Wetland CCC) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#33	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) <u>X</u> High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <u>X</u> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <u>X</u> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <u>X</u> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>2"</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland CCC.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland CCC - DP#33

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				
1				
2				
3				
4				
5				
6				
7				
	_____ = Total Cover			
	50% of total cover: _____	20% of total cover: _____		
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1				
2				
3				
4				
5				
6				
7				
8				
9				
	_____ = Total Cover			
	50% of total cover: _____	20% of total cover: _____		
Herb Stratum (Plot size: <u>1.5 m</u>)				
1	<i>Saururus cernuus</i>	60	Yes	OBL
2	<i>Carex sp.</i>	10	No	V
3	<i>Lonicera japonica</i>	10	No	FAC
4				
5				
6				
7				
8				
9				
10				
11				
	_____ = Total Cover			
	50% of total cover: <u>40</u>	20% of total cover: <u>16</u>		
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1				
2				
3				
4				
5				
	_____ = Total Cover			
	50% of total cover: _____	20% of total cover: _____		
Remarks: (Include photo numbers here or on a separate sheet.)				
Hydrophytic vegetation identified within Wetland CCC. A variable indicator rating "V" is for the unidentified species.				

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species _____ x 1 = _____

FACW species _____ x 2 = _____

FAC species _____ x 3 = _____

FACU species _____ x 4 = _____

UPL species _____ x 5 = _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall

Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes No

SOILSampling Point: Wetland CCC - DP#33

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 6/1	85	7.5 YR 4/6	15	C	PL	Clay	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.						² Location: PL=Pore Lining, M=Matrix		

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input checked="" type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)		

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

Hydric soil identified within Wetland CCC.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-05-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland D - DP#4
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.960118 Long: -78.962445 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01/04/EM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: DP#4 (Wetland D) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#4	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) _____ <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland D.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland D - DP#4

Tree Stratum (Plot size: <u>30'</u>)		Absolute % Cover	Dominant Species?	Indicator Status
1	<i>Acer rubrum</i>	35	Yes	FAC
2	<i>Pinus taeda</i>	30	Yes	FAC
3	<i>Platanus occidentalis</i>	20	Yes	FACW
4				
5				
6				
7				

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

85 = Total Cover
50% of total cover: 42.5 20% of total cover: 17

Sapling/Shrub Stratum (Plot size: 10')

1				
2				
3				
4				
5				
6				
7				
8				
9				

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals _____	(A) _____ (B) _____

Prevalence Index = B/A = _____

_____ = Total Cover
50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 1.5 m)

1	<i>Carex sp.</i>	60	Yes	V
2	<i>Saururus cernuus</i>	25	Yes	OBL
3	<i>Festuca sp.</i>	10	No	V
4	<i>Boehmeria cylindrica</i>	5	No	FACW
5				
6				
7				
8				
9				
10				
11				

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

100 = Total Cover
50% of total cover: 50 20% of total cover: 20

Woody Vine Stratum (Plot size: 1 m)

1				
2				
3				
4				
5				

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall

Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet)

Hydrophytic vegetation identified within Wetland D. A variable indicator rating "V" is for the unidentified species.

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	7.5 YR 4/2	80	10 YR 5/8	20	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)		

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Hydric soil identified within Wetland D.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-05-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Upland D - DP#4A
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.960118 Long: -78.962445 Datum: NAD 83
 Soil Map Unit Name: White Store clay loam. 2 to 10% slopes, moderately eroded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes _____ No <u>X</u> Wetland Hydrology Present? Yes _____ No <u>X</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u>
Remarks: DP#4A (Upland D) is representative of an Upland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#4A	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required, check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) ___ Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes _____ No <u>X</u> Depth (inches): _____	Wetland Hydrology Present? Yes _____ No <u>X</u>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: No indicators of hydrology were observed within upland D.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Upland D - DP#4A

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Acer rubrum</i></u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>6</u> (A) Total Number of Dominant Species Across All Strata: <u>8</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)
2. <u><i>Pinus taeda</i></u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	
3. <u><i>Fraxinus americana</i></u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>	
4. _____				
5. _____				
6. _____				
7. _____				
<u>80</u> = Total Cover 50% of total cover: <u>40</u> 20% of total cover: <u>16</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Asimina triloba</i></u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>	
2. <u><i>Betula nigra</i></u>	<u>25</u>	<u>Yes</u>	<u>FACW</u>	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
<u>65</u> = Total Cover 50% of total cover: <u>32.5</u> 20% of total cover: <u>13</u>				
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Lonicera japonica</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>	
2. <u><i>Smilax rotundifolia</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>	
3. <u><i>Gaultheria procumbens</i></u>	<u>5</u>	<u>Yes</u>	<u>FACU</u>	
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
<u>25</u> = Total Cover 50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall Woody vine – All woody vines greater than 3.28 ft in height
Remarks: (Include photo numbers here or on a separate sheet)				
Hydrophytic vegetation identified within Upland D.				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____

SOIL

Sampling Point: Upland D - DP#4A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10 YR 4/3						<u>Sandy loam</u>	
3-8	7.5 YR 4/4						<u>Clay loam</u>	
8-20	7.5 YR 4/3						<u>Sandy clay loam</u>	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains						² Location: PL=Pore Lining, M=Matrix		
Hydric Soil Indicators: <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) (LRR N) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6)				<input type="checkbox"/> Dark Surface (S7) <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)		
Restrictive Layer (if observed): Type: _____ Depth (inches): _____				³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic				
Restrictive Layer (if observed): Type: _____ Depth (inches): _____				Hydric Soil Present? Yes _____ No <u>X</u>				
Remarks <p style="text-align: center;">Hydric soil not identified within Upland D.</p>								

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site TTA Light Rail Transit City/County: Durham Sampling Date: 11-05-13
 Applicant/Owner Triangle Transit State: NC Sampling Point: Wetland DD - DP#18
 Investigator(s) Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.) basin Local relief (concave, convex, none): Concave Slope (%) 0
 Subregion (LRR or MLRA) LRR P Lat 35.907254 Long: -78.995358 Datum: NAD 83
 Soil Map Unit Name Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: DP#18 (Wetland DD) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#18	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required, check all that apply): ___ Surface Water (A1) ___ True Aquatic Plants (B14) <u>X</u> High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <u>X</u> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <u>X</u> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <u>X</u> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>5"</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0"</u> (Includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland DD.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland DD - DP#18

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Betula nigra</i></u>	<u>70</u>	<u>Yes</u>	<u>FACW</u>
2 <u><i>Acer rubrum</i></u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____

_____ = Total Cover
50% of total cover: 50 20% of total cover: 20

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____

_____ = Total Cover
50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Smilax rotundifolia</i></u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
10 _____	_____	_____	_____
11 _____	_____	_____	_____

_____ = Total Cover
50% of total cover: 7.5 20% of total cover: 3

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____

_____ = Total Cover
50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____	(A) _____ (B)
Prevalence Index = B/A = _____	

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: (Include photo numbers here or on a separate sheet)

Hydrophytic vegetation identified within Wetland DD.

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10 YR 4/2	70	7.5 YR 4/6	30	C	PL	SCL	Oxidized rhizospheres
4-9	2.5 Y 5/1	80	7.5 YR 4/6	20	C	PL	SCL	
9-20	10 YR 5/1	90	7.5 YR 4/4	10	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:			Indicators for Problematic Hydric Soils³:		
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)			
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)			
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)			
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)			
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)			
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)				
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)				
<input type="checkbox"/> Thick Dark Surface (A12)	<input checked="" type="checkbox"/> Redox Depressions (F8)				
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)				
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)				
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)				
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)				

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

Hydric soil identified within Wetland DD.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site TTA Light Rail Transit City/County: Durham Sampling Date 07-30-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Upland DD - DP#18A
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Convex Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.907254 Long: -78.995358 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes _____ No <input checked="" type="checkbox"/> Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes _____ No <input checked="" type="checkbox"/>
Remarks: DP#18A (Upland DD) is representative of an Upland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#18A	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available	
Remarks: No indicators of surface water influence were observed within Upland DD.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Upland DD - DP#18A

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Acer rubrum</i></u>	<u>50</u>	<u>Yes</u>	<u>FAC</u>
2. <u><i>Liquidambar styraciflua</i></u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>
3. <u><i>Betula nigra</i></u>	<u>15</u>	<u>No</u>	<u>FACW</u>
4. <u><i>Quercus rubra</i></u>	<u>10</u>	<u>No</u>	<u>FACU</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____

105 = Total Cover
 50% of total cover: 52.5 20% of total cover: 21

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Fraxinus pennsylvanica</i></u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____

10 = Total Cover
 50% of total cover: 5 20% of total cover: 2

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Smilax rotundifolia</i></u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>
2. <u><i>Lonicera japonica</i></u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____

50 = Total Cover
 50% of total cover: 25 20% of total cover: 10

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____	(A) _____ (B)

Prevalence Index = B/A = _____

- Hydrophytic Vegetation Indicators:**
- ___ 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - ___ 3 - Prevalence Index is ≤3.0¹
 - ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - ___ Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Upland DD.

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	2.5 YR 3/3	100					Clay loam	
2-13	7.5 Y 5/6	80	5 YR 4/6	20	C	PL	SCL	
13-20	10 YR 5/3	33	7.5 YR 5/4	33	C	M	SCL	
			7.5 YR 5/1	33	D	M		

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No **X**

Remarks:

Hydric soil not identified within Upland DD.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 12-09-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland DDD - DP#34
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.913420 Long: -78.999822 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#34 (Wetland DDD) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#34	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required, check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>2"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland DDD.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland DDD - DP#34

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <i>Platanus occidentalis</i>	40	Yes	FACW	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. <i>Acer rubrum</i>	40	Yes	FAC	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
_____ = Total Cover 50% of total cover: <u>40</u> 20% of total cover: <u>16</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Herb Stratum (Plot size: <u>1.5 m</u>)				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)
1. <i>Saururus cernuus</i>	60	Yes	OBL	
2. <i>Carex sp.</i>	10	No	V	
3. <i>Lonicera japonica</i>	10	No	FAC	
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover 50% of total cover: <u>40</u> 20% of total cover: <u>16</u>				
Woody Vine Stratum (Plot size: <u>1 m</u>)				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				
Remarks: (Include photo numbers here or on a separate sheet.) <p style="text-align:center">Hydrophytic vegetation identified within Wetland DDD. A variable indicator rating "V" is for the unidentified species.</p>				

SOIL

Sampling Point: Wetland DDD - DP#34

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 6/1	85	7.5 YR 4/6	15	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	<input checked="" type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soil identified within Wetland DDD.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-06-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland E - DP#5
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.960697 Long: -78.972118 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#5 (Wetland E) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#5	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Sediment Deposits (B2) ___ Drift Deposits (B3) ___ Algal Mat or Crust (B4) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
---	--

Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>1"</u> Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
--	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland E.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland E - DP#5

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1. <i>Acer rubrum</i>	40	Yes	FAC	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)	
2. <i>Fraxinus pennsylvanica</i>	25	Yes	FACW		
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
_____ = Total Cover 50% of total cover: <u>32.5</u> 20% of total cover: <u>13</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)					
1. _____					
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____					
Herb Stratum (Plot size: <u>1.5 m</u>)					
1. <i>Saururus cernuus</i>	20	Yes	OBL	Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
2. <i>Dichanthelium clandestinum</i>	15	Yes	FAC		
3. <i>Persicaria maculosa</i>	10	No	FACW		
4. <i>Carex sp.</i>	10	No	V		
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
11. _____					
_____ = Total Cover 50% of total cover: <u>27.5</u> 20% of total cover: <u>11</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Woody Vine Stratum (Plot size: <u>1 m</u>)					
1. _____				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	
2. _____					
3. _____					
4. _____					
5. _____					
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____					
Remarks: (Include photo numbers here or on a separate sheet.) <p style="text-align:center">Hydrophytic vegetation identified within Wetland E. A variable indicator rating "V" is for the unidentified species.</p>					

SOIL

Sampling Point: Wetland E - DP#5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 5/2	70	5 YR 4/4	30	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

Indicators for Problematic Hydric Soils³:

- | | | |
|---|---|---|
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Dark Surface (S7) | <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) | <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) | <input type="checkbox"/> Very Shallow Dark Surface (TF12) |
| <input type="checkbox"/> Stratified Layers (A5) | <input checked="" type="checkbox"/> Depleted Matrix (F3) | <input type="checkbox"/> Other (Explain in Remarks) |
| <input type="checkbox"/> 2 cm Muck (A10) (LRR N) | <input type="checkbox"/> Redox Dark Surface (F6) | |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) | |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Redox Depressions (F8) | |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) | <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) | |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) | ³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic. |
| <input type="checkbox"/> Sandy Redox (S5) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) | |
| <input type="checkbox"/> Stripped Matrix (S6) | <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147) | |

Restrictive Layer (if observed):

Hydric Soil Present? Yes No

Type _____
 Depth (inches): _____

Remarks:

Hydric soil was observed in Wetland E.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 08-14-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland EE - DP#21
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range, _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.905509 Long: -78.997726 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#21 (Wetland EE) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#21.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
--	--

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland EE.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland EE - DP#21

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1. <i>Ulmus americana</i>	40	Yes	FACW	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>7</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>71</u> (A/B)	
2. <i>Acer rubrum</i>	30	Yes	FAC		
3. <i>Quercus rubra</i>	30	Yes	FACU		
4. _____					
5. _____					
6. _____					
7. _____					
_____ = Total Cover 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)					
1. <i>Ulmus americana</i>	15	Yes	FACW		
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
_____ = Total Cover 50% of total cover: <u>7.5</u> 20% of total cover: <u>3</u>				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
Herb Stratum (Plot size: <u>1.5 m</u>)					
1. <i>Arundinaria gigantea</i>	5	Yes	FACW		
2. <i>Smilax rotundifolia</i>	5	Yes	FAC		
3. <i>Toxicodendron radicans</i>	5	Yes	FAC		
4. <i>Ligustrum sinense</i>	5	Yes	FACU		
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
11. _____					
_____ = Total Cover 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall Woody vine – All woody vines greater than 3.28 ft in height	
Woody Vine Stratum (Plot size: <u>1 m</u>)					
1. _____					
2. _____					
3. _____					
4. _____					
5. _____					
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				Hydrophytic Vegetation Present? Yes <u>X</u> No _____	
Remarks: (Include photo numbers here or on a separate sheet.)					
<p>Hydrophytic vegetation identified within Wetland EE.</p>					

SOIL

Sampling Point: Wetland EE - DP#21

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10 YR 4/3	90	7.5 YR 4/6	10	C	PL	Clay loam	
6-20	10 YR 6/2	70	7.5 YR 5/6	30	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

<p>Hydric Soil Indicators:</p> <p><input type="checkbox"/> Histosol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Stratified Layers (A5)</p> <p><input type="checkbox"/> 2 cm Muck (A10) (LRR N)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)</p> <p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p>	<p><input type="checkbox"/> Dark Surface (S7)</p> <p><input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)</p> <p><input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input checked="" type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input checked="" type="checkbox"/> Redox Depressions (F8)</p> <p><input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)</p> <p><input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)</p> <p><input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p><input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)</p> <p><input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (TF12)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p> <p>³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic</p>
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Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Hydric soil identified within Wetland EE.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-18-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland F - DP#29
 Investigator(s): Brandon Fulton, LSS, PWS Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.957872 Long: -78.972752 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>DP#29 (Wetland F) is representative of a Wetland. See Approximate Waters of the U S Boundary map Exhibit for Location of DP#29</u>	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	<u>Secondary Indicators (minimum of two required)</u>
<input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ _____ Inundation Visible on Aerial Imagery (B7) _____ <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ _____ Aquatic Fauna (B13) _____	_____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0.5"</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: <u>Saturation and other indicators of surface water influence were observed within Wetland F.</u>	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland F - DP#29

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
			Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____			Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
			_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____			Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Herb Stratum (Plot size: <u>1.5 m</u>)				
1. <u>Smilax rotundifolia</u>	<u>20</u>	<u>Yes</u>		<u>FAC</u>
2. <u>Carex sp.</u>	<u>5</u>	<u>No</u>		<u>V</u>
3. <u>Juncus effusus</u>	<u>5</u>	<u>No</u>		<u>FACW</u>
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
			_____ = Total Cover 50% of total cover: <u>15</u> 20% of total cover: <u>6</u>	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____			Hydrophytic Vegetation Present? Yes <u>X</u> No _____	
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
				_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Remarks: (Include photo numbers here or on a separate sheet.)				
Wetland is an inundated basin wetland, very few plants identified within Wetland F; however, hydrophytic vegetation was identified within Wetland F. A variable indicator rating "V" is for the unidentified species.				

SOIL

Sampling Point: Wetland F - DP#29

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	7.5 YR 3/1	100					SiCL	
6-20	7.5 YR 6/1	90	2.5 YR 4/6	10	C	PL	CL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soil identified within Wetland F.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site TTA Light Rail Transit City/County: Durham Sampling Date 08-14-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland FF - DP#20
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.905049 Long: -78.997013 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#20 (Wetland FF) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#20.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland FF.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland FF - DP#20

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1 <u><i>Pinus taeda</i></u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>7</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>71.4</u> (A/B)
2 <u><i>Ulmus americana</i></u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>	
3 <u><i>Acer rubrum</i></u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
<u>70</u> = Total Cover 50% of total cover: <u>35</u> 20% of total cover: <u>14</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1 <u><i>Carpinus caroliniana</i></u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>	
2 <u><i>Ligustrum sinense</i></u>	<u>10</u>	<u>Yes</u>	<u>FACU</u>	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
8 _____	_____	_____	_____	
9 _____	_____	_____	_____	
<u>25</u> = Total Cover 50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>				
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators:
1 <u><i>Carex sp.</i></u>	<u>60</u>	<u>Yes</u>	<u>V</u>	<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
2 <u><i>Nasturtium officinale</i></u>	<u>30</u>	<u>Yes</u>	<u>OBL</u>	
3 <u><i>Phalaris arundinacea</i></u>	<u>15</u>	<u>No</u>	<u>FACW</u>	
4 <u><i>Eurybia divaricata</i></u>	<u>5</u>	<u>No</u>	<u>NL</u>	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
8 _____	_____	_____	_____	
9 _____	_____	_____	_____	
10 _____	_____	_____	_____	
11 _____	_____	_____	_____	
<u>100</u> = Total Cover 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1 _____	_____	_____	_____	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height
2 _____	_____	_____	_____	
3 _____	_____	_____	_____	Hydrophytic Vegetation Present? Yes <u>X</u> No _____
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland FF. A variable rating indicator "V" is for the unidentified species. A not listed rating indicator "NL" is for the unlisted species.

SOIL

Sampling Point: Wetland FF - DP#20

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	7.5 YR 3/3	100					SCL	
3-20	7.5 YR 4/1	70	5 YR 4/6	30	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) (LRR N) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input checked="" type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
--	--	--

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks

Hydric soil identified within Wetland FF.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-18-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point Wetland G - DP#6
 Investigator(s): Brandon Fulton, LSS, PWS Section, Township, Range _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none) Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.956380 Long: -78.975044 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: DP#6 (Wetland G) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#6	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (E4) <input type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>14"</u> Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland G.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland G - DP#6

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Acer rubrum</i></u>	<u>70</u>	<u>Yes</u>	<u>FAC</u>
2 <u><i>Pinus taeda</i></u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
<u>90</u> = Total Cover			
50% of total cover: <u>45</u> 20% of total cover: <u>18</u>			

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Carpinus caroliniana</i></u>	<u>35</u>	<u>Yes</u>	<u>FAC</u>
2 <u><i>Liquidambar styraciflua</i></u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>
3 <u><i>Ligustrum sinense</i></u>	<u>10</u>	<u>No</u>	<u>FACU</u>
4 <u><i>Ilex opaca</i></u>	<u>10</u>	<u>No</u>	<u>FACU</u>
5 <u><i>Ulmus rubra</i></u>	<u>10</u>	<u>No</u>	<u>FAC</u>
6 <u><i>Elaeagnus angustifolia</i></u>	<u>10</u>	<u>No</u>	<u>FACU</u>
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
<u>90</u> = Total Cover			
50% of total cover: <u>45</u> 20% of total cover: <u>18</u>			

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
10 _____	_____	_____	_____
11 _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species _____ x 1 = _____

FACW species _____ x 2 = _____

FAC species _____ x 3 = _____

FACU species _____ x 4 = _____

UPL species _____ x 5 = _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A = _____

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is $\leq 3.0^1$
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes X No _____

Remarks: (Include photo numbers here or on a separate sheet)

Hydrophytic vegetation identified within Wetland G.

SOIL

Sampling Point: Wetland G - DP#6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	7.5 YR 4/3	100					SCL	
3-6	10 YR 5/4	100					Sand	
6-20	7.5 YR 5/1	70	10 YR 5/4	30	C	PL	CL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

Hydric soil identified within Wetland G.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Orange Sampling Date: 11-05-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland GG - DP#17
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.904593 Long: -79.017924 Datum: NAD 83
 Soil Map Unit Name: White Store sandy loam, 2 to 6% slopes NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#17 (Wetland GG) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#17	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland GG.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland GG - DP#17

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:			
1 <u><i>Acer rubrum</i></u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u>	(A)		
2 <u><i>Liquidambar styraciflua</i></u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>	Total Number of Dominant Species Across All Strata: <u>7</u>	(B)		
3 _____				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>71</u>	(A/B)		
4 _____				Prevalence Index worksheet:			
5 _____				Total % Cover of: _____	Multiply by:		
6 _____				OBL species _____ x 1 = _____			
7 _____				FACW species _____ x 2 = _____			
8 _____				FAC species _____ x 3 = _____			
9 _____				FACU species _____ x 4 = _____			
10 _____				UPL species _____ x 5 = _____			
11 _____				Column Totals: _____ (A) _____ (B)			
100 = Total Cover				Prevalence Index = B/A = _____			
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>							
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators:			
1 <u><i>Ligustrum sinense</i></u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>			<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
2 <u><i>Quercus phellos</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>				
3 <u><i>Fraxinus pennsylvanica</i></u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>				
4 _____							
5 _____							
6 _____							
7 _____							
8 _____							
9 _____							
10 _____							
45 = Total Cover				Definitions of Four Vegetation Strata:			
50% of total cover: <u>22.5</u> 20% of total cover: <u>9</u>							
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status			Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
1 <u><i>Lonicera japonica</i></u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>				
2 <u><i>Fragaria virginiana</i></u>	<u>20</u>	<u>Yes</u>	<u>FACU</u>				
3 <u><i>Smilax rotundifolia</i></u>	<u>10</u>	<u>No</u>	<u>FAC</u>				
4 <u><i>Gaultheria procumbens</i></u>	<u>5</u>	<u>No</u>	<u>FACU</u>				
5 _____							
6 _____							
7 _____							
8 _____							
9 _____							
10 _____							
11 _____							
55 = Total Cover				Hydrophytic Vegetation Present? Yes <u>X</u> No _____			
50% of total cover: <u>27.5</u> 20% of total cover: <u>11</u>							
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status				
1 _____							
2 _____							
3 _____							
4 _____							
5 _____							
_____ = Total Cover							
50% of total cover: _____ 20% of total cover: _____							
Remarks: (Include photo numbers here or on a separate sheet) <p style="text-align:center;">Hydrophytic vegetation identified within Wetland GG.</p>							

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-9	10 YR 3/2	100					Clay	
9-20	10 YR 5/2	85	7.5 YR 4/6	15	C	PL	Clay	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.						² Location: PL=Pore Lining, M=Matrix.		
Hydric Soil Indicators:						Indicators for Problematic Hydric Soils³:		
<input type="checkbox"/> Histosol (A1)			<input type="checkbox"/> Dark Surface (S7)			<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)		
<input type="checkbox"/> Histic Epipedon (A2)			<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)			<input type="checkbox"/> Coast Prairie Redox (A16)		
<input type="checkbox"/> Black Histic (A3)			<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)			<input type="checkbox"/> (MLRA 147, 148)		
<input type="checkbox"/> Hydrogen Sulfide (A4)			<input type="checkbox"/> Loamy Gleyed Matrix (F2)			<input type="checkbox"/> Piedmont Floodplain Soils (F19)		
<input type="checkbox"/> Stratified Layers (A5)			<input checked="" type="checkbox"/> Depleted Matrix (F3)			<input type="checkbox"/> (MLRA 136, 147)		
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)			<input type="checkbox"/> Redox Dark Surface (F6)			<input type="checkbox"/> Very Shallow Dark Surface (TF12)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)			<input type="checkbox"/> Depleted Dark Surface (F7)			<input type="checkbox"/> Other (Explain in Remarks)		
<input type="checkbox"/> Thick Dark Surface (A12)			<input type="checkbox"/> Redox Depressions (F8)					
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)			<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)					
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)					
<input type="checkbox"/> Sandy Redox (S5)			<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)					
<input type="checkbox"/> Stripped Matrix (S6)			<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)					
Restrictive Layer (if observed):								
Type: _____								
Depth (inches): _____						Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Remarks:								
Hydric soil identified within Wetland GG.								

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-18-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland H - DP#7
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): linear Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.955416 Long: -78.975207 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: Linear PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#7 (Wetland H) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#7	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required, check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland H.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland H - DP#7

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. _____				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)
2. _____				Total Number of Dominant Species Across All Strata: <u>2</u> (B)
3. _____				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
4. _____				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
5. _____				
6. _____				
7. _____				
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. _____				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Herb Stratum (Plot size: <u>1.5 m</u>)				
1. <u>Lonicera japonica</u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall Woody vine – All woody vines greater than 3.28 ft in height
2. <u>Smilax rotundifolia</u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover				
50% of total cover: <u>5</u> 20% of total cover: <u>2</u>				
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1. _____				Hydrophytic Vegetation Present? Yes <u>X</u> No _____
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Remarks: (Include photo numbers here or on a separate sheet) <p style="text-align: center;">Hydrophytic vegetation identified within Wetland H.</p>				

SOIL

Sampling Point: Wetland H - DP#7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-5	10 YR 6/4	100					Sand	
5-20	7.5 YR 4/1	80	7.5 YR 4/4	20	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) (LRR N) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)
<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

Hydric soil identified within Wetland H.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site TTA Light Rail Transit City/County: Durham Sampling Date: 12-10-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland HHH - DP#35
 Investigator(s) Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.) terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.917093 Long: -78.996505 Datum: NAD 83
 Soil Map Unit Name: Cartecay and Chewacla soils, 0 to 2% slopes, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#35 (Wetland HHH) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#35	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply): <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>2"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland HHH.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland HHH - DP#35

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
	_____ = Total Cover			
	50% of total cover: _____		20% of total cover: _____	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
	_____ = Total Cover			
	50% of total cover: _____		20% of total cover: _____	
Herb Stratum (Plot size: <u>1.5 m</u>)				
1. <i>Carex stricta</i>	60	Yes	OBL	
2. <i>Juncus effusus</i>	20	Yes	FACW	
3. <i>Lonicera japonica</i>	10	No	FAC	
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
	90 = Total Cover			
	50% of total cover: 45		20% of total cover: 18	
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
	_____ = Total Cover			
	50% of total cover: _____		20% of total cover: _____	
Remarks: (Include photo numbers here or on a separate sheet)				
Hydrophytic vegetation identified within Wetland HHH.				

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by:
 OBL species _____ x 1 = _____
 FACW species _____ x 2 = _____
 FAC species _____ x 3 = _____
 FACU species _____ x 4 = _____
 UPL species _____ x 5 = _____
 Column Totals: _____ (A) _____ (B)
 Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
 ___ 1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 ___ 3 - Prevalence Index is ≤3.0¹
 ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 ___ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata:
Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height
Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall
Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes No _____

SOIL

Sampling Point: Wetland HHH - DP#35

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	7.5 YR 3/1	100					Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

- | | | |
|--|--|---|
| Hydric Soil Indicators: | | Indicators for Problematic Hydric Soils³: |
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Dark Surface (S7) | <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) | <input type="checkbox"/> Coast Prairie Redox (A16) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) | (MLRA 147, 148) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) |
| <input type="checkbox"/> Stratified Layers (A5) | <input checked="" type="checkbox"/> Depleted Matrix (F3) | (MLRA 136, 147) |
| <input type="checkbox"/> 2 cm Muck (A10) (LRR N) | <input type="checkbox"/> Redox Dark Surface (F6) | <input type="checkbox"/> Very Shallow Dark Surface (TF12) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) | <input type="checkbox"/> Other (Explain in Remarks) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Redox Depressions (F8) | |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) | <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) | |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) | |
| <input type="checkbox"/> Sandy Redox (S5) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) | |
| <input type="checkbox"/> Stripped Matrix (S6) | <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147) | |

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

 Hydric soil identified within Wetland HHH.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 01-21-14
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland I - DP#46
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.954986 Long: -78.975612 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
--	--

Remarks: **DP#46 (Wetland I) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#46**

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
--	--

Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>3"</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
--	--

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland I.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland I - DP#46

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer negundo</u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Acer rubrum</u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
_____ = Total Cover			
50% of total cover: <u>40</u>		20% of total cover: <u>16</u>	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)			
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
_____ = Total Cover			
50% of total cover: _____		20% of total cover: _____	
Herb Stratum (Plot size: <u>1.5 m</u>)			
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			
_____ = Total Cover			
50% of total cover: _____		20% of total cover: _____	
Woody Vine Stratum (Plot size: <u>1 m</u>)			
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
_____ = Total Cover			
50% of total cover: _____		20% of total cover: _____	

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
 Total Number of Dominant Species Across All Strata: 2 (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by:
 OBL species _____ x 1 = _____
 FACW species _____ x 2 = _____
 FAC species _____ x 3 = _____
 FACU species _____ x 4 = _____
 UPL species _____ x 5 = _____
 Column Totals: _____ (A) _____ (B)
 Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
 ___ 1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 ___ 3 - Prevalence Index is $\leq 3.0^1$
 ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 ___ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:
Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet)

Hydrophytic vegetation identified within Wetland I.

SOIL

Sampling Point: Wetland I - DP#46

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	7.5 YR 5/2	60	5 YR 4/4	40	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (**LRR N**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (**LRR N, MLRA 147, 148**)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (**MLRA 147, 148**)
- Thin Dark Surface (S9) (**MLRA 147, 148**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (**LRR N, MLRA 136**)
- Umbric Surface (F13) (**MLRA 136, 122**)
- Piedmont Floodplain Soils (F19) (**MLRA 148**)
- Red Parent Material (F21) (**MLRA 127, 147**)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**MLRA 147**)
- Coast Prairie Redox (A16) (**MLRA 147, 148**)
- Piedmont Floodplain Soils (F19) (**MLRA 136, 147**)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Hydric soil identified within Wetland I.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 12-10-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland III - DP#36
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.917721 Long: -78.996094 Datum: NAD 83
 Soil Map Unit Name: Cartecay and Chewacla soils, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: DP#36 (Wetland III) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#36	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>2"</u> Saturation Present? (includes capillary fringe) Yes <u>X</u> No _____ Depth (inches): <u>0"</u>	Wetland Hydrology Present? Yes <u>X</u> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland III.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland III - DP#36

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1. <i>Fraxinus pennsylvanica</i>	30	Yes	FACW	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (E) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)	
2. <i>Acer rubrum</i>	20	Yes	FAC		
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
_____ = Total Cover 50% of total cover: <u>25</u> 20% of total cover: <u>10</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)					
1. _____					
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____					
Herb Stratum (Plot size: <u>1.5 m</u>)					
1. <i>Carex stricta</i>	30	Yes	OBL	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic	
2. <i>Juncus effusus</i>	20	Yes	FACW		
3. <i>Lonicera japonica</i>	10	No	FAC		
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
11. _____					
_____ = Total Cover 50% of total cover: <u>30</u> 20% of total cover: <u>12</u>					
Woody Vine Stratum (Plot size: <u>1 m</u>)					
1. _____				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
2. _____					
3. _____					
4. _____					
5. _____					
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	
Remarks: (Include photo numbers here or on a separate sheet)					
<p>Hydrophytic vegetation identified within Wetland III.</p>					

SOIL

Sampling Point: Wetland III - DP#36

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	7.5 YR 3/1	100					Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soil identified within Wetland III.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-18-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland J - DP#8
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.955655 Long: -78.977365 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#8 (Wetland J) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#8	

HYDROLOGY

<p>Wetland Hydrology Indicators:</p> <p><u>Primary Indicators (minimum of one is required; check all that apply)</u></p> ___ Surface Water (A1) ___ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ ___ Inundation Visible on Aerial Imagery (B7) ___ <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ ___ Aquatic Fauna (B13) ___	<p><u>Secondary Indicators (minimum of two required)</u></p> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
<p>Field Observations:</p> Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>6"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland J.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland J - DP#8

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. <u><i>Acer rubrum</i></u>	<u>80</u>	<u>Yes</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)	
2. <u><i>Fraxinus pennsylvanica</i></u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>		
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
100 = Total Cover 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. <u><i>Acer rubrum</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>		Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
10 = Total Cover 50% of total cover: <u>5</u> 20% of total cover: <u>2</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall Woody vine – All woody vines greater than 3.28 ft in height.	
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. <u><i>Lonicera japonica</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>		Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
11. _____					
10 = Total Cover 50% of total cover: <u>5</u> 20% of total cover: <u>2</u>					
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. _____					
2. _____					
3. _____					
4. _____					
5. _____					
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____					

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland J.

SOIL

Sampling Point: Wetland J - DP#8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10 YR 5/6	75	10 YR 5/2	25	C	PL	Sandy clay	
3-20	10 YR 4/2	50	10 YR 5/2	50	RM	M	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

Restrictive Layer (if observed):
 Type _____
 Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks

Hydric soil identified within Wetland J.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 06-18-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland K - DP#9
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%) 0
 Subregion (LRR or MLRA): LRR P Lat: 35.955265 Long: -78.976843 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: DP#9 (Wetland K) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#9	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required, check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <u>X</u> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <u>X</u> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <u>X</u> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland K.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland K - DP#9

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				
1. <u><i>Liquidambar styraciflua</i></u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>80</u> (A/B)
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
_____ = Total Cover				
50% of total cover: <u>20</u>		20% of total cover: <u>8</u>		
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. _____				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
_____ = Total Cover				
50% of total cover: _____		20% of total cover: _____		
Herb Stratum (Plot size: <u>1.5 m</u>)				
1. <u><i>Saururus cernuus</i></u>	<u>10</u>	<u>Yes</u>	<u>OBL</u>	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)
2. <u><i>Smilax rotundifolia</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>	
3. <u><i>Aster divaricatus</i></u>	<u>10</u>	<u>Yes</u>	<u>NL</u>	
4. <u><i>Persicaria hydropiper</i></u>	<u>10</u>	<u>Yes</u>	<u>OBL</u>	
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover				
50% of total cover: <u>20</u>		20% of total cover: <u>8</u>		
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1. _____				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover				
50% of total cover: _____		20% of total cover: _____		
Hydrophytic Vegetation Present?				Yes <input checked="" type="checkbox"/> No _____
Remarks: (Include photo numbers here or on a separate sheet) <p style="text-align:center;">Hydrophytic vegetation identified within Wetland K. A rating indicator of "NL" is for the unlisted species.</p>				

SOIL

Sampling Point: Wetland K - DP#9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	7.5 YR 5/2	60	5 YR 4/4	40	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type _____ Depth (inches) _____	Hydric Soil Present? Yes <u>X</u> No _____
---	---

Remarks:

Hydric soil identified within Wetland K.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-16-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland N - DP#10
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.954491 Long: -78.978884 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#10 (Wetland N) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#10	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ _____ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>3"</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland N.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland N - DP#10

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Celtis occidentalis</i></u>	<u>30</u>	<u>Yes</u>	<u>FACU</u>
2 <u><i>Ulmus americana</i></u>	<u>25</u>	<u>Yes</u>	<u>FACW</u>
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____

55 = Total Cover
50% of total cover: 27.5 20% of total cover: 11

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Ligustrum sinense</i></u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____

25 = Total Cover
50% of total cover: 12.5 20% of total cover: 5

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Saururus cernuus</i></u>	<u>10</u>	<u>Yes</u>	<u>OBL</u>
2 <u><i>Smilax rotundifolia</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
10 _____	_____	_____	_____
11 _____	_____	_____	_____

20 = Total Cover
50% of total cover: 10 20% of total cover: 4

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet)

Hydrophytic vegetation identified within Wetland N.

SOIL

Sampling Point: Wetland N - DP#10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-9	7.5 YR 4/2	80	2.5 YR 3/6	20	C	PL	Clay	
9-20	7.5YR 4/3	100					Clay	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains					² Location: PL=Pore Lining, M=Matrix			
Hydric Soil Indicators:						Indicators for Problematic Hydric Soils³:		
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Thick Dark Surface (A12)	<input checked="" type="checkbox"/> Redox Depressions (F8)		<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	
<input type="checkbox"/> Stripped Matrix (S6)			<input type="checkbox"/> Stripped Matrix (S6)			<input type="checkbox"/> Sandy Gleyed Matrix (S4)		³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
Restrictive Layer (if observed):								
Type: _____						Hydric Soil Present? Yes <u>X</u> No _____		
Depth (inches): _____								
Remarks:								
Hydric soil identified within Wetland N.								

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 12-11-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland NNN - DP#37
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 5
 Subregion (LRR or MLRA): LRR P Lat: 35.925959 Long: -78.989055 Datum: NAD 83
 Soil Map Unit Name: White Store sandy loam, 6 to 10% slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: <u>DP#37 (Wetland NNN) is representative of a Wetland. See Approximate Waters of the U S Boundary map Exhibit for Location of DP#37</u>	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: <u>Water-stained leaves and other indicators of surface water influence were observed within Wetland NNN.</u>	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland NNN - DP#37

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: 30')				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
	_____ = Total Cover			
	50% of total cover: _____	20% of total cover: _____		
Sapling/Shrub Stratum (Plot size: 10')				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
	_____ = Total Cover			
	50% of total cover: _____	20% of total cover: _____		
Herb Stratum (Plot size: 1.5 m)				
1. <i>Carex stricta</i>	70	Yes	OBL	
2. <i>Juncus effusus</i>	30	Yes	FACW	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
	_____ 100 = Total Cover			
	50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 1 m)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
	_____ = Total Cover			
	50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species _____ x 1 = _____

FACW species _____ x 2 = _____

FAC species _____ x 3 = _____

FACU species _____ x 4 = _____

UPL species _____ x 5 = _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland NNN.

SOIL

Sampling Point: Wetland NNN - DP#37

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	7.5 YR 5/2	80	5 YR 5/6	20	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soil identified within Wetland NNN.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-17-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland O - DP#11
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.953635 Long: -78.981179 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#11 (Wetland O) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#11	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>8"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>5"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
---	--

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland O.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland O - DP#11

Tree Stratum (Plot size: <u>30'</u>)		Absolute % Cover	Dominant Species?	Indicator Status
1	<i>Acer rubrum</i>	65	Yes	FAC
2	<i>Liquidambar styraciflua</i>	35	Yes	FAC
3				
4				
5				
6				
7				
		<u>100</u> = Total Cover		
50% of total cover: <u>50</u>		20% of total cover: <u>20</u>		
Sapling/Shrub Stratum (Plot size: <u>10'</u>)		Absolute % Cover	Dominant Species?	Indicator Status
1	<i>Acer rubrum</i>	15	Yes	FAC
2	<i>Ulmus americana</i>	15	Yes	FACW
3				
4				
5				
6				
7				
8				
9				
		<u>30</u> = Total Cover		
50% of total cover: <u>15</u>		20% of total cover: <u>6</u>		
Herb Stratum (Plot size: <u>1.5 m</u>)		Absolute % Cover	Dominant Species?	Indicator Status
1	<i>Smilax rotundifolia</i>	5	Yes	FAC
2	<i>Carex sp.</i>	5	Yes	V
3				
4				
5				
6				
7				
8				
9				
10				
11				
		<u>10</u> = Total Cover		
50% of total cover: <u>5</u>		20% of total cover: <u>2</u>		
Woody Vine Stratum (Plot size: <u>1 m</u>)		Absolute % Cover	Dominant Species?	Indicator Status
1				
2				
3				
4				
5				
		<u> </u> = Total Cover		
50% of total cover: <u> </u>		20% of total cover: <u> </u>		

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:
 Total % Cover of: Multiply by:
 OBL species x 1 =
 FACW species x 2 =
 FAC species x 3 =
 FACU species x 4 =
 UPL species x 5 =
 Column Totals: (A) (B)
 Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
 1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 3 - Prevalence Index is ≤3.0¹
 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:
Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height
Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet)

Hydrophytic vegetation identified within Wetland O. A variable indicator rating "V" is for the unidentified species.

SOIL

Sampling Point: Wetland O - DP#11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-10	2.5 YR 5/2	80	10 YR 4/6	20	C	PL	Clay	
10-20	10 YR 4/1	60	10 YR 4/4	40	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soil identified within Wetland O.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 1-22-14
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland OOO - DP#45
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.951206 Long: -78.982725 Datum: NAD 83
 Soil Map Unit Name: White Store clay loam, 2 to 10% slopes, moderately eroded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#45 (Wetland OOO) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#45	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ _____ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ _____ Aquatic Fauna (B13) _____	Secondary Indicators (minimum of two required) _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>1"</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland OOO.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland OOO - DP#45

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1 _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2 _____	_____	_____	_____	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
50% of total cover: _____ 20% of total cover: _____				
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1 _____	_____	_____	_____	
2 _____	_____	_____	_____	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
8 _____	_____	_____	_____	
9 _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators:
1 <u><i>Typha latifolia</i></u>	<u>100</u>	<u>Yes</u>	<u>OBL</u>	<input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
2 _____	_____	_____	_____	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
8 _____	_____	_____	_____	
9 _____	_____	_____	_____	
10 _____	_____	_____	_____	
11 _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Definitions of Four Vegetation Strata:
1 _____	_____	_____	_____	Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height
2 _____	_____	_____	_____	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Remarks: (Include photo numbers here or on a separate sheet)				Hydrophytic Vegetation Present? Yes <u>X</u> No _____
Hydrophytic vegetation identified within Wetland OOO.				

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 5/2	60	10 YR 5/8	40	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Hydric soil identified within Wetland 000.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-17-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland P - DP#12
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc): terrace Local relief (concave, convex, none): Concave Slope (%) 0
 Subregion (LRR or MLRA): LRR P Lat: 35.953081 Long: -78.982211 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#12 (Wetland P) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#12	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (Includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland P.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland P - DP#12

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Acer rubrum</i></u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 10 20% of total cover: 4

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Fraxinus pennsylvanica</i></u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 5 20% of total cover: 2

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Lonicera japonica</i></u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>
2. <u><i>Campsis radicans</i></u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 5 20% of total cover: 2

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

- Hydrophytic Vegetation Indicators:**
- ___ 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - ___ 3 - Prevalence Index is ≤3.0¹
 - ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - ___ Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet)

Hydrophytic vegetation identified within Wetland P.

SOIL

Sampling Point: Wetland P - DP#12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-7	10 YR 5/2	75	5 YR 4/6	25	C	PL	SCL	
7-11	10 YR 5/2	70	2.5 YR 3/6	30	C	PL	Clay	
11-20	10 YR 4/3	70	5 YR 3/4	30	C	PL	SCL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

Hydric soil identified within Wetland P.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County Durham Sampling Date: 07-17-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland Q - DP#13
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.952475 Long: -78.983613 Datum: NAD 83
 Soil Map Unit Name: White Store sandy loam, 10 to 25% slopes NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#13 (Wetland Q) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#13	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>9"</u> Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland Q.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland Q - DP#13

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1 <i>Salix nigra</i>	40	Yes	OBL	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>7</u> (A) Total Number of Dominant Species Across All Strata: <u>8</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>87.5</u> (A/B)	
2 <i>Platanus occidentalis</i>	30	Yes	FACW		
3 <i>Acer rubrum</i>	30	Yes	FAC		
4 _____					
5 _____					
6 _____					
7 _____					
_____ = Total Cover 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)					
1 <i>Liquidambar styraciflua</i>	15	Yes	FAC		
2 <i>Ulmus americana</i>	10	Yes	FACW		
3 _____					
4 _____					
5 _____					
6 _____					
7 _____					
8 _____					
9 _____					
_____ = Total Cover 50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
Herb Stratum (Plot size: <u>1.5 m</u>)					
1 <i>Boehmeria cylindrica</i>	15	Yes	FACW		
2 <i>Nasturtium officinale</i>	10	Yes	OBL		
3 <i>Carex</i> sp.	10	Yes	V		
4 _____					
5 _____					
6 _____					
7 _____					
8 _____					
9 _____					
10 _____					
11 _____					
_____ = Total Cover 50% of total cover: <u>17.5</u> 20% of total cover: <u>7</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Woody Vine Stratum (Plot size: <u>1 m</u>)					
1 _____					
2 _____					
3 _____					
4 _____					
5 _____					
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	
Remarks: (Include photo numbers here or on a separate sheet.) <p style="text-align:center">Hydrophytic vegetation identified within Wetland Q. A variable indicator rating "V" is for the unidentified species.</p>					

SOIL

Sampling Point: Wetland Q - DP#13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	7.5 YR 3/2	100					SCL	
4-20	7.5 YR 3/2	80	5 YR 4/6	20	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

<p>Hydric Soil Indicators:</p> <p><input type="checkbox"/> Histosol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Stratified Layers (A5)</p> <p><input type="checkbox"/> 2 cm Muck (A10) (LRR N)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)</p> <p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p>	<p><input type="checkbox"/> Dark Surface (S7)</p> <p><input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)</p> <p><input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input checked="" type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input checked="" type="checkbox"/> Redox Depressions (F8)</p> <p><input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)</p> <p><input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)</p> <p><input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p><input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)</p> <p><input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (TF12)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

<p>Restrictive Layer (if observed):</p> <p>Type: _____</p> <p>Depth (inches): _____</p>	<p>Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
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Remarks:

Hydric soil identified within Wetland Q.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-17-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland R - DP#14
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.950453 Long: -78.996833 Datum: NAD 83
 Soil Map Unit Name: Wehadkee silt loam, 0 to 2% slopes, frequently flooded NWI classification: PF01/04

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#14 (Wetland R) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#14	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required, check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland R.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland R - DP#14

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Acer rubrum</i></u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>6</u> (A) Total Number of Dominant Species Across All Strata: <u>8</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)
2. <u><i>Salix nigra</i></u>	<u>25</u>	<u>Yes</u>	<u>OBL</u>	
3. <u><i>Liquidambar styraciflua</i></u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>	
4. <u><i>Pinus taeda</i></u>	<u>25</u>	<u>Yes</u>	<u>FAC</u>	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Morella cerifera</i></u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>	
2. <u><i>Acer rubrum</i></u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
_____ = Total Cover 50% of total cover: <u>15</u> 20% of total cover: <u>6</u>				
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Campsis radicans</i></u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>	
2. <u><i>Carex sp.</i></u>	<u>5</u>	<u>Yes</u>	<u>V</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
_____ = Total Cover 50% of total cover: <u>5</u> 20% of total cover: <u>2</u>				
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Vitis aestivalis</i></u>	<u>5</u>	<u>Yes</u>	<u>FACU</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
_____ = Total Cover 50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>				
Remarks: (Include photo numbers here or on a separate sheet)				Hydrophytic Vegetation Present? Yes <u>X</u> No _____
Hydrophytic vegetation identified within Wetland R. A variable indicator rating "V" is for the unidentified species.				

SOILSampling Point: Wetland R - DP#14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	5 Y 5/1	90	7.5 YR 4/6	10	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input checked="checked" type="checkbox"/> 2 cm Muck (A10) (LRR N) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6)		<input type="checkbox"/> Dark Surface (S7) <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="checked" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)		Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)	
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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <u>X</u> No _____
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Remarks:

Hydric soil identified within Wetland R.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-17-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland S - DP#15
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.946871 Long: -78.999477 Datum NAD 83
 Soil Map Unit Name: White Store sandy loam, 6-10% slopes NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#15 (Wetland S) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#15	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required, check all that apply)</u> ___ Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Sediment Deposits (B2) ___ Drift Deposits (B3) ___ Algal Mat or Crust (B4) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>11"</u> Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>10"</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland S.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland S - DP#15

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Ulmus americana</i></u>	<u>40</u>	<u>Yes</u>	<u>FACW</u>
2 <u><i>Quercus rubra</i></u>	<u>30</u>	<u>Yes</u>	<u>FACU</u>
3 <u><i>Fraxinus pennsylvanica</i></u>	<u>20</u>	<u>Yes</u>	<u>FACW</u>
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 45 20% of total cover: 18

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Viburnum prunifolium</i></u>	<u>15</u>	<u>Yes</u>	<u>FACU</u>
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 7.5 20% of total cover: 3

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u><i>Toxicodendron radicans</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
10 _____	_____	_____	_____
11 _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 5 20% of total cover: 2

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

- Hydrophytic Vegetation Indicators:**
- ___ 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - ___ 3 - Prevalence Index is ≤3.0¹
 - ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - ___ Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland S.

SOIL

Sampling Point: Wetland S - DP#15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	7.5 YR 3/2	100					SCL	
3-20	10 YR 5/2	80	7.5 YR 3/2	20	C	PL	SCL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

 Hydric soil identified within Wetland S.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-17-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland T - DP#16
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.947070 Long: -78.998468 Datum: NAD 83
 Soil Map Unit Name: White Store sandy loam, 6-10% slopes NWI classification: PSS1

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>DP#16 (Wetland T) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#16</u>	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required, check all that apply): ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	Secondary Indicators (minimum of two required): ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>12"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland T.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland T - DP#16

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. <i>Baccharis halimifolia</i>	20	Yes	FACW	
2. <i>Rubus allegheniensis</i>	15	Yes	FACU	
3. <i>Liquidambar styraciflua</i>	15	Yes	FAC	
4. <i>Tilia americana</i>	10	No	FACU	
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
_____ = Total Cover				
50% of total cover: <u>30</u> 20% of total cover: <u>12</u>				
Herb Stratum (Plot size: <u>1.5 m</u>)				
1. <i>Microstegium vimineum</i>	30	Yes	FAC	
2. <i>Carex sp.</i>	30	Yes	V	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover				
50% of total cover: <u>30</u> 20% of total cover: <u>12</u>				
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover				
50% of total cover: _____ 20% of total cover: _____				

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species _____ x 1 = _____

FACW species _____ x 2 = _____

FAC species _____ x 3 = _____

FACU species _____ x 4 = _____

UPL species _____ x 5 = _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet)

Hydrophytic vegetation identified within Wetland T. A variable indicator rating "V" is for the unidentified species.

SOIL

Sampling Point: Wetland T - DP#16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	7.5 YR 3/2	100					SCL	
2-20	2.5 Y 5/2	85	7.5 YR 4/6	15	C	PL	SCL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Hydric soil identified within Wetland T.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 12-11-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland TTT - DP#38
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.981822 Long: -78.956835 Datum: NAD 83
 Soil Map Unit Name: Urban Land NWI classification: PF01/04

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#38 (Wetland TTT) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#38	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A 1) ___ True Aquatic Plants (B 14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland TTT.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland TTT - DP#38

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Pinus taeda</i></u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. <u><i>Acer rubrum</i></u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
50% of total cover: <u>30</u>	<u>60</u> = Total Cover	<u>20%</u> of total cover:	<u>12</u>	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. <u><i>Acer rubrum</i></u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
50% of total cover: <u>30</u>	<u>60</u> = Total Cover	<u>20%</u> of total cover:	<u>12</u>	
Herb Stratum (Plot size: <u>1.5 m</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
50% of total cover: _____	_____ = Total Cover	<u>20%</u> of total cover:	_____	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
50% of total cover: _____	_____ = Total Cover	<u>20%</u> of total cover:	_____	Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall Woody vine – All woody vines greater than 3.28 ft in height.
Remarks: (Include photo numbers here or on a separate sheet.)				
<p>Hydrophytic vegetation identified within Wetland TTT.</p>				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____

SOIL

Sampling Point: Wetland TTT - DP#38

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	7.5 YR 3/2	80	10 YR 4/6	20	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

<p>Hydric Soil Indicators:</p> <p>___ Histosol (A1)</p> <p>___ Histic Epipedon (A2)</p> <p>___ Black Histic (A3)</p> <p>___ Hydrogen Sulfide (A4)</p> <p>___ Stratified Layers (A5)</p> <p>___ 2 cm Muck (A10) (LRR N)</p> <p>___ Depleted Below Dark Surface (A11)</p> <p>___ Thick Dark Surface (A12)</p> <p>___ Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)</p> <p>___ Sandy Gleyed Matrix (S4)</p> <p>___ Sandy Redox (S5)</p> <p>___ Stripped Matrix (S6)</p>	<p>___ Dark Surface (S7)</p> <p>___ Polyvalue Below Surface (S8) (MLRA 147, 148)</p> <p>___ Thin Dark Surface (S9) (MLRA 147, 148)</p> <p>___ Loamy Gleyed Matrix (F2)</p> <p><input checked="" type="checkbox"/> Depleted Matrix (F3)</p> <p>___ Redox Dark Surface (F6)</p> <p>___ Depleted Dark Surface (F7)</p> <p>___ Redox Depressions (F8)</p> <p>___ Iron-Manganese Masses (F12) (LRR N, MLRA 136)</p> <p>___ Umbric Surface (F13) (MLRA 136, 122)</p> <p>___ Piedmont Floodplain Soils (F19) (MLRA 148)</p> <p>___ Red Parent Material (F21) (MLRA 127, 147)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p>___ 2 cm Muck (A10) (MLRA 147)</p> <p>___ Coast Prairie Redox (A16) (MLRA 147, 148)</p> <p>___ Piedmont Floodplain Soils (F19) (MLRA 136, 147)</p> <p>___ Very Shallow Dark Surface (TF12)</p> <p>___ Other (Explain in Remarks)</p>
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<p>Restrictive Layer (if observed):</p> <p>Type: _____</p> <p>Depth (inches): _____</p>	<p>Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____</p>
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Remarks:

Hydric soil identified within Wetland TTT.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-18-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland U - DP#23
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.959323 Long: -78.979621 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2 % slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#23 (Wetland U) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#23.	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches) <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available.	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland U.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland U - DP#23

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Acer rubrum</i></u>	<u>80</u>	<u>Yes</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
<u>80</u> = Total Cover 50% of total cover: <u>40</u> 20% of total cover: <u>16</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Saururus cernuus</i></u>	<u>20</u>	<u>Yes</u>	<u>OBL</u>	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____
Remarks: (Include photo numbers here or on a separate sheet) <p style="text-align:center;">Hydrophytic vegetation identified within Wetland U.</p>				

SOIL

Sampling Point: Wetland U - DP#23

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-10	10 YR 4/1	90	10 YR 4/6	10	C	PL	Clay	
10-20	10 YR 4/2	80	10 YR 5/8	10	C	PL	Clay	
			10 YR 2/1	10	D	M		

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

 Hydric soil identified within Wetland U.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 1-21-14
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland UUU - DP#41
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.954829 Long: -78.974272 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>DP#41 (Wetland UUU) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#41</u>	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>7"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: <u>Water-stained leaves and other indicators of surface water influence were observed within Wetland UUU.</u>	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland UUU - DP#41

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1 <u>Fraxinus pennsylvanica</u>	<u>80</u>	<u>Yes</u>	<u>FACW</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)
2 <u>Acer rubrum</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	
3 _____				
4 _____				
5 _____				
6 _____				
7 _____				
_____ = Total Cover 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1 <u>Acer rubrum</u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	
2 _____				
3 _____				
4 _____				
5 _____				
6 _____				
7 _____				
8 _____				
9 _____				
_____ = Total Cover 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>				
Herb Stratum (Plot size: <u>1.5 m</u>)				
1 <u>Lonicera japonica</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>	
2 <u>Carex sp.</u>	<u>10</u>	<u>Yes</u>	<u>V</u>	
3 _____				
4 _____				
5 _____				
6 _____				
7 _____				
8 _____				
9 _____				
10 _____				
11 _____				
_____ = Total Cover 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>				
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1 _____				
2 _____				
3 _____				
4 _____				
5 _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Remarks: (Include photo numbers here or on a separate sheet.) <p style="text-align:center;">Hydrophytic vegetation identified within Wetland UUU. A variable indicator rating "V" is for the unidentified species.</p>				Hydrophytic Vegetation Present? Yes <u>X</u> No _____

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 4/2	80	10 YR 5/8	20	C	PL	Clay	
¹ Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.						² Location: PL=Pore Lining, M=Matrix.		
Hydric Soil Indicators:			Indicators for Problematic Hydric Soils³:					
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)	<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		<input type="checkbox"/> Thick Dark Surface (A12)	<input checked="" type="checkbox"/> Redox Depressions (F8)		<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	
Restrictive Layer (if observed):							³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic	
Type: _____								
Depth (inches): _____								Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks:								
Hydric soil identified within Wetland UUU.								

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-18-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland V - DP#24
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.959323 Long: -78.980116 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#24 (Wetland V) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#24.	

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (B6)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Geomorphic Position (D2)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Microtopographic Relief (D4)
<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	
<input type="checkbox"/> Presence of Reduced Iron (C4)	
<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	
<input type="checkbox"/> Thin Muck Surface (C7)	
<input type="checkbox"/> Other (Explain in Remarks)	

Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>5"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland V.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland V - DP#24

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				
1. <u><i>Acer rubrum</i></u>	<u>35</u>	<u>Yes</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>83</u> (A/B)
2. <u><i>Platanus occidentalis</i></u>	<u>35</u>	<u>Yes</u>	<u>FACW</u>	
3. <u><i>Fraxinus pennsylvanica</i></u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>	
4. _____				
5. _____				
6. _____				
7. _____				
_____ = Total Cover 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. <u><i>Asimina triloba</i></u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
_____ = Total Cover 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>				
Herb Stratum (Plot size: <u>1.5 m</u>)				
1. <u><i>Smilax rotundifolia</i></u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)
2. <u><i>Eurybia divaricata</i></u>	<u>5</u>	<u>Yes</u>	<u>NL</u>	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1. _____				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				
Remarks: (Include photo numbers here or on a separate sheet.) <p style="text-align:center;">Hydrophytic vegetation identified within Wetland V. A rating indicator or "NL" is for the unlisted species.</p>				

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10 YR 5/2	80	7.5 YR 4/4	20	C	PL	SCL	
6-20	10 YR 5/2	90	7.5 YR 4/6	10	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soil identified within Wetland V.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 11-05-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland VV - DP#25
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRP or MLRA): LRR P Lat: 35.960060 Long: -78.980634 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#25 (Wetland VV) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#25.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>12"</u> Saturation Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland VV.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland VV - DP#25

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				
1				
2				
3				
4				
5				
6				
7				
				Dominance Test worksheet:
				Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)
				Total Number of Dominant Species Across All Strata: <u>3</u> (B)
				Percent of Dominant Species That Are OBL, FACW, or FAC: <u>67</u> (A/B)
				Prevalence Index worksheet:
				Total % Cover of: _____ Multiply by:
				OBL species _____ x 1 = _____
				FACW species _____ x 2 = _____
				FACU species _____ x 3 = _____
				UPL species _____ x 5 = _____
				Column Totals: _____ (A) _____ (B)
				Prevalence Index = B/A = _____
				Hydrophytic Vegetation Indicators:
				<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation
				<input checked="" type="checkbox"/> 2 - Dominance Test is >50%
				<input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹
				<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)
				<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)
				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
				Definitions of Four Vegetation Strata:
				Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height
				Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall
				Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall
				Woody vine – All woody vines greater than 3.28 ft in height
				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1				
2				
3				
4				
5				
6				
7				
8				
9				
				Herb Stratum (Plot size: <u>1.5 m</u>)
1	<i>Juncus effusus</i>	50	Yes	FACW
2	<i>Phalaris arundinacea</i>	30	Yes	FACW
3	<i>Carex sp.</i>	20	Yes	V
4				
5				
6				
7				
8				
9				
10				
11				
				Woody Vine Stratum (Plot size: <u>1 m</u>)
1				
2				
3				
4				
5				
				Remarks: (Include photo numbers here or on a separate sheet.)
				Hydrophytic vegetation identified within Wetland VV. A variable rating indicator "V" is for the unidentified species.

SOIL

Sampling Point: Wetland VV - DP#25

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	5 YR 6/1	80	7.5 YR 5/8	20	C	PL	SCL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

 Hydric soil identified within Wetland VV.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 1-21-14
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland VVV - DP#40
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.955307 Long: -78.973797 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>DP#40 (Wetland VVV) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#40</u>	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>2"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: <u>Water-stained leaves and other indicators of surface water influence were observed within Wetland VVV.</u>	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland VVV - DP#40

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer rubrum</u>	50	Yes	FAC
2. <u>Fraxinus pennsylvanica</u>	30	Yes	FACW
3. <u>Acer negundo</u>	20	Yes	FAC
4. _____			
5. _____			
6. _____			
7. _____			
100 = Total Cover			
50% of total cover: <u>50</u> 20% of total cover: <u>20</u>			
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer negundo</u>	50	Yes	FAC
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
50 = Total Cover			
50% of total cover: <u>25</u> 20% of total cover: <u>10</u>			
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
_____ = Total Cover			
50% of total cover: _____ 20% of total cover: _____			

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
 Total Number of Dominant Species Across All Strata: 3 (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by:
 OBL species _____ x 1 = _____
 FACW species _____ x 2 = _____
 FAC species _____ x 3 = _____
 FACU species _____ x 4 = _____
 UPL species _____ x 5 = _____
 Column Totals: _____ (A) _____ (B)
 Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
 ___ 1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 ___ 3 - Prevalence Index is ≤3.0¹
 ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 ___ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:
Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet.)
 Hydrophytic vegetation identified within Wetland VVV.

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8	10 YR 3/2	100					Clay	
8-20	10 YR 3/2	70	10 YR 4/6	30	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input checked="" type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)		
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)		
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)		

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____
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Remarks:

Hydric soil identified within Wetland VVV.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-30-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland W - DP#22
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): Concave Slope (%) 0
 Subregion (LRR or MLRA): LRR P Lat: 35.958192 Long: -78.982022 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#22 (Wetland W) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#22.	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) _____ <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) _____ <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) _____ <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ <input type="checkbox"/> Aquatic Fauna (B13) _____	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>12"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>9"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland W.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland W - DP#22

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1 <i>Quercus phellos</i>	25	Yes	FAC	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>60</u> (A/B)
2 <i>Quercus alba</i>	25	Yes	FACU	
3 _____				
4 _____				
5 _____				
6 _____				
7 _____				
_____ = Total Cover 50% of total cover: <u>25</u> 20% of total cover: <u>10</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1 <i>Betula nigra</i>	20	Yes	FACW	
2 _____				
3 _____				
4 _____				
5 _____				
6 _____				
7 _____				
8 _____				
9 _____				
_____ = Total Cover 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)
Herb Stratum (Plot size: <u>1.5 m</u>)				
1 <i>Carex sp.</i>	30	Yes	V	
2 <i>Lonicera japonica</i>	20	Yes	FAC	
3 <i>Juncus effusus</i>	10	No	FACW	
4 <i>Typha latifolia</i>	10	No	OBL	
5 <i>Bidens frondosa</i>	10	No	FACW	
6 _____				
7 _____				
8 _____				
9 _____				
10 _____				
11 _____				
_____ = Total Cover 50% of total cover: <u>40</u> 20% of total cover: <u>16</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1 _____				
2 _____				
3 _____				
4 _____				
5 _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland W. A variable indicator rating "V" is for the unidentified species.

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-3	10 YR 5/3	100					Sandy clay	
3-9	10 YR 5/3	100					Clay	
9-20	2.5 Y 5/2	90	7.5 YR 3/4	10	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) (LRR N) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Dark Surface (S7) <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input checked="" type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)
	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

Hydric soil identified within Wetland W.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Orange Sampling Date: 11-05-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland WW - DP#31
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.905366 Long: -79.028462 Datum: NAD 83
 Soil Map Unit Name: White Store sandy loam, 2 to 6% slopes NWI classification: PF01/EM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#31 (Wetland WW) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#31	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply): ___ Surface Water (A1) ___ True Aquatic Plants (B14) ___ High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) ___ Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	Secondary Indicators (minimum of two required): ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
--	--

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland WW.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland WW - DP#31

Tree Stratum (Plot size <u>30'</u>)		Absolute % Cover	Dominant Species?	Indicator Status
1	<i>Acer rubrum</i>	60	Yes	FAC
2	<i>Liquidambar styraciflua</i>	40	Yes	FAC
3				
4				
5				
6				
7				
		100 = Total Cover		
50% of total cover:		50	20% of total cover:	20
Sapling/Shrub Stratum (Plot size, <u>10'</u>)				
1	<i>Ligustrum sinense</i>	25	Yes	FACU
2	<i>Quercus phellos</i>	10	Yes	FAC
3	<i>Fraxinus pennsylvanica</i>	10	Yes	FACW
4				
5				
6				
7				
8				
9				
		45 = Total Cover		
50% of total cover:		22.5	20% of total cover:	9
Herb Stratum (Plot size <u>1.5 m</u>)				
1	<i>Lonicera japonica</i>	20	Yes	FAC
2	<i>Fragaria virginiana</i>	20	Yes	FACU
3	<i>Smilax rotundifolia</i>	10	No	FAC
4	<i>Gaultheria procumbens</i>	5	No	FACU
5				
6				
7				
8				
9				
10				
11				
		55 = Total Cover		
50% of total cover:		27.5	20% of total cover:	11
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1				
2				
3				
4				
5				
		= Total Cover		
50% of total cover:			20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 71 (A/B)

Prevalence Index worksheet:

Total % Cover of	Multiply by
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)
Prevalence Index = B/A = _____	

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland WW.

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-9	10 YR 3/2	100					Clay	
9-20	10 YR 5/2	85	7.5 YR 4/6	15	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Hydric soil identified within Wetland WW.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 1-22-14
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland WWW - DP#44
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.952950 Long: -78.978619 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>DP#44 (Wetland WWW) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#44</u>	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ _____ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>1"</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (Includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: <u>Water-stained leaves and other indicators of surface water influence were observed within Wetland WWW.</u>	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland WWW - DP#44

	Absolute % Cover	Dominant Species?	Indicator Status	
Tree Stratum (Plot size: <u>30'</u>)				
1. <u><i>Ulmus americana</i></u>	100	Yes	FACW	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
50% of total cover: <u>50</u>	<u>100</u> = Total Cover			
	20% of total cover: <u>20</u>			
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. <u><i>Carpinus caroliniana</i></u>	25	Yes	FAC	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
50% of total cover: <u>12.5</u>	<u>25</u> = Total Cover			
	20% of total cover: <u>5</u>			
Herb Stratum (Plot size: <u>1.5 m</u>)				
1. <u><i>Smilax rotundifolia</i></u>	10	Yes	FAC	
2. <u><i>Lonicera japonica</i></u>	10	Yes	FAC	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
50% of total cover: <u>5</u>	<u>10</u> = Total Cover			
	20% of total cover: <u>2</u>			
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
50% of total cover: _____	_____ = Total Cover			
	20% of total cover: _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species _____ x 1 = _____

FACW species _____ x 2 = _____

FAC species _____ x 3 = _____

FACU species _____ x 4 = _____

UPL species _____ x 5 = _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤3.0¹

4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland WWW.

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 4/2	60	10 YR 4/6	40	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

<p>Hydric Soil Indicators:</p> <p><input type="checkbox"/> Histosol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Stratified Layers (A5)</p> <p><input type="checkbox"/> 2 cm Muck (A10) (LRR N)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)</p> <p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p>	<p><input type="checkbox"/> Dark Surface (S7)</p> <p><input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)</p> <p><input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input checked="" type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input checked="" type="checkbox"/> Redox Depressions (F8)</p> <p><input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)</p> <p><input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)</p> <p><input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p><input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)</p> <p><input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (TF12)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Hydric soil identified within Wetland WWW.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 09-18-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland XX - DP#26
 Investigator(s): Brandon Fulton, LSS, PWS Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.954826 Long: -78.977794 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#26 (Wetland XX) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#26	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply): <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>11"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>4"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: Saturation and other indicators of surface water influence were observed within Wetland XX.	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland XX - DP#26

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Betula nigra</i></u>	<u>15</u>	<u>Yes</u>	<u>FACW</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. <u><i>Acer rubrum</i></u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
<u>25</u> = Total Cover 50% of total cover: <u>12.5</u> 20% of total cover: <u>5</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Ulmus americana</i></u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
<u>10</u> = Total Cover 50% of total cover: <u>5</u> 20% of total cover: <u>2</u>				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall Woody vine – All woody vines greater than 3.28 ft in height
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____
Remarks: (Include photo numbers here or on a separate sheet)				
<p>Hydrophytic vegetation identified within Wetland XX.</p>				

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	7.5 YR 3/1	100						
2-20	10 YR 7/2	80	7.5 YR 5/6	20	C	PL	SCL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:		Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	<input checked="" type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:
 Hydric soil identified within Wetland XX.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 07-31-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland Y - DP#40
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): basin Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.914784 Long: -78.995006 Datum: NAD 83
 Soil Map Unit Name: White Store sandy loam, 6 to 10% slopes NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	

Remarks: **DP#40 (Wetland Y) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#40**

HYDROLOGY

Wetland Hydrology Indicators:	<u>Secondary Indicators (minimum of two required)</u>
<u>Primary Indicators (minimum of one is required; check all that apply)</u>	_____ Surface Soil Cracks (B6)
<input checked="" type="checkbox"/> Surface Water (A1)	_____ Sparsely Vegetated Concave Surface (B8)
<input checked="" type="checkbox"/> High Water Table (A2)	_____ Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	_____ Moss Trim Lines (B16)
<input checked="" type="checkbox"/> Water Marks (B1)	_____ Dry-Season Water Table (C2)
_____ Sediment Deposits (B2)	_____ Crayfish Burrows (C8)
_____ Drift Deposits (B3)	_____ Saturation Visible on Aerial Imagery (C9)
_____ Algal Mat or Crust (B4)	_____ Stunted or Stressed Plants (D1)
_____ Iron Deposits (B5)	_____ Geomorphic Position (D2)
_____ Inundation Visible on Aerial Imagery (B7)	_____ Shallow Aquitard (D3)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	_____ Microtopographic Relief (D4)
_____ Aquatic Fauna (B13)	_____ FAC-Neutral Test (D5)

Field Observations:	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>3"</u>	
Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u>	
Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland Y.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland Y - DP#40

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. <u><i>Acer rubrum</i></u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>60</u> (A/B)	
2. _____					
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
<u>60</u> = Total Cover 50% of total cover: <u>30</u> 20% of total cover: <u>12</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. <u><i>Liquidambar styraciflua</i></u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>		Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain)
2. <u><i>Acer rubrum</i></u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>		
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
<u>30</u> = Total Cover 50% of total cover: <u>15</u> 20% of total cover: <u>6</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. <u><i>Campsis radicans</i></u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>		Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
2. <u><i>Carex sp.</i></u>	<u>5</u>	<u>Yes</u>	<u>V</u>		
3. _____					
4. _____					
5. _____					
6. _____					
7. _____					
8. _____					
9. _____					
10. _____					
11. _____					
<u>10</u> = Total Cover 50% of total cover: <u>5</u> 20% of total cover: <u>2</u>					
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. <u><i>Vitis aestivalis</i></u>	<u>5</u>	<u>Yes</u>	<u>FACU</u>		
2. _____					
3. _____					
4. _____					
5. _____					
<u>5</u> = Total Cover 50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>					

Remarks: (Include photo numbers here or on a separate sheet)

Hydrophytic vegetation identified within Wetland Y. A variable indicator rating "V" is for the unidentified species.

SOIL

Sampling Point: Wetland Y - DP#40

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	5 Y 5/1	90	7.5 YR 4/6	10	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input checked="" type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soil identified within Wetland Y.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site TTA Light Rail Transit City/County Orange Sampling Date: 09-19-13
 Applicant/Owner Triangle Transit State: NC Sampling Point Wetland YY - DP#27
 Investigator(s): Brandon Fulton, LSS, PWS Section, Township, Range _____
 Landform (hillslope, terrace, etc.): Toe slope Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA) LRR P Lat: 35.904199 Long: -79.018528 Datum: NAD 83
 Soil Map Unit Name: White Store sandy loam, 2 to 6% slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#27 (Wetland YY) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#27	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required, check all that apply)</u> ___ Surface Water (A1) ___ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) ___ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) ___ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) ___ Presence of Reduced Iron (C4) ___ Sediment Deposits (B2) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Drift Deposits (B3) ___ Thin Muck Surface (C7) ___ Algal Mat or Crust (B4) ___ Other (Explain in Remarks) ___ Iron Deposits (B5) ___ inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) ___ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Sparsely Vegetated Concave Surface (B8) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>10"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>3"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Saturation and other indicators of surface water influence were observed within Wetland YY.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland YY - DP#27

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1 _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2 _____	_____	_____	_____	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet:
50% of total cover: _____		20% of total cover: _____		
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1 _____	_____	_____	_____	
2 _____	_____	_____	_____	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
8 _____	_____	_____	_____	
9 _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators:
50% of total cover: _____		20% of total cover: _____		
Herb Stratum (Plot size: <u>1.5 m</u>)				<input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation _____ 2 - Dominance Test is >50% _____ 3 - Prevalence Index is ≤3.0 ¹ _____ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) _____ Problematic Hydrophytic Vegetation ¹ (Explain)
1 <u>Juncus effusus</u>	<u>40</u>	<u>Yes</u>	<u>FACW</u>	
2 <u>Carex stricta</u>	<u>40</u>	<u>Yes</u>	<u>OBL</u>	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
8 _____	_____	_____	_____	
9 _____	_____	_____	_____	
10 _____	_____	_____	_____	
11 _____	_____	_____	_____	
_____ = Total Cover				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
50% of total cover: <u>40</u>		20% of total cover: <u>16</u>		
Woody Vine Stratum (Plot size: <u>1 m</u>)				Definitions of Four Vegetation Strata:
1 _____	_____	_____	_____	
2 _____	_____	_____	_____	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
_____ = Total Cover				Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
50% of total cover: _____		20% of total cover: _____		
Remarks: (Include photo numbers here or on a separate sheet)				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____
Hydrophytic vegetation identified within Wetland YY.				

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-5	10 YR 4/3	100					SCL	
5-20	10 YR 7/2	90	7.5 YR 5/8	10	C	PL	CL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

Hydric soil identified within Wetland YY.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 1-22-14
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland YYY - DP#43
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.953209 Long: -78.978240 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____
Remarks: <u>DP#43 (Wetland YYY) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#43</u>	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <u>X</u> No _____ Depth (inches): <u>1"</u> Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>0"</u> Saturation Present? (includes capillary fringe) Yes <u>X</u> No _____ Depth (inches): <u>0"</u>	Wetland Hydrology Present? Yes <u>X</u> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: <u>Water-stained leaves and other indicators of surface water influence were observed within Wetland YYY.</u>	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland YYY - DP#43

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Acer rubrum</u>	<u>70</u>	<u>Yes</u>	<u>FAC</u>
2. <u>Ulmus americana</u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
50% of total cover: <u>50</u>		100 = Total Cover	
20% of total cover: <u>20</u>			
Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Carpinus caroliniana</u>	<u>30</u>	<u>Yes</u>	<u>FAC</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
50% of total cover: <u>15</u>		30 = Total Cover	
20% of total cover: <u>6</u>			
Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Smilax rotundifolia</u>	<u>10</u>	<u>Yes</u>	<u>FAC</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
50% of total cover: <u>5</u>		10 = Total Cover	
20% of total cover: <u>2</u>			
Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
50% of total cover: _____		_____ = Total Cover	
20% of total cover: _____			

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
 Total Number of Dominant Species Across All Strata: 4 (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by:
 OBL species _____ x 1 = _____
 FACW species _____ x 2 = _____
 FAC species _____ x 3 = _____
 FACU species _____ x 4 = _____
 UPL species _____ x 5 = _____
 Column Totals: _____ (A) _____ (B)
 Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
 ___ 1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 ___ 3 - Prevalence Index is ≤3.0¹
 ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 ___ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:
Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet)
 Hydrophytic vegetation identified within Wetland YYY.

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 4/2	80	10 YR 5/8	20	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

 Hydric soil identified within Wetland YYY.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 7-31-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland Z - DP#39
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.914086 Long: -78.996942 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____	
Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	

Remarks: **DP#39 (Wetland Z) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#39**

HYDROLOGY

Wetland Hydrology Indicators:	<u>Secondary Indicators (minimum of two required)</u>
<u>Primary Indicators (minimum of one is required; check all that apply)</u>	_____ Surface Soil Cracks (B6)
_____ Surface Water (A1)	_____ Sparsely Vegetated Concave Surface (B8)
<input checked="" type="checkbox"/> High Water Table (A2)	_____ Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	_____ Moss Trim Lines (B16)
<input checked="" type="checkbox"/> Water Marks (B1)	_____ Dry-Season Water Table (C2)
_____ Sediment Deposits (B2)	_____ Crayfish Burrows (C8)
_____ Drift Deposits (B3)	_____ Saturation Visible on Aerial Imagery (C9)
_____ Algal Mat or Crust (B4)	_____ Stunted or Stressed Plants (D1)
_____ Iron Deposits (B5)	_____ Geomorphic Position (D2)
_____ Inundation Visible on Aerial Imagery (B7)	_____ Shallow Aquitard (D3)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	_____ Microtopographic Relief (D4)
_____ Aquatic Fauna (B13)	_____ FAC-Neutral Test (D5)

Field Observations:	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>6"</u>	
Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland Z.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland Z - DP#39

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u>Liquidambar styraciflua</u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>
2 <u>Acer rubrum</u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: <u>50</u>	20% of total cover: <u>20</u>		

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____	20% of total cover: _____		

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 <u>Microstegium vimineum</u>	<u>60</u>	<u>Yes</u>	<u>FAC</u>
2 <u>Boehmeria cylindrica</u>	<u>10</u>	<u>No</u>	<u>FACW</u>
3 <u>Lonicera japonica</u>	<u>10</u>	<u>No</u>	<u>FAC</u>
4 _____	_____	_____	_____
5 _____	_____	_____	_____
6 _____	_____	_____	_____
7 _____	_____	_____	_____
8 _____	_____	_____	_____
9 _____	_____	_____	_____
10 _____	_____	_____	_____
11 _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: <u>40</u>	20% of total cover: <u>16</u>		

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____
5 _____	_____	_____	_____
_____ = Total Cover			
50% of total cover: _____	20% of total cover: _____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species _____ x 1 = _____

FACW species _____ x 2 = _____

FAC species _____ x 3 = _____

FACU species _____ x 4 = _____

UPL species _____ x 5 = _____

Column Totals: _____ (A) _____ (B)

Prevalence Index = B/A = _____

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall

Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland Z.

SOIL

Sampling Point: Wetland Z - DP#39

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-20	10 YR 6/1	85	7.5 YR 4/6	15	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils ³ :
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (MLRA 147)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> (MLRA 147, 148)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Piedmont Floodplain Soils (F19)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> (MLRA 136, 147)
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input checked="" type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	
<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:
 Hydric soil identified within Wetland Z.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Orange Sampling Date: 07-17-13
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland ZZ - DP#28
 Investigator(s): Brandon Fulton, LSS, PWS Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Toe slope Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.905663 Long: -79.029793 Datum: NAD 83
 Soil Map Unit Name: White Store-Urban Land Complex, 2 to 8% slopes NWI classification: PF01/EM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: DP#28 (Wetland ZZ) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#28	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required, check all that apply) <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>2"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe **Recorded Data** (stream gauge, monitoring well, aerial photos, previous inspections), if available

Remarks: **Water-stained leaves and other indicators of surface water influence were observed within Wetland ZZ.**

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland ZZ - DP#28

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u><i>Alnus serrulata</i></u>	<u>10</u>	<u>Yes</u>	<u>OBL</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)
2. <u><i>Platanus occidentalis</i></u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>	
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
50% of total cover: <u>10</u>		20% of total cover: <u>4</u>		
Sapling/Shrub Stratum (Plot size: <u>10'</u>)				
1. <u><i>Alnus serrulata</i></u>	<u>5</u>	<u>Yes</u>	<u>OBL</u>	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
_____ = Total Cover				
50% of total cover: <u>2.5</u>		20% of total cover: <u>1</u>		
Herb Stratum (Plot size: <u>1.5 m</u>)				
1. <u><i>Juncus effusus</i></u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>	Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u><i>Carex sp.</i></u>	<u>30</u>	<u>Yes</u>	<u>V</u>	
3. <u><i>Typha latifolia</i></u>	<u>5</u>	<u>No</u>	<u>OBL</u>	
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
_____ = Total Cover				
50% of total cover: <u>32.5</u>		20% of total cover: <u>13</u>		
Woody Vine Stratum (Plot size: <u>1 m</u>)				
1. _____				
2. _____				
3. _____				
4. _____				
5. _____				
_____ = Total Cover				
50% of total cover: _____		20% of total cover: _____		
Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in (7.6 cm) or more in diameter at breast height (DBH), regardless of height Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall Woody vine – All woody vines greater than 3.28 ft in height.				
Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____				
Remarks: (Include photo numbers here or on a separate sheet) <p style="text-align:center;">Hydrophytic vegetation identified within Wetland ZZ. A variable indicator rating "V" is for the unidentified species.</p>				

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10 YR 4/3	100					SCL	
4-20	10 YR 7/2	90	7.5 YR 5/8	10	C	PL	SCL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Dark Surface (S7)	<p>Indicators for Problematic Hydric Soils³:</p> <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) <input type="checkbox"/> Coast Prairie Redox (A16) (MLRA 147, 148) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 136, 147) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Stratified Layers (A5)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> 2 cm Muck (A10) (LRR N)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122)	
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147)	

Restrictive Layer (if observed):

Type _____	Hydric Soil Present? Yes <u>X</u> No _____
Depth (inches) _____	

Remarks:

Hydric soil identified within Wetland ZZ.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: TTA Light Rail Transit City/County: Durham Sampling Date: 1-22-14
 Applicant/Owner: Triangle Transit State: NC Sampling Point: Wetland ZZZ - DP#42
 Investigator(s): Brandon Phillips, CHMM Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 0
 Subregion (LRR or MLRA): LRR P Lat: 35.953608 Long: -78.977814 Datum: NAD 83
 Soil Map Unit Name: Chewacla loam, 0 to 2% slopes, frequently flooded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>DP#42 (Wetland ZZZ) is representative of a Wetland. See Approximate Waters of the U.S Boundary map Exhibit for Location of DP#42</u>	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ Aquatic Fauna (B13)	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>2"</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks: <u>Water-stained leaves and other indicators of surface water influence were observed within Wetland ZZZ.</u>	

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland ZZZ - DP#42

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Acer rubrum</i></u>	<u>40</u>	<u>Yes</u>	<u>FAC</u>
2. <u><i>Ulmus americana</i></u>	<u>35</u>	<u>Yes</u>	<u>FACW</u>
3. <u><i>Platanus occidentalis</i></u>	<u>25</u>	<u>Yes</u>	<u>FACW</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 50 20% of total cover: 20

Sapling/Shrub Stratum (Plot size: <u>10'</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Carpinus caroliniana</i></u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>
2. <u><i>Ulmus americana</i></u>	<u>15</u>	<u>Yes</u>	<u>FACW</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 17.5 20% of total cover: 7

Herb Stratum (Plot size: <u>1.5 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u><i>Smilax rotundifolia</i></u>	<u>20</u>	<u>Yes</u>	<u>FAC</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: 10 20% of total cover: 4

Woody Vine Stratum (Plot size: <u>1 m</u>)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____

_____ = Total Cover
 50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)
 Total Number of Dominant Species Across All Strata: 5 (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by:
 OBL species _____ x 1 = _____
 FACW species _____ x 2 = _____
 FAC species _____ x 3 = _____
 FACU species _____ x 4 = _____
 UPL species _____ x 5 = _____
 Column Totals: _____ (A) _____ (B)
 Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
 ___ 1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 ___ 3 - Prevalence Index is ≤3.0¹
 ___ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 ___ Problematic Hydrophytic Vegetation¹ (Explain)
¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:
Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall
Woody vine – All woody vines greater than 3.28 ft in height

Hydrophytic Vegetation Present? Yes No _____

Remarks: (Include photo numbers here or on a separate sheet.)
 Hydrophytic vegetation identified within Wetland ZZZ.

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8	10 YR 4/3	100					Clay	
8-20	10 YR 4/2	80	10 YR 5/8	20	C	PL	Clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) **(LRR N)**
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- Thin Dark Surface (S9) **(MLRA 147, 148)**
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- Umbric Surface (F13) **(MLRA 136, 122)**
- Piedmont Floodplain Soils (F19) **(MLRA 148)**
- Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) **(MLRA 147)**
- Coast Prairie Redox (A16) **(MLRA 147, 148)**
- Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soil identified within Wetland ZZZ.

NCDWQ Stream Identification Forms

Map ID	Map ID
A	MMM
AA	N
B	NN
C	O
CC	OO
D	OOO
DD	P
E	PP
EE	Q
EEE	QQ
F	QQQ
G	R
GG	RR
GGG	S
H	SS
HH	T
I	TT
II	UU
J	UUU
JJ	V
JJJ	W
K	WW
KK	X
KKK	XX
L	XXX
LL	Y
LLL	YY
M	Z
MM	

RPW Stream A

NC DWQ Stream Identification Form Version 4.11

Date: 06/04/2013	Project/Site: TTA	Latitude: 35.976615
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.957612
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other SW Durham, NC Quad <i>e.g. Quad Name:</i>

A. Geomorphology (Subtotal = **20.0**)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = **8.5**)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = **8.75**)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75, OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream A was determined to be perennial within project limits. Crayfish also observed.

Sketch.

seasonal RPW Stream AA

NC DWQ Stream Identification Form Version 4.11

Date: 08/13/2013	Project/Site: TTA	Latitude: 35.908312
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.993569
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 24.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>11</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	<u>1</u>	2	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>6.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	<u>0.5</u>	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream AA was determined to be intermittent within project limits.

Sketch:

RPW Stream B

NC DWQ Stream Identification Form Version 4.11

Date: 06/04/2013	Project/Site: TTA	Latitude: 35.976339
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.957751
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other SW Durham, NC Quad e.g. Quad Name:
32.50		

A. Geomorphology (Subtotal = **16.0**)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = **8.5**)

12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = **8.00**)

18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream B was determined to be perennial within project limits. Crayfish also observed.

Sketch.

RPW Stream C

NC DWQ Stream Identification Form Version 4.11

Date: 06/04/2013	Project/Site: TTA	Latitude: 35.975685
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.957613
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other SW Durham, NC Quad e.g. Quad Name:
30.50		

A. Geomorphology (Subtotal = 14.0)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.5)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 8.00)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream C was determined to be perennial within project limits. Crayfish also observed.

Sketch:

RPW Stream CC

NC DWQ Stream Identification Form Version 4.11

Date: 08/13/2013	Project/Site: TTA	Latitude: 35.906210
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.995225
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 41.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>18.5</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>9.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	<u>3</u>
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>13.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	<u>3</u>	2	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	0	<u>1</u>	2	3
22. Fish	0	0.5	1	<u>1.5</u>
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream CC was determined to be perennial within project limits.

Sketch.

seasonal RPW Stream D

NC DWQ Stream Identification Form Version 4.11

Date: 06/05/2013	Project/Site: TTA	Latitude: 35.972010
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.956864
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad <i>e.g. Quad Name:</i>
21.50		

A. Geomorphology (Subtotal = 10.0)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	<u>1</u>	2	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	<u>0</u>	1	2	3
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Recent alluvial deposits	<u>0</u>	1	2	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	0.5	<u>1</u>	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.0)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 5.5)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	<u>0</u>	0.5	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <u>Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream D was determined to be intermittent within project limits.

Sketch:

seasonal RPW Stream DD

NC DWQ Stream Identification Form Version 4.11

Date: 08/14/2013	Project/Site: TTA	Latitude: 35.904737
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.998785
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad <i>e.g. Quad Name:</i>
23.75		

A. Geomorphology (Subtotal = <u>10</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	<u>1</u>	2	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = <u>6.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed		<u>FACW = 0.75</u>	OBL = 1.5	Other = 0

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream DD was determined to be intermittent within project limits.

Sketch:

seasonal RPW Stream E

NC DWQ Stream Identification Form Version 4.11

Date: 06/05/2013	Project/Site: TTA	Latitude: 35.971518
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.957078
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$</i> 27.50	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>15.0</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	<u>1</u>	2	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	0.5	<u>1</u>	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7.0</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>5.5</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	<u>0</u>	0.5	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; <u>Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream E was determined to be intermittent within project limits.

Sketch:

RPW Stream EE

NC DWQ Stream Identification Form Version 4.11

Date: 08/14/2013	Project/Site: TTA	Latitude: 35.904704
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.997698
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 14.5)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 10.25)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream EE was determined to be perennial within project limits.

Sketch:

seasonal RPW Stream EEE

NC DWQ Stream Identification Form Version 4.11

Date: 12/10/2013	Project/Site: TTA	Latitude: 35.906472
Evaluator: Brandon Phillips	County: Durham County	Longitude: -79.008771
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other Chapel Hill, NC Quad e.g. Quad Name:
21.25		

A. Geomorphology (Subtotal = <u>9.5</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Recent alluvial deposits	<u>0</u>	1	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7.0</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>4.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	<u>0</u>	0.5	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream EEE was determined to be intermittent within project limits.

Sketch

RPW Stream F

NC DWQ Stream Identification Form Version 4.11

Date: 06/05/2013	Project/Site: TTA	Latitude: 35.960978
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.961410
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 38.25	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 16.5)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	<u>0</u>	1	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.0)

12. Presence of Baseflow	0	1	2	<u>3</u>
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 12.75)

18. Fibrous roots in streambed	<u>3</u>	2	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	1	<u>1.5</u>
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream F was determined to be perennial within project limits.

Sketch.

Seasonal RPW Stream G

NC DWQ Stream Identification Form Version 4.11

Date: 06/05/2013	Project/Site: TTA	Latitude: 35.960352
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.963239
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 11.0)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.0)

12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	<u>No = 0</u>		<u>Yes = 3</u>	

C. Biology (Subtotal = 4.75)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream G was determined to be intermittent within project limits.

Sketch:

seasonal RPW Stream GG

NC DWQ Stream Identification Form Version 4.11

Date: 08/15/2013	Project/Site: TTA	Latitude: 35.983044
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.956850
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 20.5	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad <i>e.g. Quad Name:</i>

A. Geomorphology (Subtotal = <u>10</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>4</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 <u>Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream GG was determined to be intermittent within project limits.

Sketch:

seasonal RPW Stream GGG

NC DWQ Stream Identification Form Version 4.11

Date: 12/10/2013	Project/Site: TTA	Latitude: 35.925876
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.989128
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 23.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>11.5</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	<u>0</u>	1	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>5.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	<u>0</u>	0.5	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream GGG was determined to be intermittent within project limits.

Sketch:

seasonal RPW Stream H

NC DWQ Stream Identification Form Version 4.11

Date: 06/05/2013	Project/Site: TTA	Latitude: 35.959455
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.965589
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 24.75	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>12.5</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	(1)	2	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	0	1	(2)	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	(No = 0)		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	(1)	2	3
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	0	(0.5)	1	1.5
16. Organic debris lines or piles	0	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		(Yes = 3)	

C. Biology (Subtotal = <u>5.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	(1)	0
19. Rooted upland plants in streambed	3	(2)	1	0
20. Macroinvertebrates (note diversity and abundance)	(0)	1	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	(0.5)	1	1.5
24. Amphibians	0	0.5	(1)	1.5
25. Algae	0	(0.5)	1	1.5
26. Wetland plants in streambed	(FACW = 0.75) OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream H was determined to be intermittent within project limits.

Sketch.

RPW Stream HH

NC DWQ Stream Identification Form Version 4.11

Date: 08/15/2013	Project/Site: TTA	Latitude: 35.983516
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.956785
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad <i>e.g. Quad Name:</i>
34.75		

A. Geomorphology (Subtotal = <u>18</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	0.5	<u>1</u>	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>8.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> ; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream HH was determined to be perennial within project limits.

Sketch:

RPW Stream I

NC DWQ Stream Identification Form Version 4.11

Date: 06/05/2013	Project/Site: TTA	Latitude: 35.960085
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.969946
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 15.5)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.0)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 9.25)

18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macrobenthos (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream I was determined to be perennial within project limits.

Sketch.

seasonal RPW Stream II

NC DWQ Stream Identification Form Version 4.11

Date: 09/16/2013	Project/Site: TTA	Latitude: 35.983516
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.953951
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 21.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 10.5)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		<u>Yes = 3</u>	

^aartificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.5)

12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	<u>No = 0</u>		<u>Yes = 3</u>	

C. Biology (Subtotal = 4.25)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	2	<u>1</u>	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream II was determined to be intermittent within project limits.

Sketch:

RPW Stream J - Sandy Creek

NC DWQ Stream Identification Form Version 4.11

Date: 06/05/2013	Project/Site: TTA	Latitude: 35.956158
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.975226
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 47.25	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other SW Durham, NC Quad <i>e.g. Quad Name:</i>

A. Geomorphology (Subtotal = 24)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	3
2. Sinuosity of channel along thalweg	0	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3
4. Particle size of stream substrate	0	1	2	3
5. Active/relict floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Recent alluvial deposits	0	1	2	3
8. Headcuts	0	1	2	3
9. Grade control	0	0.5	1	1.5
10. Natural valley	0	0.5	1	1.5
11. Second or greater order channel	No = 0		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 10.5)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	3
13. Iron oxidizing bacteria	0	1	2	3
14. Leaf litter	1.5	1	0.5	0
15. Sediment on plants or debris	0	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3	

C. Biology (Subtotal = 12.75)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	1	0
19. Rooted upland plants in streambed	3	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	2	3
21. Aquatic Mollusks	0	1	2	3
22. Fish	0	0.5	1	1.5
23. Crayfish	0	0.5	1	1.5
24. Amphibians	0	0.5	1	1.5
25. Algae	0	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75 OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream J (Sandy Creek) was determined to be perennial within project limits.

Sketch.

RPW Stream JJ

NC DWQ Stream Identification Form Version 4.11

Date: 09/17/2013	Project/Site: TTA	Latitude: 35.999698
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.952907
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 31.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>14</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	0.5	<u>1</u>	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^aartificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>9.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream JJ was determined to be perennial within project limits.

Sketch:

seasonal RPW Stream JJJ

NC DWQ Stream Identification Form Version 4.11

Date: 12/10/2013	Project/Site: TTA	Latitude: 35.903190
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.998857
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 21.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>9.5</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	<u>0</u>	1	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Recent alluvial deposits	<u>0</u>	1	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7.0</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>4.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	<u>0</u>	0.5	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream JJJ was determined to be intermittent within project limits.

Sketch.

RPW Stream K

NC DWQ Stream Identification Form Version 4.11

Date: 06/18/2013	Project/Site: TTA	Latitude: 35.954988
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.975801
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 41.25	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>22</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	2	<u>3</u>
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>10</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	<u>3</u>
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>9.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> , OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream K was determined to be perennial within project limits.

Sketch.

RPW Stream KK

NC DWQ Stream Identification Form Version 4.11

Date: 09/17/2013	Project/Site: TTA	Latitude: 36.002065
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.951402
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$</i> 32.25	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other NW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 19)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	0.5	<u>1</u>	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)

12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 6.25)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	2	<u>1</u>	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	<u>0.5</u>	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	FACW = 0.75 ; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream KK was determined to be perennial within project limits.

Sketch:

seasonal RPW Stream KKK

NC DWQ Stream Identification Form Version 4.11

Date: 12/10/2013	Project/Site: TTA	Latitude: 35.901335
Evaluator: Brandon Phillips	County: Durham County	Longitude: -79.008253
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 20.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other Chapel Hill, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>8.5</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	<u>0</u>	1	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Recent alluvial deposits	<u>0</u>	1	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7.0</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>4.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	<u>0</u>	0.5	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream KKK was determined to be intermittent within project limits.

Sketch.

RPW Stream L

NC DWQ Stream Identification Form Version 4.11

Date: 06/18/2013	Project/Site: TTA	Latitude: 35.961054
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.973072
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 33.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 17)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	<u>No = 0</u>		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	1	<u>2</u>	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	<u>No = 0</u>		<u>Yes = 3</u>	

C. Biology (Subtotal = 7.25)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream L was determined to be perennial within project limits.

Sketch.

RPW Stream LL

NC DWQ Stream Identification Form Version 4.11

Date: 09/17/2013	Project/Site: TTA	Latitude: 35.938971
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.992066
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 34.25	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>17</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	0.5	<u>1</u>	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>8.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	<u>0.5</u>	1	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream LL was determined to be perennial within project limits.

Sketch:

seasonal RPW Stream LLL

NC DWQ Stream Identification Form Version 4.11

Date: 12/10/2013	Project/Site: TTA	Latitude: 35.903724
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.013458
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 21.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other Chapel Hill, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>8</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	<u>1</u>	2	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Recent alluvial deposits	<u>0</u>	1	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7.0</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>6.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream LLL was determined to be intermittent within project limits.

Sketch.

seasonal RPW Stream M

NC DWQ Stream Identification Form Version 4.11

Date: 11/06/2013	Project/Site: TTA	Latitude: 35.922657
Evaluator: Brandon Fulton	County: Durham County	Longitude: -79.986684
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 11.5)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)

12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 5.75)

18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream M was determined to be intermittent within project limits.

Sketch:

RPW Stream MM

NC DWQ Stream Identification Form Version 4.11

Date: 09/17/2013	Project/Site: TTA	Latitude: 35.935939
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.990829
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 36.25	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 19)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	2	<u>3</u>
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	0.5	<u>1</u>	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.5)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 8.75)

18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	<u>0.5</u>	1	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream MM was determined to be perennial within project limits.

Sketch:

RPW Stream MMM

NC DWQ Stream Identification Form Version 4.11

Date: 12/10/2013	Project/Site: TTA	Latitude: 35.900496
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.010116
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 30.25	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other Chapel Hill, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>11</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Recent alluvial deposits	<u>0</u>	1	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>9.0</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>10.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream MMM was determined to be perennial within project limits.

Sketch.

seasonal RPW Stream N

NC DWQ Stream Identification Form Version 4.11

Date: 11/06/2013	Project/Site: TTA	Latitude: 35.927208
Evaluator: Brandon Fulton	County: Orange County	Longitude: -79.987333
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 25.75	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad <i>e.g. Quad Name:</i>

A. Geomorphology (Subtotal = 12.5)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)

12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	<u>No = 0</u>		<u>Yes = 3</u>	

C. Biology (Subtotal = 5.75)

18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream N was determined to be intermittent within project limits.

Sketch:

RPW Stream NN

NC DWQ Stream Identification Form Version 4.11

Date: 09/18/2013	Project/Site: TTA	Latitude: 35.929179
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.987929
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 30.25	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>13.5</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>8.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macrobenthos (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> ; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream NN was determined to be perennial within project limits.

Sketch:

RPW Stream O

NC DWQ Stream Identification Form Version 4.11

Date: 07/16/2013	Project/Site: TTA	Latitude: 35.955713
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.978670
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 31.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>17</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	2	<u>3</u>
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>6.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream O was determined to be perennial within project limits.

Sketch.

seasonal RPW Stream OO

NC DWQ Stream Identification Form Version 4.11

Date: 09/18/2013	Project/Site: TTA	Latitude: 35.906073
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.995219
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 19.75	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>7</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	<u>0</u>	1	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	<u>0</u>	1	2	3
9. Grade control	<u>0</u>	0.5	1	1.5
10. Natural valley	<u>0</u>	0.5	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>6.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> ; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream OO was determined to be intermittent within project limits.

Sketch:

seasonal RPW Stream OOO

NC DWQ Stream Identification Form Version 4.11

Date: 12/11/2013	Project/Site: TTA	Latitude: 35.955545
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.984254
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other Durham SW, NC Quad e.g. Quad Name:

25.75

A. Geomorphology (Subtotal = <u>13</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>6.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream OOO was determined to be intermittent within project limits.

Sketch:

seasonal RPW Stream P

NC DWQ Stream Identification Form Version 4.11

Date: 07/16/2013	Project/Site: TTA	Latitude: 35.952995
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.982961
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 25.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad <i>e.g. Quad Name:</i>

A. Geomorphology (Subtotal = <u>14.5</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	<u>1</u>	2	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>4.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream P was determined to be intermittent within project limits.

Sketch.

seasonal RPW Stream PP

NC DWQ Stream Identification Form Version 4.11

Date: 11/06/2013	Project/Site: TTA	Latitude: 35.922953
Evaluator: Brandon Fulton	County: Durham County	Longitude: -79.986421
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 26.75	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 13.5)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 5.75)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream PP was determined to be intermittent within project limits.

Sketch:

seasonal RPW Stream Q

NC DWQ Stream Identification Form Version 4.11

Date: 07/16/2013	Project/Site: TTA	Latitude: 35.952756
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.983074
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 12.5)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6)

12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	<u>No = 0</u>		<u>Yes = 3</u>	

C. Biology (Subtotal = 4.75)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream Q was determined to be intermittent within project limits.

Sketch:

RPW Stream QQ

NC DWQ Stream Identification Form Version 4.11

Date: 11/05/2013	Project/Site: TTA	Latitude: 35.902398
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.014898
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$</i>	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other Chapel Hill, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 12.5)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 10.75)

18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	FACW = 0.75 OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream QQ was determined to be perennial within project limits.

Sketch:

seasonal RPW Stream QQQ

NC DWQ Stream Identification Form Version 4.11

Date: 12/11/2013	Project/Site: TTA	Latitude: 35.953951
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.982939
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 27.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other Durham SW, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>14.5</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	0.5	<u>1</u>	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>6.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macrobenthos (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream QQQ was determined to be intermittent within project limits.

Sketch.

seasonal RPW Stream R

NC DWQ Stream Identification Form Version 4.11

Date: 07/17/2013	Project/Site: TTA	Latitude: 35.946925
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.998766
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:
23.75		

A. Geomorphology (Subtotal = 12.5)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	<u>1</u>	2	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)

12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 3.75)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	<u>0</u>	0.5	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream R was determined to be intermittent within project limits.

Sketch.

RPW Stream RR

NC DWQ Stream Identification Form Version 4.11

Date: 11/05/2013	Project/Site: TTA	Latitude: 35.904249
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.017962
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 33.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other Chapel Hill, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>18</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	<u>1</u>	2	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	0.5	<u>1</u>	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>7.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	<u>0.5</u>	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream RR was determined to be perennial within project limits.

Sketch:

RPW Stream S

NC DWQ Stream Identification Form Version 4.11

Date: 07/18/2013	Project/Site: TTA	Latitude: 35.959693
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.979567
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 40.75	Stream Determination (circle one) Ephemeral Intermittent <input type="radio"/> Perennial <input checked="" type="radio"/>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>19.5</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>10</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	<u>3</u>
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>11.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream S was determined to be perennial within project limits.

Sketch.

seasonal RPW Stream SS

NC DWQ Stream Identification Form Version 4.11

Date: 11/05/2013	Project/Site: TTA	Latitude: 35.903861
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.018298
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other Chapel Hill, NC Quad e.g. Quad Name:
19.75		

A. Geomorphology (Subtotal = <u>8</u>)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Recent alluvial deposits	<u>0</u>	1	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.5)

12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 5.25)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> ; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream SS was determined to be intermittent within project limits.

Sketch:

RPW Stream T (New Hope Creek)

NC DWQ Stream Identification Form Version 4.11

Date: 07/18/2013	Project/Site: TTA	Latitude: 35.958850
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.981211
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 23)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	2	<u>3</u>
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 10.5)

12. Presence of Baseflow	0	1	2	<u>3</u>
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	1	<u>1.5</u>
16. Organic debris lines or piles	0	0.5	1	<u>1.5</u>
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 13.75)

18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	0	<u>1</u>	2	3
22. Fish	0	0.5	1	<u>1.5</u>
23. Crayfish	0	0.5	1	<u>1.5</u>
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream T (New Hope Creek) was determined to be perennial within project limits.

Sketch.

RPW Stream TT

NC DWQ Stream Identification Form Version 4.11

Date: 11/05/2013	Project/Site: TTA	Latitude: 35.906395
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.024656
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 34.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other Chapel Hill, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 18.5)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 8.75)

18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> ; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream TT was determined to be perennial within project limits.

Sketch:

seasonal RPW Stream UU

NC DWQ Stream Identification Form Version 4.11

Date: 11/05/2013	Project/Site: TTA	Latitude: 35.905825
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.029577
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$</i>	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other Chapel Hill, NC Quad e.g. Quad Name:
25.25		

A. Geomorphology (Subtotal = <u>8</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	<u>0</u>	1	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Recent alluvial deposits	<u>0</u>	1	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>9.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> ; OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream UU was determined to be intermittent within project limits.

Sketch:

RPW Stream UUU

NC DWQ Stream Identification Form Version 4.11

Date: 01/21/2014	Project/Site: TTA	Latitude: 35.954952
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.973348
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 24)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	2	<u>3</u>
7. Recent alluvial deposits	0	1	2	<u>3</u>
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9.5)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	1	<u>1.5</u>
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 12.75)

18. Fibrous roots in streambed	<u>3</u>	2	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	1	<u>1.5</u>
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	FACW = 0.75 OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream UUU was determined to be perennial within project limits.

Sketch.

seasonal RPW Stream V

NC DWQ Stream Identification Form Version 4.11

Date: 07/31/2013	Project/Site: TTA	Latitude: 35.916023
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.989454
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 27.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad <i>e.g. Quad Name:</i>

A. Geomorphology (Subtotal = <u>12.5</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	<u>1</u>	2	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^aartificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>7</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>7.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	0.5	1	<u>1.5</u>
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream V was determined to be intermittent within project limits.

Sketch.

seasonal RPW Stream W

NC DWQ Stream Identification Form Version 4.11

Date: 07/31/2013	Project/Site: TTA	Latitude: 35.914764
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.998681
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$</i> 23.25	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 12.5)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	<u>0</u>	1	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	<u>No = 0</u>		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 5.5)

12. Presence of Baseflow	<u>0</u>	1	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	<u>No = 0</u>		<u>Yes = 3</u>	

C. Biology (Subtotal = 5.25)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	<u>0</u>	0.5	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream W was determined to be intermittent within project limits.

Sketch.

RPW Stream WW - Chapel Branch

NC DWQ Stream Identification Form Version 4.11

Date: 11/05/2013	Project/Site: TTA	Latitude: 35.905374
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.028821
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 38.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other Chapel Hill, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 19.5)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	2	<u>3</u>
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	2	<u>3</u>
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.5)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 10.75)

18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream WW (Chapel Branch) was determined to be perennial within project limits.

Sketch:

RPW Stream X

NC DWQ Stream Identification Form Version 4.11

Date: 08/01/2013	Project/Site: TTA	Latitude: 35.913729
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.998816
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 39.5	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 18)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 12.5)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	0	<u>1</u>	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	FACW = 0.75; <u>OBL = 1.5</u> ; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream X was determined to be perennial within project limits.

Sketch.

seasonal RPW Stream XX

NC DWQ Stream Identification Form Version 4.11

Date: 11/05/2013	Project/Site: TTA	Latitude: 35.899108
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.036483
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 19.75	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other Chapel Hill, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>9</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	<u>1</u>	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	1	<u>2</u>	3
5. Active/relict floodplain	0	<u>1</u>	2	3
6. Depositional bars or benches	<u>0</u>	1	2	3
7. Recent alluvial deposits	<u>0</u>	1	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	<u>0.5</u>	1	1.5
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>6.5</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	<u>0</u>	1	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>4.25</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	<u>0</u>	1	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	<u>0</u>	0.5	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream XX was determined to be intermittent within project limits.

Sketch:

RPW Stream XXX

NC DWQ Stream Identification Form Version 4.11

Date: 01/22/2014	Project/Site: TTA	Latitude: 35.954375
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.977513
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 31.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = <u>17</u>)	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	1	2	<u>3</u>
7. Recent alluvial deposits	0	1	<u>2</u>	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	<u>No = 0</u>		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8</u>)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	<u>1</u>	2	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = <u>6.75</u>)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macrobenthos (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	<u>0</u>	0.5	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	<u>0.5</u>	1	1.5
25. Algae	<u>0</u>	0.5	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream XXX was determined to be perennial within project limits.

Sketch:

RPW Stream Y

NC DWQ Stream Identification Form Version 4.11

Date: 08/01/2013	Project/Site: TTA	Latitude: 35.913654
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.999032
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 40	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 18)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	2	<u>3</u>
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	1	<u>2</u>	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	1	<u>1.5</u>
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 9)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 13)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	0	<u>1</u>	2	3
22. Fish	0	0.5	1	<u>1.5</u>
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	0.5	<u>1</u>	1.5
26. Wetland plants in streambed	FACW = 0.75; <u>OBL = 1.5</u> ; Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream Y was determined to be perennial within project limits.

Sketch:

RPW Stream YY - Meeting of the Waters

NC DWQ Stream Identification Form Version 4.11

Date: 11/05/2013	Project/Site: TTA	Latitude: 35.899077
Evaluator: Brandon Phillips	County: Orange County	Longitude: -79.035864
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$</i>	Stream Determination (circle one) Ephemeral Intermittent <input type="checkbox"/> Perennial <input checked="" type="checkbox"/>	Other Chapel Hill, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 19.5)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	<u>2</u>	3
4. Particle size of stream substrate	0	1	2	<u>3</u>
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	1	<u>2</u>	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.5)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	1	<u>0.5</u>	0
15. Sediment on plants or debris	0	0.5	<u>1</u>	1.5
16. Organic debris lines or piles	0	0.5	<u>1</u>	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 10.25)

18. Fibrous roots in streambed	3	<u>2</u>	1	0
19. Rooted upland plants in streambed	3	<u>2</u>	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	<u>2</u>	3
21. Aquatic Mollusks	<u>0</u>	1	2	3
22. Fish	0	0.5	<u>1</u>	1.5
23. Crayfish	0	0.5	<u>1</u>	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75; OBL = 1.5 Other = 0</u>			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream YY (Meeting of the Waters) was determined to be perennial within project limits.

Sketch:

RPW Stream Z

NC DWQ Stream Identification Form Version 4.11

Date: 08/13/2013	Project/Site: TTA	Latitude: 35.908000
Evaluator: Brandon Phillips	County: Durham County	Longitude: -78.993723
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 32.75	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other SW Durham, NC Quad e.g. Quad Name:

A. Geomorphology (Subtotal = 15.5)

	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	<u>2</u>	3
2. Sinuosity of channel along thalweg	0	1	<u>2</u>	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	<u>1</u>	2	3
4. Particle size of stream substrate	0	<u>1</u>	2	3
5. Active/relict floodplain	0	1	<u>2</u>	3
6. Depositional bars or benches	0	<u>1</u>	2	3
7. Recent alluvial deposits	0	<u>1</u>	2	3
8. Headcuts	0	<u>1</u>	2	3
9. Grade control	0	<u>0.5</u>	1	1.5
10. Natural valley	0	0.5	<u>1</u>	1.5
11. Second or greater order channel	No = 0		<u>Yes = 3</u>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)

12. Presence of Baseflow	0	1	<u>2</u>	3
13. Iron oxidizing bacteria	0	<u>1</u>	2	3
14. Leaf litter	1.5	<u>1</u>	0.5	0
15. Sediment on plants or debris	0	<u>0.5</u>	1	1.5
16. Organic debris lines or piles	0	<u>0.5</u>	1	1.5
17. Soil-based evidence of high water table?	No = 0		<u>Yes = 3</u>	

C. Biology (Subtotal = 9.25)

18. Fibrous roots in streambed	3	2	<u>1</u>	0
19. Rooted upland plants in streambed	<u>3</u>	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	<u>1</u>	2	3
21. Aquatic Mollusks	0	<u>1</u>	2	3
22. Fish	0	<u>0.5</u>	1	1.5
23. Crayfish	0	<u>0.5</u>	1	1.5
24. Amphibians	0	0.5	<u>1</u>	1.5
25. Algae	0	<u>0.5</u>	1	1.5
26. Wetland plants in streambed	<u>FACW = 0.75</u> OBL = 1.5 Other = 0			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes: Stream Z was determined to be perennial within project limits.

Sketch.

USACE Stream Quality Assessment Worksheets

Map ID	Map ID
A	MMM
AA	N
B	NN
C	O
CC	OO
D	OOO
DD	P
E	PP
EE	Q
EEE	QQ
F	QQQ
G	R
GG	RR
GGG	S
H	SS
HH	T
I	TT
II	UU
J	UUU
JJ	V
JJJ	W
K	WW
KK	X
KKK	XX
L	XXX
LL	Y
LLL	YY
M	Z
MM	

RPW Stream A



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
 3. Date of Evaluation: 6/4/13 4. Time of Evaluation: 10:00 am
 5. Name of Stream: Unnamed 6. River Basin: Cape Fear
 7. Approximate Drainage Area: 100 acres 8. Stream Order: 2nd
 9. Length of Reach Evaluated: 100 ft. 10. County: Durham
 11. Location of reach under evaluation (include nearby roads and landmarks): east of US 501/15, north of Herald Sun Building
 12. Site Coordinates (if known): 35.976615 N -78.957612 W
 13. Proposed Channel Work (if any): rail crossing
 14. Recent Weather Conditions: hot, humid
 15. Site conditions at time of visit: warm, humid
 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
 20. Estimated Watershed Land Use: 25 % Residential 10 % Commercial % Industrial % Agricultural
65 % Forested % Cleared / Logged % Other (_____)
 21. Bankfull Width: 10 ft 22. Bank Height (from bed to top of bank): 4 ft
 23. Channel slope down center of stream: Flat (0 to 2%) x Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
 24. Channel Sinuosity: Straight Occasional Bends x Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 62 Comments: Perennial RPW

RPW Stream A was determined to have perennial flow within project limits.

Evaluator's Signature B. Phillips Date 6/4/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream A

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	1
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	5
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						62

* These characteristics are not assessed in coastal streams.

seasonal RPW Stream AA



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
 3. Date of Evaluation: 8/13/13 4. Time of Evaluation: 9:30 am
 5. Name of Stream: unnamed 6. River Basin: Cape Fear
 7. Approximate Drainage Area: 50 acres 8. Stream Order: 1st
 9. Length of Reach Evaluated: 50 ft. 10. County: Durham
 11. Location of reach under evaluation (include nearby roads and landmarks): east of George King Road.
 12. Site Coordinates (if known): 35.908312 N -78.993569 W
 13. Proposed Channel Work (if any): rail embankment
 14. Recent Weather Conditions: hot, humid
 15. Site conditions at time of visit: warm, humid
 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
 17. Is there a pond or lake located upstream of the evaluation point? YES (NO) If yes, estimate the water surface area: _____
 18. Does channel appear on USGS quad map? YES (NO) 19. Does channel appear on USDA Soil Survey? YES (NO)
 20. Estimated Watershed Land Use: 15 % Residential % Commercial % Industrial % Agricultural
85 % Forested % Cleared / Logged % Other (_____)
 21. Bankfull Width: 5 ft 22. Bank Height (from bed to top of bank): 1 foot
 23. Channel slope down center of stream: Flat (0 to 2%) X Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
 24. Channel Sinuosity: Straight Occasional Bends X Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 52Comments: Seasonal RPW

Seasonal RPW Stream AA was determined to have intermittent flow within project limits.

Evaluator's Signature B. PhillipsDate 8/13/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream AA

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						52

* These characteristics are not assessed in coastal streams.

RPW Stream B



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 6/4/13 4. Time of Evaluation: 11:00 am
5. Name of Stream: Unnamed 6. River Basin: Cape Fear
7. Approximate Drainage Area: 25 acres 8. Stream Order: 1st
9. Length of Reach Evaluated: 100 ft. 10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): east of US 501/15, north of Herald Sun Building
12. Site Coordinates (if known): 35.976339 N -78.957751 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: hot, humid
15. Site conditions at time of visit: warm, humid
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 25 % Residential 10 % Commercial % Industrial % Agricultural
65 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 4 ft 22. Bank Height (from bed to top of bank): 6 inches
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 57Comments: Perennial RPW

RPW Stream B was determined to have perennial flow within project limits.

Evaluator's Signature B. PhillipsDate 6/4/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream B

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						57

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream C



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 6/4/13
- 4. Time of Evaluation: 1:00 pm
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 25 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of US 501/15, north of Herald Sun Building
- 12. Site Coordinates (if known): 35.975685 N -78.957613 W
- 13. Proposed Channel Work (if any): rail embankment
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 25 % Residential 10 % Commercial % Industrial % Agricultural 65 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 3 ft
- 22. Bank Height (from bed to top of bank): 6 inches
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 55 Comments: Perennial RPW

RPW Stream C was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 6/4/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream C

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						55

* These characteristics are not assessed in coastal streams.

RPW Stream CC



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 8/13/13
4. Time of Evaluation: 11:30 am
5. Name of Stream: unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: 250 acres
8. Stream Order: 2nd
9. Length of Reach Evaluated: 100 ft.
10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): west of George King Road, south of US 54.
12. Site Coordinates (if known): 35.906210 N -78.995225 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: hot, humid
15. Site conditions at time of visit: warm, humid
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 10 acres
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 15 % Residential % Commercial % Industrial % Agricultural 85 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 20 ft
22. Bank Height (from bed to top of bank): 4 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 69 **Comments:** Perennial RPW

RPW Stream CC was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 8/13/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream CC

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	4
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						69

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

seasonal RPW Stream D



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 6/5/13
- 4. Time of Evaluation: 10:00 am
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 15 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Tower Rd, north of Chapel Hill Blvd. Svc Rd.
- 12. Site Coordinates (if known): 35.972010 N -78.956864 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 95 % Residential % Commercial % Industrial % Agricultural 5 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 3 ft
- 22. Bank Height (from bed to top of bank): 6 inches
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 37 Comments: Seasonal RPW

Seasonal RPW Stream D was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 6/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream D

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	1
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	1
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	1
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	1
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	4
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	1
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	3
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						37

* These characteristics are not assessed in coastal streams.

seasonal RPW Stream DD



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
 3. Date of Evaluation: 8/14/13 4. Time of Evaluation: 8:30 am
 5. Name of Stream: unnamed 6. River Basin: Cape Fear
 7. Approximate Drainage Area: 50 acres 8. Stream Order: 1st
 9. Length of Reach Evaluated: 100 ft. 10. County: Durham
 11. Location of reach under evaluation (include nearby roads and landmarks): west of George King Road, north of US 54.
 12. Site Coordinates (if known): 35.904737 N -78.998785 W
 13. Proposed Channel Work (if any): rail embankment
 14. Recent Weather Conditions: hot, humid
 15. Site conditions at time of visit: warm, humid
 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
 20. Estimated Watershed Land Use: % Residential % Commercial % Industrial % Agricultural
 100 % Forested % Cleared / Logged % Other (_____)
 21. Bankfull Width: 6 ft 22. Bank Height (from bed to top of bank): 6 inches
 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 49Comments: Seasonal RPW

RPW Stream DD was determined to have intermittent flow within project limits.

Evaluator's Signature B. PhillipsDate 8/14/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream DD

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						49

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ# _____

seasonal RPW Stream E



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 6/5/13
- 4. Time of Evaluation: 10:30 am
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 25 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Tower Rd. north of Chapel Hill Blvd. Svc Rd.
- 12. Site Coordinates (if known): 35.9715180 N -78.957078 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 75 % Residential 10 % Commercial % Industrial % Agricultural 15 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 4 ft
- 22. Bank Height (from bed to top of bank): 6 inches
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 44 Comments: Seasonal RPW

Seasonal RPW Stream E was determined to have intermittent flow within project limits.

Evaluator's Signature *B. Phillips* Date 6/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream E

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						44

* These characteristics are not assessed in coastal streams.

RPW Stream EE



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 8/14/13 4. Time of Evaluation: 10:30 am
5. Name of Stream: unnamed 6. River Basin: Cape Fear
7. Approximate Drainage Area: 50 acres 8. Stream Order: 1st
9. Length of Reach Evaluated: 100 ft. 10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): west of George King Road, south of US 54.
12. Site Coordinates (if known): 35.904704 N -78.997698 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: hot, humid
15. Site conditions at time of visit: warm, humid
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: % Residential % Commercial % Industrial % Agricultural
 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 6 ft 22. Bank Height (from bed to top of bank): 6 inches
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 61 Comments: Perennial RPW

RPW Stream EE was determined to have perennial flow within project limits.

Evaluator's Signature B. Phillips Date 8/14/13

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STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream EE

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	4
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						61

* These characteristics are not assessed in coastal streams.

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DWQ # _____



seasonal RPW Stream EEE STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 12/10/13
- 4. Time of Evaluation: 3:45 pm
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Meadowmont Lane
- 12. Site Coordinates (if known): 35.906472 N -79.008771 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: cold, rainy
- 15. Site conditions at time of visit: cold, rainy
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: % Residential 85 % Commercial % Industrial % Agricultural
 15 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 2ft
- 22. Bank Height (from bed to top of bank): 1 foot
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 42 Comments: Seasonal RPW

RPW Stream EEE was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 12/10/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream EEE

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)					42	

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID#

DWQ #

RPW Stream F



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 6/5/13
- 4. Time of Evaluation: 11:30 am
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 100 acres
- 8. Stream Order: 2nd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of University Dr, south of MLK Jr. Pkwy.
- 12. Site Coordinates (if known): 35.960978 N -78.961410 W
- 13. Proposed Channel Work (if any): rail embankment
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 1 acre
- 18. Does channel appear on USGS quad map? YES NO
- 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 25 % Residential 60 % Commercial % Industrial % Agricultural 15 % Forested % Cleared / Logged % Other ()
- 21. Bankfull Width: 25 ft
- 22. Bank Height (from bed to top of bank): 6 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 61 Comments: Perennial RPW

RPW Stream F was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 6/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream F

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						61

* These characteristics are not assessed in coastal streams.

Seasonal RPW Stream G



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 6/5/13 4. Time of Evaluation: 10:30 am
5. Name of Stream: Unnamed 6. River Basin: Cape Fear
7. Approximate Drainage Area: 25 acres 8. Stream Order: 1st
9. Length of Reach Evaluated: 100 ft. 10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): east and west of University Drive and south of MLK Jr. Parkway
12. Site Coordinates (if known): 35.959836 N -78.936050 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: hot, humid
15. Site conditions at time of visit: warm, humid
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 85 % Residential % Commercial % Industrial % Agricultural
15 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 4 ft 22. Bank Height (from bed to top of bank): 2-3 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 57Comments: Perennial RPW

Seasonal RPW Stream G was determined to have intermittent flow within project limits.

Evaluator's Signature B. PhillipsDate 6/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

Seasonal RPW Stream G

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	1
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	1
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	1
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	2
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						38

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

Seasonal RPW Stream GG



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 8/15/13
- 4. Time of Evaluation: 10:30 am
- 5. Name of Stream: UT to Sandy Creek
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~3 acres
- 8. Stream Order: 1
- 9. Length of Reach Evaluated: 30 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of intersection of NC 15/501 and Cornwallis Road
- 12. Site Coordinates (if known): 35.983044 N -78.956850 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 85 % Residential % Commercial % Industrial % Agricultural 15 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 4 ft
- 22. Bank Height (from bed to top of bank): 2-3 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 40 Comments: Intermittent RPW

Seasonal RPW Stream GG was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 8/15/13

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STREAM QUALITY ASSESSMENT WORKSHEET

Seasonal RPW Stream GG

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	1
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	1
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	0
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	1
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						40

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____



seasonal RPW Stream GGG STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 12/10/13
4. Time of Evaluation: 9:30 am
5. Name of Stream: unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: 50 acres
8. Stream Order: 1st
9. Length of Reach Evaluated: 100 ft.
10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): west of George King Road.
12. Site Coordinates (if known): 35.925876 N -78.989128 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: cold, rainy
15. Site conditions at time of visit: cold, rainy
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 2 acres
18. Does channel appear on USGS quad map? YES NO
19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 15 % Residential % Commercial % Industrial % Agricultural
85 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 4ft
22. Bank Height (from bed to top of bank): 1 foot
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 51 Comments: Seasonal RPW

RPW Stream GGG was determined to have intermittent flow within project limits.

Evaluator's Signature [Signature] Date 12/10/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change - version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream GGG

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	4
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	2
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	1
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						51

* These characteristics are not assessed in coastal streams.

seasonal RPW Stream H



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 6/5/13
- 4. Time of Evaluation: 1:30 pm
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of University Dr, south of MLK Jr. Pkwy.
- 12. Site Coordinates (if known): 35.959455 N -78.965589 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 1 acre
- 18. Does channel appear on USGS quad map? YES NO
- 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 75 % Residential % Commercial % Industrial % Agricultural 25 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 5 ft
- 22. Bank Height (from bed to top of bank): 1 foot
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 46 Comments: Seasonal RPW

Seasonal RPW Stream H was determined to have intermittent flow within project limits.

Evaluator's Signature [Signature] Date 6/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream H

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						46

* These characteristics are not assessed in coastal streams.

Perennial RPW Stream HH



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
 3. Date of Evaluation: 8/15/13 4. Time of Evaluation: 11:45 am
 5. Name of Stream: UT to Sandy Creek 6. River Basin: Cape Fear
 7. Approximate Drainage Area: ~1500 acres 8. Stream Order: >3
 9. Length of Reach Evaluated: 50 ft. 10. County: Durham
 11. Location of reach under evaluation (include nearby roads and landmarks): east of intersection of NC 15/501 and Cornwallis Road
 12. Site Coordinates (if known): 35.983516 N -78.956785 W
 13. Proposed Channel Work (if any): rail crossing
 14. Recent Weather Conditions: hot, humid
 15. Site conditions at time of visit: warm, humid
 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
 20. Estimated Watershed Land Use: 85 % Residential % Commercial % Industrial % Agricultural
15 % Forested % Cleared / Logged % Other (_____)
 21. Bankfull Width: 25 ft 22. Bank Height (from bed to top of bank): 4-5 feet
 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 62Comments: Perennial RPW

Perennial RPW Stream HH was determined to have perennial flow within project limits.

Evaluator's Signature B. PhillipsDate 8/15/13

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STREAM QUALITY ASSESSMENT WORKSHEET

Seasonal RPW Stream HH

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						62

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID#

DWQ #

RPW Stream I



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 6/5/13
- 4. Time of Evaluation: 2:30 pm
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 100 acres
- 8. Stream Order: 2nd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Garrett Rd. west of University Dr.
- 12. Site Coordinates (if known): 35.960085 N -78.969946 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 1 acre
- 18. Does channel appear on USGS quad map? YES NO
- 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 25 % Residential % Commercial % Industrial % Agricultural 75 % Forested % Cleared / Logged % Other ()
- 21. Bankfull Width: 6 ft
- 22. Bank Height (from bed to top of bank): 2 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 56 Comments: Perennial RPW

RPW Stream I was determined to have perennial flow within project limits.

Evaluator's Signature [Signature] Date 6/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream I

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						56

* These characteristics are not assessed in coastal streams.

Seasonal RPW Stream II



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 9/16/13
4. Time of Evaluation: 9:15 am
5. Name of Stream: UT to Sandy Creek
6. River Basin: Cape Fear
7. Approximate Drainage Area: ~30 acres
8. Stream Order: 1
9. Length of Reach Evaluated: 50 ft.
10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): south of intersection of Cameron Blvd and Erwin Road
12. Site Coordinates (if known): 35.983516 N -78.953951 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: warm, humid
15. Site conditions at time of visit: warm, humid
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 85 % Residential % Commercial % Industrial % Agricultural
15 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 4 ft
22. Bank Height (from bed to top of bank): 1-2 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 50 Comments: Seasonal RPW

Seasonal RPW Stream II was determined to have seasonal flow within project limits.

Evaluator's Signature B. Phillips Date 9/16/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

Seasonal RPW Stream II

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						50

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

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DWQ # _____

RPW Stream J - Sandy Creek



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 6/5/13
- 4. Time of Evaluation: 3:00 pm
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 250 acres
- 8. Stream Order: 3rd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Garrett Rd. west of University Dr.
- 12. Site Coordinates (if known): 35.956158 N -78.975226 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 1 acre
- 18. Does channel appear on USGS quad map? YES NO
- 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 20 % Residential 20 % Commercial % Industrial % Agricultural
60 % Forested % Cleared / Logged % Other ()
- 21. Bankfull Width: 30 ft
- 22. Bank Height (from bed to top of bank): 4 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 74 Comments: Perennial RPW

RPW Stream J (Sandy Creek) was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 6/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream J – Sandy Creek

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	4
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	5
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	5
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	4
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						74

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream JJ



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 9/17/13
- 4. Time of Evaluation: 8:45 am
- 5. Name of Stream: UT to Sandy Creek
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~100 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of Erwin Road and north of Cameron Blvd.
- 12. Site Coordinates (if known): 35.999698 N -78.952907 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: mild, dry
- 15. Site conditions at time of visit: warm, dry
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO
- 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: % Residential % Commercial % Industrial % Agricultural % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 10 ft
- 22. Bank Height (from bed to top of bank): 3 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 56 Comments: Perennial RPW

Perennial RPW Stream JJ was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 9/17/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream JJ

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						56

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____



seasonal RPW Stream JJJ STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 12/10/13
- 4. Time of Evaluation: 3:30 pm
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): south of NC 54
- 12. Site Coordinates (if known): 35.903190 N -78.998857 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: cold, rainy
- 15. Site conditions at time of visit: cold, rainy
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 50 % Residential 15 % Commercial % Industrial % Agricultural 35 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 4 ft
- 22. Bank Height (from bed to top of bank): 1 foot
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 46 Comments: Seasonal RPW

RPW Stream JJJ was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 12/10/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream JJJ

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						46

* These characteristics are not assessed in coastal streams.

RPW Stream K



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 6/5/13
4. Time of Evaluation: 4:00 pm
5. Name of Stream: Unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: 100 acres
8. Stream Order: 2nd
9. Length of Reach Evaluated: 100 ft.
10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): east of Garrett Rd, west of University Dr.
12. Site Coordinates (if known): 35.954988 N -78.975801 W
13. Proposed Channel Work (if any): rail embankment
14. Recent Weather Conditions: hot, humid
15. Site conditions at time of visit: warm, humid
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 25 % Residential % Commercial % Industrial % Agricultural 75 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 6 ft
22. Bank Height (from bed to top of bank): 2 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 60 **Comments:** Perennial RPW

RPW Stream K was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 6/5/13

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STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream K

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						60

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream KK



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 9/17/13
- 4. Time of Evaluation: 10:00 am
- 5. Name of Stream: UT to Sandy Creek
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~100 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of Erwin Road and north of Cameron Blvd.
- 12. Site Coordinates (if known): 36.002065 N -78.951402 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: mild, dry
- 15. Site conditions at time of visit: warm, dry
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: % Residential 20 % Commercial % Industrial % Agricultural 80 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 12 ft
- 22. Bank Height (from bed to top of bank): 4 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 60 Comments: Perennial RPW

Perennial RPW Stream KK was determined to have perennial flow within project limits.

Evaluator's Signature [Signature] Date 9/17/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream KK

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	4
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	2
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						60

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____



seasonal RPW Stream KKK STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 12/10/13
- 4. Time of Evaluation: 4:00 pm
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): south of NC 54
- 12. Site Coordinates (if known): 35.901335 N -79.008253 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: cold, rainy
- 15. Site conditions at time of visit: cold, rainy
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 60 % Residential 15 % Commercial % Industrial % Agricultural 25 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 2ft
- 22. Bank Height (from bed to top of bank): 1 foot
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 41 Comments: Seasonal RPW

RPW Stream KKK was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 12/10/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream KKK

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						41

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream L



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 6/5/13
- 4. Time of Evaluation: 4:30 pm
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Garrett Rd, west of University Dr.
- 12. Site Coordinates (if known): 35.961054 N -78.973072 W
- 13. Proposed Channel Work (if any): rail embankment
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: % Residential 85 % Commercial % Industrial % Agricultural 15 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 6 ft
- 22. Bank Height (from bed to top of bank): 2 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 53 Comments: Perennial RPW

RPW Stream L was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 6/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream L

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 - 5	0 - 4	0 - 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 - 6	0 - 5	0 - 5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 - 6	0 - 4	0 - 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 - 5	0 - 4	0 - 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 - 3	0 - 4	0 - 4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 - 4	0 - 4	0 - 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 - 5	0 - 4	0 - 2	1
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 - 6	0 - 4	0 - 2	2
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 - 5	0 - 4	0 - 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 - 5	0 - 4	0 - 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 - 4	0 - 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 - 5	0 - 4	0 - 5	1
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 - 5	0 - 5	0 - 5	1
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 - 3	0 - 4	0 - 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 - 5	0 - 4	0 - 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 - 3	0 - 5	0 - 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 - 6	0 - 6	0 - 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 - 5	0 - 5	0 - 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 - 4	0 - 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 - 4	0 - 5	0 - 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 - 4	0 - 4	0 - 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 - 4	0 - 4	0 - 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 - 6	0 - 5	0 - 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						53

* These characteristics are not assessed in coastal streams.

RPW Stream LL



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 9/17/13
- 4. Time of Evaluation: 1:30 pm
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~100 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of I-40 and east of Crystal Oaks Ct.
- 12. Site Coordinates (if known): 35.929179 N -78.987929 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: mild, dry
- 15. Site conditions at time of visit: warm, dry
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 15 acres
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 40 % Residential % Commercial % Industrial % Agricultural 60 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 8 ft
- 22. Bank Height (from bed to top of bank): 2 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 56 Comments: Perennial RPW

Perennial RPW Stream LL was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 9/17/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream LL

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						56

* These characteristics are not assessed in coastal streams.

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DWQ # _____



seasonal RPW Stream LLL STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 12/10/13
4. Time of Evaluation: 4:15 pm
5. Name of Stream: unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: 50 acres
8. Stream Order: 1st
9. Length of Reach Evaluated: 50 ft.
10. County: Orange
11. Location of reach under evaluation (include nearby roads and landmarks): south of NC 54
12. Site Coordinates (if known): 35.903724 N -79.013458 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: cold, rainy
15. Site conditions at time of visit: cold, rainy
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 3 acres
18. Does channel appear on USGS quad map? YES NO
19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: % Residential % Commercial % Industrial % Agricultural
 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 2ft
22. Bank Height (from bed to top of bank): 1 foot
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 42 Comments: Seasonal RPW

RPW Stream LLL was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 12/10/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream LLL

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	1
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						42

* These characteristics are not assessed in coastal streams.

RPW Stream M



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Fulton
3. Date of Evaluation: 11/06/13 4. Time of Evaluation: 12:30 pm
5. Name of Stream: unnamed 6. River Basin: Cape Fear
7. Approximate Drainage Area: ~20 acres 8. Stream Order: 1st
9. Length of Reach Evaluated: 50 ft. 10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): west of I-40 and east of Fairington Rd.
12. Site Coordinates (if known): 35.922657 N -78.986684 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: mild, dry
15. Site conditions at time of visit: cool, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 70 % Residential % Commercial % Industrial % Agricultural
30 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 4 ft 22. Bank Height (from bed to top of bank): 2 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 42 Comments: Intermittent RPW

Seasonal RPW Stream M was determined to have intermittent flow within project limits.

Evaluator's Signature B. Fulton Date 11/6/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream NN

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	1
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						42

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream MM



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 9/17/13
- 4. Time of Evaluation: 3:30 pm
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~100 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of I-40 and east of Bakers Mill Rd.
- 12. Site Coordinates (if known): 35.929179 N -78.987929 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: mild, dry
- 15. Site conditions at time of visit: warm, dry
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 60 % Residential % Commercial % Industrial % Agricultural 40 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 12 ft
- 22. Bank Height (from bed to top of bank): 3 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 59 Comments: Perennial RPW

Perennial RPW Stream MM was determined to have perennial flow within project limits.

Evaluator's Signature Date 9/17/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream MM

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)					59	

* These characteristics are not assessed in coastal streams.



RPW Stream MMM STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 12/10/13
- 4. Time of Evaluation: 4:30 pm
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Orange
- 11. Location of reach under evaluation (include nearby roads and landmarks): south of NC 54
- 12. Site Coordinates (if known): 35.900496 N -79.010116 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: cold, rainy
- 15. Site conditions at time of visit: cold, rainy
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 1 acre
- 18. Does channel appear on USGS quad map? YES NO
- 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: % Residential 85 % Commercial % Industrial % Agricultural 15 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 4ft
- 22. Bank Height (from bed to top of bank): 1-3 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 53 Comments: Perennial RPW

RPW Stream MMM was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 12/10/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream MMM

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	1
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	1
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	4
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)					53	

* These characteristics are not assessed in coastal streams.

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DWQ #

RPW Stream N



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Fulton
- 3. Date of Evaluation: 11/06/13
- 4. Time of Evaluation: 9:15 am
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~20 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of I-40 and east of Fairington Rd.
- 12. Site Coordinates (if known): 35.927208 N -79.987333 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: mild, dry
- 15. Site conditions at time of visit: cool, dry
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO
- 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 30 % Residential % Commercial % Industrial % Agricultural 70 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 4 ft
- 22. Bank Height (from bed to top of bank): 2 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 47 Comments: Intermittent RPW

Seasonal RPW Stream N was determined to have intermittent flow within project limits.

Evaluator's Signature [Signature] Date 11/6/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream NN

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)					47	

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream NN



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 9/18/13
- 4. Time of Evaluation: 8:30 pm
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of I-40 and south of Ephesus Church Rd.
- 12. Site Coordinates (if known): 35.929179 N -78.987929 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: mild, dry
- 15. Site conditions at time of visit: cool, dry
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 30 % Residential % Commercial % Industrial % Agricultural
70 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 7 ft
- 22. Bank Height (from bed to top of bank): 2 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) X Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight X Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 55 Comments: Perennial RPW

Perennial RPW Stream NN was determined to have perennial flow within project limits.

Evaluator's Signature B. Phillips Date 9/18/13

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STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream NN

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						55

* These characteristics are not assessed in coastal streams.

RPW Stream O



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
 3. Date of Evaluation: 7/16/13 4. Time of Evaluation: 9:30 am
 5. Name of Stream: Unnamed 6. River Basin: Cape Fear
 7. Approximate Drainage Area: 250 acres 8. Stream Order: 2nd
 9. Length of Reach Evaluated: 100 ft. 10. County: Durham
 11. Location of reach under evaluation (include nearby roads and landmarks): west of Garrett Rd. south of US 15/501.
 12. Site Coordinates (if known): 35.955713 N -78.978670 W
 13. Proposed Channel Work (if any): rail embankment
 14. Recent Weather Conditions: hot, humid
 15. Site conditions at time of visit: warm, humid
 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
 20. Estimated Watershed Land Use: % Residential 15 % Commercial % Industrial % Agricultural
 85 % Forested % Cleared / Logged % Other (_____)
 21. Bankfull Width: 20 ft 22. Bank Height (from bed to top of bank): 2 feet
 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 67Comments: Perennial RPW

RPW Stream O was determined to have perennial flow within project limits.

Evaluator's Signature B. PhillipsDate 7/16/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream O

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	4
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	1
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	5
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	2
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						67

* These characteristics are not assessed in coastal streams.

seasonal RPW Stream OO



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 9/18/13
4. Time of Evaluation: 3:30 pm
5. Name of Stream: unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: ~250 acres
8. Stream Order: 1st
9. Length of Reach Evaluated: 50 ft.
10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): south of US 54 and in between RPWs BB and CC.
12. Site Coordinates (if known): 35.906073 N -78.995219 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: mild, dry
15. Site conditions at time of visit: warm, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 15 % Residential % Commercial % Industrial % Agricultural 85 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 4 ft
22. Bank Height (from bed to top of bank): 2 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 41 Comments: Seasonal RPW

Seasonal RPW Stream OO was determined to have intermittent flow within project limits.

Evaluator's Signature [Signature] Date 9/18/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream OO

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	1
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	4
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						41

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____



seasonal RPW Stream OOO STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 12/11/13
- 4. Time of Evaluation: 10:00 am
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Durham Drive
- 12. Site Coordinates (if known): 35.955545 N -78.984254 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: cold, rainy
- 15. Site conditions at time of visit: cold, rainy
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 50 % Residential % Commercial % Industrial % Agricultural 50 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 3 ft
- 22. Bank Height (from bed to top of bank): 1 foot
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 49 Comments: Seasonal RPW

RPW Stream OOO was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 12/11/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream 000

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	4
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						49

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

seasonal RPW Stream P



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 7/16/13
- 4. Time of Evaluation: 11:30 am
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 2nd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Durham Drive, south of US 15/501.
- 12. Site Coordinates (if known): 35.952995 N -78.982961 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 45 % Residential 15 % Commercial % Industrial % Agricultural
40 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 3 ft
- 22. Bank Height (from bed to top of bank): 1 foot
- 23. Channel slope down center of stream: Flat (0 to 2%) X Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends X Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 47 Comments: Seasonal RPW

seasonal RPW Stream P was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 7/16/13

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STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream P

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	1
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	1
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						47

* These characteristics are not assessed in coastal streams.

RPW Stream PP



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Fulton
3. Date of Evaluation: 11/06/13
4. Time of Evaluation: 10:30 am
5. Name of Stream: unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: ~25 acres
8. Stream Order: 1st
9. Length of Reach Evaluated: 50 ft.
10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): west of I-40 and west of Fairington Road.
12. Site Coordinates (if known): 35.922953 N -78.986421 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: mild, dry
15. Site conditions at time of visit: cool, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 70 % Residential % Commercial % Industrial % Agricultural 30 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 4 ft
22. Bank Height (from bed to top of bank): 2 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 49 Comments: Seasonal RPW

Seasonal RPW Stream PP was determined to have intermittent flow within project limits.

Evaluator's Signature *B. Fulton* Date 11/6/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream NN

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 - 5	0 - 4	0 - 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 - 6	0 - 5	0 - 5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 - 6	0 - 4	0 - 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 - 5	0 - 4	0 - 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 - 3	0 - 4	0 - 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 - 4	0 - 4	0 - 2	1
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 - 5	0 - 4	0 - 2	1
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 - 6	0 - 4	0 - 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 - 5	0 - 4	0 - 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 - 5	0 - 4	0 - 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 - 4	0 - 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 - 5	0 - 4	0 - 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 - 5	0 - 5	0 - 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 - 3	0 - 4	0 - 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 - 5	0 - 4	0 - 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 - 3	0 - 5	0 - 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 - 6	0 - 6	0 - 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 - 5	0 - 5	0 - 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 - 4	0 - 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 - 4	0 - 5	0 - 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 - 4	0 - 4	0 - 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 - 4	0 - 4	0 - 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 - 6	0 - 5	0 - 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						49

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

seasonal RPW Stream Q



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 7/16/13
- 4. Time of Evaluation: 1:30 pm
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Durham Drive, south of US 15/501.
- 12. Site Coordinates (if known): 35.952756 N -78.983074 W
- 13. Proposed Channel Work (if any): rail embankment
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 75 % Residential 15 % Commercial % Industrial % Agricultural 10 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 3 ft
- 22. Bank Height (from bed to top of bank): 1 foot
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 45 Comments: Seasonal RPW

seasonal RPW Stream Q was determined to have intermittent flow within project limits.

Evaluator's Signature Date 7/16/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream Q

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	1
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						45

* These characteristics are not assessed in coastal streams.

RPW Stream QQ



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 11/5/13
4. Time of Evaluation: 10:00 am
5. Name of Stream: unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: ~150 acres
8. Stream Order: 1st
9. Length of Reach Evaluated: 50 ft.
10. County: Orange
11. Location of reach under evaluation (include nearby roads and landmarks): south of US 54 and east of Finley Golf Course.
12. Site Coordinates (if known): 35.902398 N -79.014898 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: mild, dry
15. Site conditions at time of visit: cool, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 1 acre
18. Does channel appear on USGS quad map? YES NO
19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: % Residential % Commercial % Industrial % Agricultural % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 5 ft
22. Bank Height (from bed to top of bank): 2 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 46 **Comments:** Perennial RPW

RPW Stream QQ was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 11/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream QQ

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)					46	

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID#

DWQ #



seasonal RPW Stream QQQ STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 12/11/13
- 4. Time of Evaluation: 10:30 am
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of Durham Drive
- 12. Site Coordinates (if known): 35.953951 N -78.982939 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: cold, rainy
- 15. Site conditions at time of visit: cold, rainy
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 50 % Residential % Commercial % Industrial % Agricultural
50 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 3 ft
- 22. Bank Height (from bed to top of bank): 1 foot
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 47 Comments: Seasonal RPW

RPW Stream QQQ was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 12/11/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream QQQ

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	4
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						47

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

seasonal RPW Stream R



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 7/17/13
- 4. Time of Evaluation: 3:30 pm
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): north of Old Chapel Hill Rd, east of N. White Oak Dr.
- 12. Site Coordinates (if known): 35.946925 N -78.998766 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 15 % Residential % Commercial % Industrial % Agricultural 85 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 3 ft
- 22. Bank Height (from bed to top of bank): 2 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 39

Comments: Seasonal RPW

seasonal RPW Stream R was determined to have intermittent flow within project limits.

Evaluator's Signature

Date

7/17/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream R

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	2
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	1
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	2
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						39

* These characteristics are not assessed in coastal streams.

RPW Stream RR



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 11/5/13 4. Time of Evaluation: 8:30 am
5. Name of Stream: unnamed 6. River Basin: Cape Fear
7. Approximate Drainage Area: ~150 acres 8. Stream Order: 2nd
9. Length of Reach Evaluated: 50 ft. 10. County: Orange
11. Location of reach under evaluation (include nearby roads and landmarks): south of US 54 and north of Finley Golf Course.
12. Site Coordinates (if known): 35.904249 N -79.017962 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: mild, dry
15. Site conditions at time of visit: cool, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: % Residential % Commercial % Industrial % Agricultural
 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 5 ft 22. Bank Height (from bed to top of bank): 1 foot
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 54 Comments: Perennial RPW

RPW Stream RR was determined to have perennial flow within project limits.

Evaluator's Signature [Signature] Date 11/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream RR

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						54

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream S



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 7/18/13
- 4. Time of Evaluation: 3:30 pm
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 250 acres
- 8. Stream Order: 2nd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): south of US 15/501, west of Garrett Rd.
- 12. Site Coordinates (if known): 35.959693 N -78.979567 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 45 % Residential 35 % Commercial % Industrial % Agricultural 20 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 15 ft
- 22. Bank Height (from bed to top of bank): 5 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 55 **Comments:** Perennial RPW

RPW Stream S was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 7/18/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream S

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	2
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	3
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	3
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						55

* These characteristics are not assessed in coastal streams.

seasonal RPW Stream SS



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 11/5/13 4. Time of Evaluation: 8:00 am
5. Name of Stream: unnamed 6. River Basin: Cape Fear
7. Approximate Drainage Area: ~150 acres 8. Stream Order: 1st
9. Length of Reach Evaluated: 50 ft. 10. County: Orange
11. Location of reach under evaluation (include nearby roads and landmarks): south of US 54 and north of Finley Golf Course.
12. Site Coordinates (if known): 35.903861 N -79.018298 W
13. Proposed Channel Work (if any): rail embankment
14. Recent Weather Conditions: mild, dry
15. Site conditions at time of visit: cool, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: % Residential 40% Commercial % Industrial % Agricultural
60% Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 2 ft 22. Bank Height (from bed to top of bank): 1 foot
23. Channel slope down center of stream: X Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: X Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 40 Comments: Seasonal RPW

Seasonal RPW Stream SS was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips

Date 11/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream SS

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	1
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	1
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	2
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)					40	

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream T - New Hope Creek



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 7/18/13
- 4. Time of Evaluation: 10:30 am
- 5. Name of Stream: New Hope Creek
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 250 acres
- 8. Stream Order: 3rd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): south of US 15/501, west of Garrett Rd.
- 12. Site Coordinates (if known): 35.958850 N -78.981211 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 25 % Residential 15 % Commercial % Industrial % Agricultural
60 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 30 ft
- 22. Bank Height (from bed to top of bank): 6 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 72 **Comments:** Perennial RPW

RPW Stream T (New Hope Creek) was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 7/18/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream T - New Hope Creek

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	4
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	5
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	4
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						72

* These characteristics are not assessed in coastal streams.

RPW Stream TT



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 11/5/13
4. Time of Evaluation: 9:00 am
5. Name of Stream: unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: ~250 acres
8. Stream Order: 2nd
9. Length of Reach Evaluated: 50 ft.
10. County: Orange
11. Location of reach under evaluation (include nearby roads and landmarks): south of US 54 and west of Finley Golf Course.
12. Site Coordinates (if known): 35.906395 N -79.024656 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: mild, dry
15. Site conditions at time of visit: cool, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: % Residential % Commercial % Industrial % Agricultural
 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 18 ft
22. Bank Height (from bed to top of bank): 8 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 56 **Comments:** Perennial RPW

RPW Stream TT was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 11/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream TT

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	1
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	4
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						56

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

seasonal RPW Stream UU



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 11/5/13
- 4. Time of Evaluation: 10:00 am
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Orange
- 11. Location of reach under evaluation (include nearby roads and landmarks): north of US 54 and north of Barbee Chapel Rd.
- 12. Site Coordinates (if known): 35.905825 N -79.029577 W
- 13. Proposed Channel Work (if any): rail embankment
- 14. Recent Weather Conditions: mild, dry
- 15. Site conditions at time of visit: cool, dry
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: % Residential 50 % Commercial % Industrial % Agricultural 50 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 6 ft
- 22. Bank Height (from bed to top of bank): 4 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 34 Comments: Seasonal RPW

Seasonal RPW Stream UU was determined to have intermittent flow within project limits.

Evaluator's Signature [Signature] Date 11/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream UU

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	1
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	1
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	0
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	1
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						34

* These characteristics are not assessed in coastal streams.

RPW Stream UUU



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 1/21/14
- 4. Time of Evaluation: 2:00 pm
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 250 acres
- 8. Stream Order: 2nd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of Garrett Rd.
- 12. Site Coordinates (if known): 35.954952 N -78.973348 W
- 13. Proposed Channel Work (if any): rail embankment
- 14. Recent Weather Conditions: cold, rainy
- 15. Site conditions at time of visit: cold, clear
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 40 % Residential 20 % Commercial % Industrial % Agricultural 40 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 20 ft
- 22. Bank Height (from bed to top of bank): 3 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 74 **Comments:** Perennial RPW

RPW Stream UUU was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 1/21/14

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream UUU

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	4
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	5
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	4
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)					74	

* These characteristics are not assessed in coastal streams.

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DWQ # _____

seasonal RPW Stream V



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 7/31/13
- 4. Time of Evaluation: 9:30 am
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): south of Wendell Road.
- 12. Site Coordinates (if known): 35.916023 N -78.989454 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 2 acres
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 25 % Residential % Commercial % Industrial % Agricultural 85 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 3 ft
- 22. Bank Height (from bed to top of bank): 6 inches
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 51 Comments: Perennial RPW

RPW Stream V was determined to have intermittent flow within project limits.

Evaluator's Signature [Signature] Date 7/31/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
seasonal RPW Stream V

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	2
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	2
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	1
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	1
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						51

* These characteristics are not assessed in coastal streams.

seasonal RPW Stream W



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA 2. Evaluator's Name: B. Phillips
 3. Date of Evaluation: 7/31/13 4. Time of Evaluation: 2:30 pm
 5. Name of Stream: unnamed 6. River Basin: Cape Fear
 7. Approximate Drainage Area: 150 acres 8. Stream Order: 1st
 9. Length of Reach Evaluated: 100 ft. 10. County: Durham
 11. Location of reach under evaluation (include nearby roads and landmarks): west of George King Road.
 12. Site Coordinates (if known): 35.914764 N -78.998681 W
 13. Proposed Channel Work (if any): rail crossing
 14. Recent Weather Conditions: hot, humid
 15. Site conditions at time of visit: warm, humid
 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
 20. Estimated Watershed Land Use: 15 % Residential % Commercial % Industrial % Agricultural
85 % Forested % Cleared / Logged % Other (_____)
 21. Bankfull Width: 6 ft 22. Bank Height (from bed to top of bank): 1 foot
 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 51 Comments: Seasonal RPW

RPW Stream W was determined to have intermittent flow within project limits.

Evaluator's Signature B. Phillips Date 7/31/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream W

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	1
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						51

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream WW – Chapel Branch



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 11/5/13
- 4. Time of Evaluation: 11:00 am
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~250 acres
- 8. Stream Order: 2nd
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Orange
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of US 54 and north of Old Mason Farm Rd.
- 12. Site Coordinates (if known): 35.905374 N -79.028821 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: mild, dry
- 15. Site conditions at time of visit: cool, dry
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 50 % Residential 50 % Commercial 50 % Industrial 50 % Agricultural
50 % Forested 50 % Cleared / Logged 50 % Other (_____)
- 21. Bankfull Width: 12 ft
- 22. Bank Height (from bed to top of bank): 3 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 59 Comments: Perennial RPW

RPW Stream WW (Chapel Branch) was determined to have perennial flow within project limits.

Evaluator's Signature [Signature] Date 11/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream WW – Chapel Branch

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	4
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	2
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						59

* These characteristics are not assessed in coastal streams.

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USACE AID#

DWQ #

RPW Stream X



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 8/1/13
- 4. Time of Evaluation: 10:30 am
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 250 acres
- 8. Stream Order: 2nd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of George King Road.
- 12. Site Coordinates (if known): 35.913729 N -78.998816 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 15 % Residential % Commercial % Industrial % Agricultural 85 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 20 ft
- 22. Bank Height (from bed to top of bank): 2 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 69

Comments: Perennial RPW

RPW Stream X was determined to have perennial flow within project limits.

Evaluator's Signature

Date

8/1/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream X

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						69

* These characteristics are not assessed in coastal streams.

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DWQ # _____

seasonal RPW Stream XX



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 11/5/13
- 4. Time of Evaluation: 11:00 am
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: ~50 acres
- 8. Stream Order: 1st
- 9. Length of Reach Evaluated: 50 ft.
- 10. County: Orange
- 11. Location of reach under evaluation (include nearby roads and landmarks): north of US 54 and east of Manning Dr.
- 12. Site Coordinates (if known): 35.899108 N -79.036483 W
- 13. Proposed Channel Work (if any): rail embankment
- 14. Recent Weather Conditions: mild, dry
- 15. Site conditions at time of visit: cool, dry
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: % Residential 50 % Commercial % Industrial % Agricultural 50 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 8 ft
- 22. Bank Height (from bed to top of bank): 3 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 36 Comments: Seasonal RPW

Seasonal RPW Stream XX was determined to have intermittent flow within project limits.

Evaluator's Signature [Signature] Date 11/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

seasonal RPW Stream XX

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	1
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	1
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	1
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	1
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	3
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	1
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	1
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	2
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	3
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	0
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	1
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						36

* These characteristics are not assessed in coastal streams.

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USACE AID# _____

DWQ # _____

RPW Stream XXX



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 1/22/14
- 4. Time of Evaluation: 9:00 am
- 5. Name of Stream: Unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 250 acres
- 8. Stream Order: 2nd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): west of Garrett Rd.
- 12. Site Coordinates (if known): 35.954375 N -78.977513 W
- 13. Proposed Channel Work (if any): rail crossing
- 14. Recent Weather Conditions: cold, rainy
- 15. Site conditions at time of visit: cold, clear
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: % Residential 15 % Commercial % Industrial % Agricultural 85 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 8 ft
- 22. Bank Height (from bed to top of bank): 2 feet
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 66 Comments: Perennial RPW

RPW Stream XXX was determined to have perennial flow within project limits.

Evaluator's Signature *B. Phillips* Date 1/22/14

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STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream XXX

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	2
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	5
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						66

* These characteristics are not assessed in coastal streams.

RPW Stream Y – Little Creek



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 8/1/13
4. Time of Evaluation: 1:30 pm
5. Name of Stream: unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: 250 acres
8. Stream Order: 2nd
9. Length of Reach Evaluated: 100 ft.
10. County: Durham
11. Location of reach under evaluation (include nearby roads and landmarks): west of George King Road.
12. Site Coordinates (if known): 35.913654 N -78.999032 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: hot, humid
15. Site conditions at time of visit: warm, humid
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 15 % Residential 85 % Forested % Commercial % Cleared / Logged % Industrial % Agricultural % Other (_____)
21. Bankfull Width: 25 ft
22. Bank Height (from bed to top of bank): 4 feet
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 69 **Comments:** Perennial RPW

RPW Stream Y (Little Creek) was determined to have perennial flow within project limits.

Evaluator's Signature [Signature] Date 8/1/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream Y – Little Creek

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	4
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	4
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	1
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						69

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID# _____

DWQ # _____

RPW Stream YY – Meeting of the Waters



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: TTA
2. Evaluator's Name: B. Phillips
3. Date of Evaluation: 11/5/13
4. Time of Evaluation: 11:15 am
5. Name of Stream: unnamed
6. River Basin: Cape Fear
7. Approximate Drainage Area: ~250 acres
8. Stream Order: 2nd
9. Length of Reach Evaluated: 50 ft.
10. County: Orange
11. Location of reach under evaluation (include nearby roads and landmarks): north of US 54 and east of Manning Dr.
12. Site Coordinates (if known): 35.899077 N -79.035864 W
13. Proposed Channel Work (if any): rail crossing
14. Recent Weather Conditions: mild, dry
15. Site conditions at time of visit: cool, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 30 % Residential 20 % Commercial % Industrial % Agricultural 50 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: 20 ft
22. Bank Height (from bed to top of bank): 3 ft
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 68 Comments: Perennial RPW

RPW Stream YY (Meeting of the Waters) was determined to have perennial flow within project limits.

Evaluator's Signature B. Phillips Date 11/5/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream YY – Meeting of the Waters

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	3
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	4
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	4
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	4
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	3
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	3
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						68

* These characteristics are not assessed in coastal streams.

OFFICE USE ONLY:

USACE AID#

DWQ #

RPW Stream Z



STREAM QUALITY ASSESSMENT WORKSHEET



- 1. Applicant's Name: TTA
- 2. Evaluator's Name: B. Phillips
- 3. Date of Evaluation: 8/13/13
- 4. Time of Evaluation: 8:30 am
- 5. Name of Stream: unnamed
- 6. River Basin: Cape Fear
- 7. Approximate Drainage Area: 150 acres
- 8. Stream Order: 2nd
- 9. Length of Reach Evaluated: 100 ft.
- 10. County: Durham
- 11. Location of reach under evaluation (include nearby roads and landmarks): east of George King Road.
- 12. Site Coordinates (if known): 35.908000 N -78.993723 W
- 13. Proposed Channel Work (if any): rail embankment
- 14. Recent Weather Conditions: hot, humid
- 15. Site conditions at time of visit: warm, humid
- 16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
- 17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____
- 18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
- 20. Estimated Watershed Land Use: 15 % Residential % Commercial % Industrial % Agricultural 85 % Forested % Cleared / Logged % Other (_____)
- 21. Bankfull Width: 6 ft
- 22. Bank Height (from bed to top of bank): 1 foot
- 23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
- 24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 57 Comments: Perennial RPW

RPW Stream Z was determined to have perennial flow within project limits.

Evaluator's Signature [Signature] Date 8/13/13

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET
RPW Stream Z

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0 – 5	0 – 4	0 – 5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0 – 6	0 – 5	0 – 5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0 – 6	0 – 4	0 – 5	3
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0 – 5	0 – 4	0 – 4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0 – 3	0 – 4	0 – 4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0 – 4	0 – 4	0 – 2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0 – 5	0 – 4	0 – 2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0 – 6	0 – 4	0 – 2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0 – 5	0 – 4	0 – 3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0 – 5	0 – 4	0 – 4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0 – 4	0 – 5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0 – 5	0 – 4	0 – 5	3
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0 – 5	0 – 5	0 – 5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0 – 3	0 – 4	0 – 5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0 – 5	0 – 4	0 – 5	3
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0 – 3	0 – 5	0 – 6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0 – 6	0 – 6	0 – 6	3
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0 – 5	0 – 5	0 – 5	4
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0 – 4	0 – 4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 5	0 – 5	2
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0 – 4	0 – 4	0 – 4	1
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0 – 6	0 – 5	0 – 5	3
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						57

* These characteristics are not assessed in coastal streams.

NC Wetland Assessment Method Forms

Map ID	NCWAM Classification	NCWAM Wetland Rating
A	Headwater Forest	High
AA	Bottomland Hardwood Forest	High
B	Basin Wetland	Medium
BB	Bottomland Hardwood Forest	High
BBB	Basin Wetland	High
C	Headwater Forest	High
CC	Bottomland Hardwood Forest	High
CCC	Basin Wetland	High
D	Bottomland Hardwood Forest	Low
DD	Bottomland Hardwood Forest	High
DDD	Basin Wetland	High
E	Bottomland Hardwood Forest	High
EE	Bottomland Hardwood Forest	High
F	Bottomland Hardwood Forest	Medium
FF	Bottomland Hardwood Forest	High
G	Bottomland Hardwood Forest	High
GG	Bottomland Hardwood Forest	High
H	Non-Tidal Freshwater Marsh	Medium
HHH	Non-Tidal Freshwater Marsh	Low
I	Bottomland Hardwood Forest	High
III	Bottomland Hardwood Forest	High
J	Bottomland Hardwood Forest	High
K	Bottomland Hardwood Forest	High
N	Bottomland Hardwood Forest	High
NNN	Non-Tidal Freshwater Marsh	High
O	Bottomland Hardwood Forest	High
OOO	Basin Wetland	Low
P	Bottomland Hardwood Forest	High
Q	Bottomland Hardwood Forest	High
R	Headwater Forest	Low
S	Headwater Forest	High
T	Headwater Forest	Low
TTT	Bottomland Hardwood Forest	High
U	Basin Wetland	Medium
UUU	Bottomland Hardwood Forest	High
V	Bottomland Hardwood Forest	Low
VV	Non-Tidal Freshwater Marsh	Low
VVV	Bottomland Hardwood Forest	High
W	Bottomland Hardwood Forest	High
WW	Bottomland Hardwood Forest	Low
WWW	Bottomland Hardwood Forest	High
XX	Bottomland Hardwood Forest	High
Y	Basin Wetland	Medium
YY	Non-Tidal Freshwater Marsh	Medium
YYY	Bottomland Hardwood Forest	High
Z	Bottomland Hardwood Forest	High
ZZ	Bottomland Hardwood Forest	Medium
ZZZ	Bottomland Hardwood Forest	High

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland A	Date 6/4/13
Wetland Type <input type="text" value="Headwater Forest"/>	Assessor Name/Organization BP -STV
Level III Ecoregion <input type="text" value="Piedmont"/>	Nearest Named Water Body Sandy Creek
River Basin <input type="text" value="Cape Fear"/>	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.976203, -78.957812	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-prow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**
Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|----------------------------|----------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|----------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland A is a palustrine forested wetland abutting both sides of Stream B. Wetland A is drained by Stream B to Stream A.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland A Date 6/4/13
Wetland Type Headwater Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	HIGH
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	MEDIUM
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	MEDIUM

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland AA	Date 7/31/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Little Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.913693, -78.999364

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | | |
|---------------------------------------|----------------------------|----------------------------|--|
| | GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| | Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G	From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H	From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I	From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J	From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K	< 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).



17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
- B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
- B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
- B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
- C Majority of canopy trees are < 6 inches DBH or no trees.

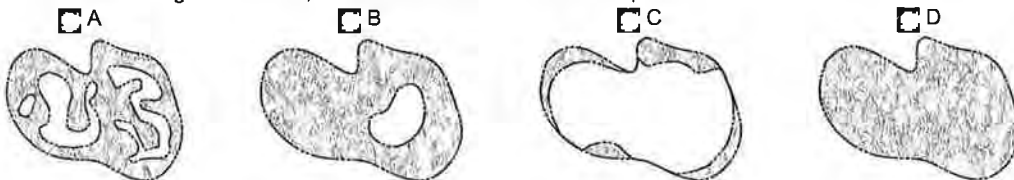
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
- B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
- B Overbank flow is severely altered in the assessment area.
- C Overland flow is severely altered in the assessment area.
- D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland AA is a palustrine forested/emergent wetland located adjacent to Little Creek (Stream Y). Wetland AA is located in the floodplain forest of the Corps Waterfowl lands.

NC WAM Wetland Rating Sheet
Accompianes User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland AA Date 7/31/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention	Condition	HIGH	
	Sub-Surface Storage and Retention	Condition	LOW	
Water Quality	Pathogen Change	Condition	HIGH	
		Condition/Opportunity	HIGH	
		Opportunity Presence? (Y/N)	NO	
	Particulate Change	Condition	MEDIUM	
		Condition/Opportunity	MEDIUM	
		Opportunity Presence? (Y/N)	NO	
	Soluble Change	Condition	HIGH	
		Condition/Opportunity	HIGH	
		Opportunity Presence? (Y/N)	NO	
		Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH	
		Opportunity Presence? (Y/N)	YES	
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence? (Y/N)	NA		
Habitat	Physical Structure	Condition	HIGH	
	Landscape Patch Structure	Condition	HIGH	
	Vegetation Composition	Condition	HIGH	

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Conditon	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland B	Date 6/4/13
Wetland Type Basin Wetland	Assessor Name/Organization BP-STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.976683, -78.958088	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-prow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland B is a palustrine forested wetland that is located in an isolated basin within an upland forest.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland B Date 6/4/13
Wetland Type Basin Wetland Assessor Name/Organization BP-STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	NA
		Sub-Surface Storage and Retention	Condition
Water Quality	Pathogen Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Particulate Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
Pollution Change	Condition	MEDIUM	
	Condition/Opportunity	MEDIUM	
	Opportunity Presence? (Y/N)	NO	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	MEDIUM
	Condition/Opportunity	MEDIUM
	Opportunity Presence? (Y/N)	NO
Habitat	Condition	MEDIUM

Overall Wetland Rating **MEDIUM**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland BB	Date 7/31/13
Wetland Type Bottomland Hardwood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Little Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.914080, -78.998049

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|-----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).



17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
- B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
- B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
- B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
- C Majority of canopy trees are < 6 inches DBH or no trees.

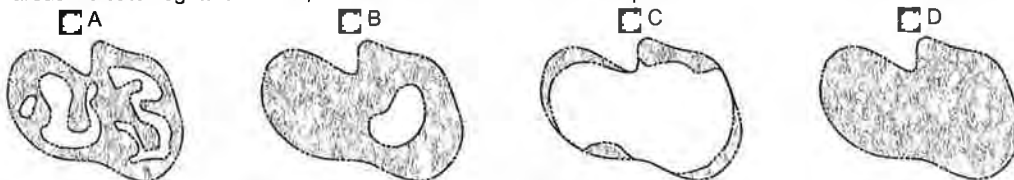
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
- B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
- B Overbank flow is severely altered in the assessment area.
- C Overland flow is severely altered in the assessment area.
- D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland BB is a palustrine forested/emergent wetland located adjacent to Stream W. Wetland BB is located in the floodplain forest of the Corps Waterfowl lands.

NC WAM Wetland Rating Sheet
Accompnies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland BB Date 7/31/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>NO</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention	Condition	HIGH	
	Sub-Surface Storage and Retention	Condition	LOW	
Water Quality	Pathogen Change	Condition	HIGH	
		Condition/Opportunity	HIGH	
		Opportunity Presence? (Y/N)	NO	
	Particulate Change	Condition	MEDIUM	
		Condition/Opportunity	MEDIUM	
		Opportunity Presence? (Y/N)	NO	
	Soluble Change	Condition	Condition	HIGH
			Condition/Opportunity	HIGH
			Opportunity Presence? (Y/N)	NO
		Physical Change	Condition	LOW
			Condition/Opportunity	LOW
			Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence? (Y/N)	NA		
Habitat	Physical Structure	Condition	HIGH	
	Landscape Patch Structure	Condition	HIGH	
	Vegetation Composition	Condition	HIGH	

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Conditon	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland BBB	Date 12/09/13
Wetland Type Basin Wetland	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Little Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.914571, -79.002095	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric


Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|-----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input checked="" type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G	From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H	From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I	From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J	From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K	< 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

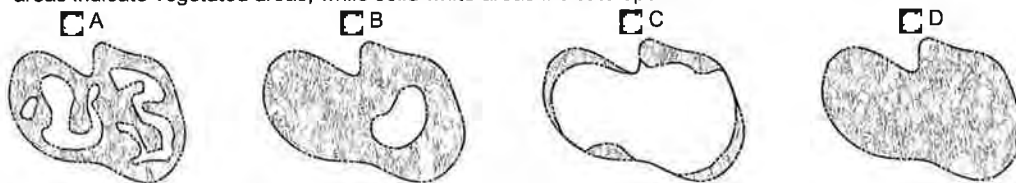
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland BBB is a palustrine forested/emergent wetland located adjacent to Little Creek (Stream Y). Wetland BBB is a backwater basin located in the floodplain forest of the Corps Waterfowl lands.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland BBB Date 12/09/13
Wetland Type Basin Wetland Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>YES</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<u>NA</u>
	Sub-Surface Storage and Retention	Condition	<u>NA</u>
Water Quality	Pathogen Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Particulate Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Soluble Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
Physical Change	Condition	<u>NA</u>	
	Condition/Opportunity	<u>NA</u>	
	Opportunity Presence? (Y/N)	<u>NA</u>	
Pollution Change	Condition	<u>HIGH</u>	
	Condition/Opportunity	<u>HIGH</u>	
	Opportunity Presence? (Y/N)	<u>NO</u>	
Habitat	Physical Structure	Condition	<u>HIGH</u>
	Landscape Patch Structure	Condition	<u>HIGH</u>
	Vegetation Composition	Condition	<u>HIGH</u>

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	<u>HIGH</u>
Water Quality	Condition	<u>HIGH</u>
	Condition/Opportunity	<u>HIGH</u>
	Opportunity Presence? (Y/N)	<u>NO</u>
Habitat	Condition	<u>HIGH</u>

Overall Wetland Rating HIGH

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland C	Date 6/4/13
Wetland Type <input type="text" value="Headwater Forest"/>	Assessor Name/Organization BP-STV
Level III Ecoregion <input type="text" value="Piedmont"/>	Nearest Named Water Body Sandy Creek
River Basin <input type="text" value="Cape Fear"/>	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.975664, -78.957633	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-prow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland C is a palustrine forested/emergent wetland abutting both sides of Stream C. Wetland C drains to Stream B and Wetland A through a pipe culvert set under an earthen berm that has created a dam which has created Wetland C.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland C Date 6/4/13
Wetland Type Headwater Forest Assessor Name/Organization BP-STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	MEDIUM
Water Quality	Pathogen Change	Condition	LOW
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	MEDIUM

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland CC		Date 11/05/13
Wetland Type	Bottomland Hardw ood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion	Piedmont	Nearest Named Water Body Little Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.906439, -78.994569

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | |
|---------------------------------------|----------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|----------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|----------------------------|---|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
- A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|----------------------------|-----------------------|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G	From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H	From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I	From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J	From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K	< 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

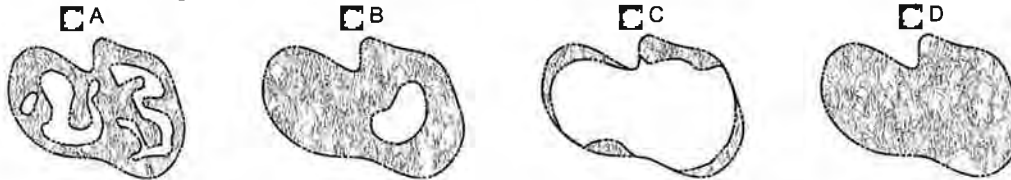
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland CC is a palustrine forested wetland located adjacent to the NC 54 Highway. Wetland CC is located in the floodplain forest adjacent to Stream CC.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland CC Date 11/05/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-Surface Storage and Retention	Condition	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	MEDIUM

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland CCC		Date 12/09/13
Wetland Type	Basin Wetland	Assessor Name/Organization BP/STV
Level III Ecoregion	Piedmont	Nearest Named Water Body Little Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.913820, -79.001718

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|----------------------------|----------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G	From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H	From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I	From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J	From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K	< 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

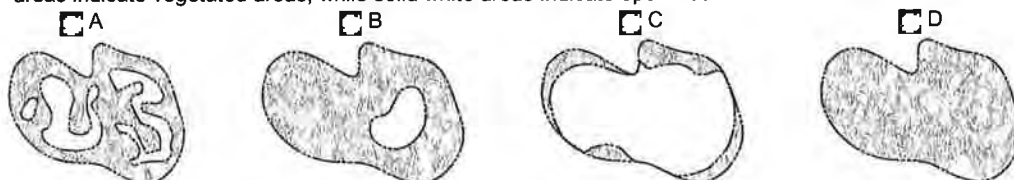
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland CCC is a palustrine emergent wetland located adjacent to Little Creek (Stream Y). Wetland CCC is a backwater basin located in the floodplain forest of the Corps Waterfowl lands.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland CCC Date 12/09/13
Wetland Type Basin Wetland Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>YES</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<u>NA</u>
		Sub-Surface Storage and Retention	<u>NA</u>
Water Quality	Pathogen Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Particulate Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Soluble Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Physical Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
Pollution Change	Condition	<u>HIGH</u>	
	Condition/Opportunity	<u>HIGH</u>	
	Opportunity Presence? (Y/N)	<u>NO</u>	
Habitat	Physical Structure	Condition	<u>HIGH</u>
	Landscape Patch Structure	Condition	<u>HIGH</u>
	Vegetation Composition	Condition	<u>HIGH</u>

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	<u>HIGH</u>
Water Quality	Condition	<u>HIGH</u>
	Condition/Opportunity	<u>HIGH</u>
	Opportunity Presence? (Y/N)	<u>NO</u>
Habitat	Condition	<u>HIGH</u>

Overall Wetland Rating HIGH

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland D	Date 6/5/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP-STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.960118, -78.962445	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-pow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|----------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland D is a palustrine forested/emergent wetland located over a sanitary sewer line adjacent to University Drive and Stream F. Wetland D drains into Stream G which drains to Stream F.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland D Date 6/5/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP-STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) YES
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	LOW
		Sub-Surface Storage and Retention	MEDIUM
Water Quality	Pathogen Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence? (Y/N)	
Habitat	Condition	LOW

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland DD		Date 11/05/13
Wetland Type	Bottomland Hardw ood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion	Piedmont	Nearest Named Water Body Little Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.907254, -78.995358

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).



17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
- B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
- B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
- B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
- C Majority of canopy trees are < 6 inches DBH or no trees.

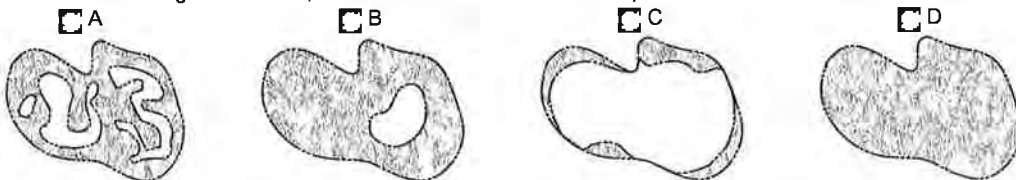
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
- B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
- B Overbank flow is severely altered in the assessment area.
- C Overland flow is severely altered in the assessment area.
- D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland DD is a palustrine forested wetland located within the Corps Waterfowl lands. Wetland DD is an isolated basin within the floodplain forest.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland DD Date 11/05/13
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) NO
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-Surface Storage and Retention	Condition	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Conditon	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland DDD	Date 12/09/13
Wetland Type Basin Wetland	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Little Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.912596, -79.000845

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|-----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|----------------------------|----------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
- B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- C Loamy or clayey soils not exhibiting redoximorphic features
- D Loamy or clayey gleyed soil
- E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
- B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
- B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 - Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 - Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 - A ≥50 feet
 - B From 30 to < 50 feet
 - C From 15 to < 30 feet
 - D From 5 to < 15 feet
 - E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 - ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 - Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 - Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 - Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|----------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

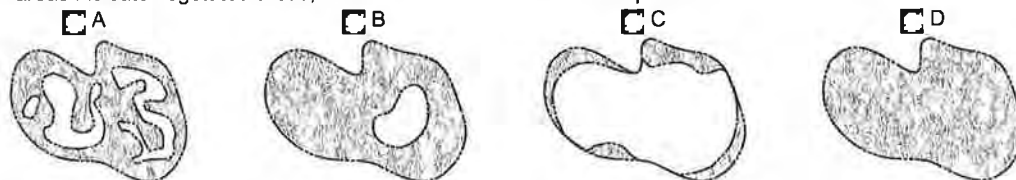
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland DDD is a palustrine forested wetland located adjacent to Little Creek (Stream Y). Wetland DDD is a backwater basin located in the floodplain forest of the Corps Waterfowl lands.

NC WAM Wetland Rating Sheet
Accompnies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland DDD Date 12/09/13
Wetland Type Basin Wetland Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	NA
	Sub-Surface Storage and Retention	Condition	NA
Water Quality	Pathogen Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Particulate Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
Pollution Change	Condition	HIGH	
	Condition/Opportunity	HIGH	
	Opportunity Presence? (Y/N)	NO	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	NO
Habitat	Conditon	HIGH

Overall Wetland Rating HIGH

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland E	Date 6/06/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.960697, -78.972118	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Not severely altered |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-pow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|-----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland E is a palustrine forested wetland located in the Sandy Creek floodplain. Wetland E receives drainage from Stream L and drains to Stream J (Sandy Creek).

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland E Date 6/06/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>YES</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>YES</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating HIGH

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland EE		Date 8/14/13
Wetland Type	Bottomland Hardw ood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion	Piedmont	Nearest Named Water Body Little Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.905451, -78.997632

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|----------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
- A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥100 feet |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 80 to < 100 feet |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 80 feet |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | From 40 to < 50 feet |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | From 30 to < 40 feet |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input checked="" type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input checked="" type="checkbox"/> H | <input checked="" type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

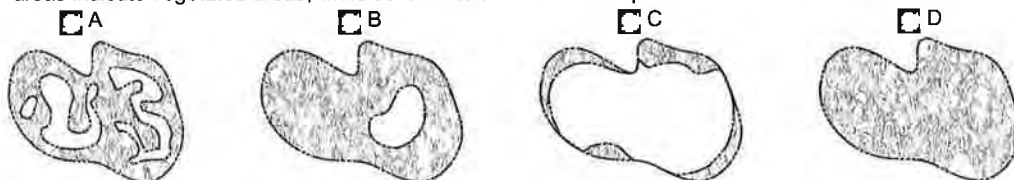
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland EE is a palustrine forested wetland located adjacent to the NC 54 Highway and the Corps Waterfowl lands. Wetland EE abuts both sides of and provides the headwaters to Stream DD.

NC WAM Wetland Rating Sheet
Accompianies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland EE Date 8/14/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-Surface Storage and Retention	Condition	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Conditon	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland F	Date 6/18/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.959115, -78.971601	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plov lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input checked="" type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	<input checked="" type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersed vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland F is a palustrine emergent wetland located in the Sandy Creek floodplain. Wetland F is a small, linear wetland that drains to Stream J (Sandy Creek).

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland F Date 6/18/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	MEDIUM
		Sub-Surface Storage and Retention	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	MEDIUM
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	MEDIUM

Overall Wetland Rating **MEDIUM**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland FF		Date 8/14/13
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion	Piedmont	Nearest Named Water Body Little Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.905049, -78.997013

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥100 feet |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 80 to < 100 feet |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 80 feet |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | From 40 to < 50 feet |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | From 30 to < 40 feet |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input checked="" type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input checked="" type="checkbox"/> H | <input checked="" type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

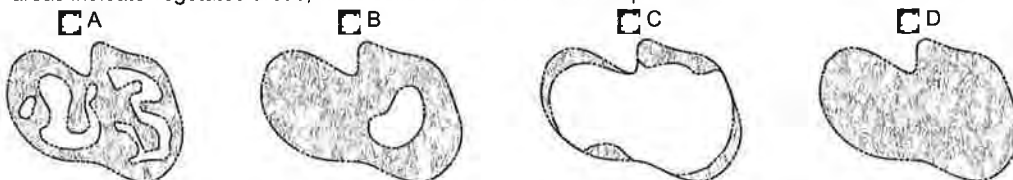
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersed between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland FF is a palustrine forested wetland located adjacent to the NC 54 Highway. Wetland FF abuts both sides of Stream EE.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland FF Date 8/14/13
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) NO
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-Surface Storage and Retention	Condition	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland G	Date 6/18/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.956380, -78.975044	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plov lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|----------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|------------------------------------|-------------------------|--|
| <input checked="" type="radio"/> A | <input type="radio"/> A | <input type="radio"/> A ≥ 500 acres |
| <input type="radio"/> B | <input type="radio"/> B | <input type="radio"/> B From 100 to < 500 acres |
| <input type="radio"/> C | <input type="radio"/> C | <input type="radio"/> C From 50 to < 100 acres |
| <input type="radio"/> D | <input type="radio"/> D | <input type="radio"/> D From 25 to < 50 acres |
| <input type="radio"/> E | <input type="radio"/> E | <input type="radio"/> E From 10 to < 25 acres |
| <input type="radio"/> F | <input type="radio"/> F | <input type="radio"/> F From 5 to < 10 acres |
| <input type="radio"/> G | <input type="radio"/> G | <input type="radio"/> G From 1 to < 5 acres |
| <input type="radio"/> H | <input type="radio"/> H | <input type="radio"/> H From 0.5 to < 1 acre |
| <input type="radio"/> I | <input type="radio"/> I | <input type="radio"/> I From 0.1 to < 0.5 acre |
| <input type="radio"/> J | <input type="radio"/> J | <input type="radio"/> J From 0.01 to < 0.1 acre |
| <input type="radio"/> K | <input type="radio"/> K | <input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

- | Well | Loosely |
|-------------------------|--|
| <input type="radio"/> A | <input type="radio"/> A ≥ 500 acres |
| <input type="radio"/> B | <input type="radio"/> B From 100 to < 500 acres |
| <input type="radio"/> C | <input type="radio"/> C From 50 to < 100 acres |
| <input type="radio"/> D | <input type="radio"/> D From 10 to < 50 acres |
| <input type="radio"/> E | <input type="radio"/> E < 10 acres |
| <input type="radio"/> F | <input type="radio"/> F Wetland type has a poor or no connection to other natural habitats |

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland G is a palustrine forested wetland located in the Sandy Creek floodplain. Wetland G abuts Stream J (Sandy Creek).

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland G Date 6/18/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>YES</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>YES</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
		Landscape Patch Structure	LOW
		Vegetation Composition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating HIGH

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland GG		Date 11/05/13
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion	Piedmont	Nearest Named Water Body Chapel Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.905366, -79.028462

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric


Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
- A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. **Check appropriate box(es) (a box may be checked in each column).** Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A
<input type="checkbox"/> B	<input type="checkbox"/> B
<input type="checkbox"/> C	<input type="checkbox"/> C
<input type="checkbox"/> D	<input type="checkbox"/> D
<input type="checkbox"/> E	<input type="checkbox"/> E
<input type="checkbox"/> F	<input type="checkbox"/> F

A ≥500 acres
 B From 100 to < 500 acres
 C From 50 to < 100 acres
 D From 10 to < 50 acres
 E < 10 acres
 F Wetland type has a poor or no connection to other natural habitats

13b. **Evaluate for marshes only.**

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

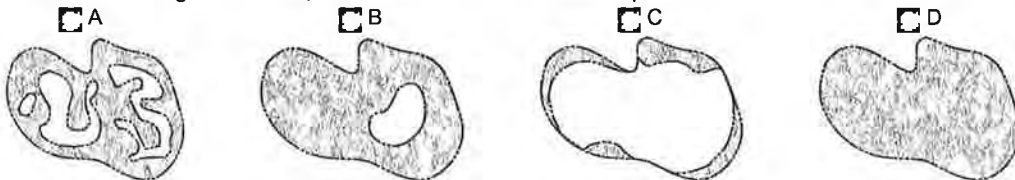
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland GG is a palustrine forested wetland located adjacent to the NC 54 Highway and upland forest. Wetland GG abuts both sides of Stream RR.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland GG Date 11/05/13
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) NO
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-Surface Storage and Retention	Condition	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	NO
Habitat	Condition	MEDIUM

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland H	Date 6/18/13
Wetland Type Non-Tidal Freshwater Marsh	Assessor Name/Organization BP -STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.955416, -78.975207	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-pow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

- | WT | WC | FW (if applicable) |
|-------------------------|-------------------------|--|
| <input type="radio"/> A | <input type="radio"/> A | <input type="radio"/> A ≥ 500 acres |
| <input type="radio"/> B | <input type="radio"/> B | <input type="radio"/> B From 100 to < 500 acres |
| <input type="radio"/> C | <input type="radio"/> C | <input type="radio"/> C From 50 to < 100 acres |
| <input type="radio"/> D | <input type="radio"/> D | <input type="radio"/> D From 25 to < 50 acres |
| <input type="radio"/> E | <input type="radio"/> E | <input type="radio"/> E From 10 to < 25 acres |
| <input type="radio"/> F | <input type="radio"/> F | <input type="radio"/> F From 5 to < 10 acres |
| <input type="radio"/> G | <input type="radio"/> G | <input type="radio"/> G From 1 to < 5 acres |
| <input type="radio"/> H | <input type="radio"/> H | <input type="radio"/> H From 0.5 to < 1 acre |
| <input type="radio"/> I | <input type="radio"/> I | <input type="radio"/> I From 0.1 to < 0.5 acre |
| <input type="radio"/> J | <input type="radio"/> J | <input type="radio"/> J From 0.01 to < 0.1 acre |
| <input type="radio"/> K | <input type="radio"/> K | <input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut |

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

- | Well | Loosely |
|-------------------------|--|
| <input type="radio"/> A | <input type="radio"/> A ≥ 500 acres |
| <input type="radio"/> B | <input type="radio"/> B From 100 to < 500 acres |
| <input type="radio"/> C | <input type="radio"/> C From 50 to < 100 acres |
| <input type="radio"/> D | <input type="radio"/> D From 10 to < 50 acres |
| <input type="radio"/> E | <input type="radio"/> E < 10 acres |
| <input type="radio"/> F | <input type="radio"/> F Wetland type has a poor or no connection to other natural habitats |

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland H is a palustrine emergent wetland located in the New Hope Creek floodplain adjacent to Stream K. Wetland H is a small, linear wetland.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland H Date 6/18/13
Wetland Type Non-Tidal Freshwater Marsh Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	NA
		Sub-Surface Storage and Retention	Condition
Water Quality	Pathogen Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Particulate Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	MEDIUM
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	MEDIUM
	Condition/Opportunity	MEDIUM
	Opportunity Presence? (Y/N)	NO
Habitat	Condition	MEDIUM

Overall Wetland Rating **MEDIUM**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland HHH	Date 12/10/13
Wetland Type Non-Tidal Freshwater Marsh	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Little Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.918546, -78.997501

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric


Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|----------------------------|---|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

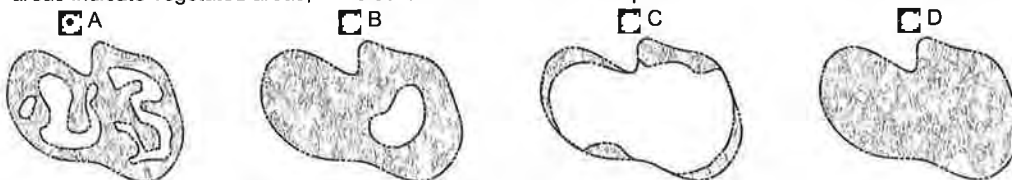
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland HHH is a palustrine emergent wetland located adjacent to Stream GGG. Wetland HHH appears to have been created as a result of a former logging road, and is located in the floodplain forest of the Corps Waterfowl lands.

NC WAM Wetland Rating Sheet
Accompnies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland HHH Date 12/10/13
Wetland Type Non-Tidal Freshwater Marsh Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<u>NA</u>
	Sub-Surface Storage and Retention	Condition	<u>NA</u>
Water Quality	Pathogen Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Particulate Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Soluble Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Physical Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
Pollution Change	Condition	<u>NA</u>	
	Condition/Opportunity	<u>NA</u>	
	Opportunity Presence? (Y/N)	<u>NA</u>	
Habitat	Physical Structure	Condition	<u>LOW</u>
	Landscape Patch Structure	Condition	<u>MEDIUM</u>
	Vegetation Composition	Condition	<u>MEDIUM</u>

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	<u>MEDIUM</u>
Water Quality	Condition	<u>LOW</u>
	Condition/Opportunity	<u>LOW</u>
	Opportunity Presence? (Y/N)	<u>NO</u>
Habitat	Conditon	<u>LOW</u>

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland I	Date 1/21/14
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.954986, -78.975612	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plov lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|----------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input checked="" type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland I is a palustrine forested wetland located in the New Hope Creek floodplain. Wetland I is located adjacent to Stream J (Sandy Creek).

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland I Date 1/21/14
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>NO</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>YES</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating HIGH

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland III	Date 12/10/13
Wetland Type Bottomland Hardwood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Little Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.919039, -78.997437

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).



17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
- B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum**. Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
- B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
- B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
- C Majority of canopy trees are < 6 inches DBH or no trees.

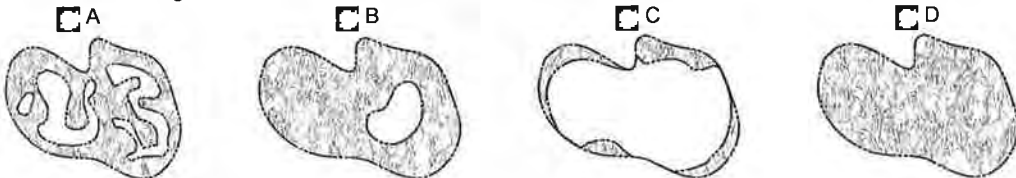
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
- B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
- B Overbank flow is severely altered in the assessment area.
- C Overland flow is severely altered in the assessment area.
- D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland III is a palustrine forested wetland located adjacent to Stream GGG. Wetland III provides the headwaters to Stream GGG and is located in the floodplain forest of the Corps Waterfowl lands.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland III Date 12/10/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>YES</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-Surface Storage and Retention	Condition	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	NO
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland J	Date 6/18/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.956380, -78.975044	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-prow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 100 feet |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | From 80 to < 100 feet |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 80 feet |
| <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | From 40 to < 50 feet |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | From 30 to < 40 feet |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input checked="" type="checkbox"/> G | <input checked="" type="checkbox"/> G | From 5 to < 15 feet |
| <input checked="" type="checkbox"/> H | <input checked="" type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland J is a palustrine forested wetland located in the New Hope Creek floodplain.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland J Date 6/18/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
		Landscape Patch Structure	HIGH
		Vegetation Composition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland K	Date 6/18/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.955265, -78.976843	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-pow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|----------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input checked="" type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland K is a palustrine forested wetland located in the New Hope Creek floodplain. Wetland K is located adjacent to Stream J (Sandy Creek).

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland K Date 6/18/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland N	Date 7/16/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion Piedmont	Nearest Named Water Body New Hope Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.955336, -78.979398	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plov lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|----------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland N is a palustrine forested wetland located in the New Hope Creek floodplain.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland N Date 7/16/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>YES</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>YES</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
		Landscape Patch Structure	HIGH
		Vegetation Composition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating HIGH

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland NNN	Date 12/11/13
Wetland Type <input type="text" value="Non-Tidal Freshwater Marsh"/>	Assessor Name/Organization BP/STV
Level III Ecoregion <input type="text" value="Piedmont"/>	Nearest Named Water Body Little Creek
River Basin <input type="text" value="Cape Fear"/>	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.925959, -78.989055	

Evidence of stressors affecting the assessment area (may not be within the assessment area)
Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. **Ground Surface Condition/Vegetation Condition – assessment area condition metric**
Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

	GS	VS	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Not severely altered
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-prow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration)

2. **Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric**
Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

	Surf	Sub	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Water storage capacity and duration are not altered.
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation).
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines).

3. **Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)**
Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

	AA	WT	
3a.	<input type="checkbox"/> A	<input type="checkbox"/> A	Majority of wetland with depressions able to pond water > 1 foot deep
	<input type="checkbox"/> B	<input type="checkbox"/> B	Majority of wetland with depressions able to pond water 6 inches to 1 foot deep
	<input type="checkbox"/> C	<input type="checkbox"/> C	Majority of wetland with depressions able to pond water 3 to 6 inches deep
	<input checked="" type="checkbox"/> D	<input checked="" type="checkbox"/> D	Depressions able to pond water < 3 inches deep
3b.	<input type="checkbox"/> A	<input type="checkbox"/> A	Evidence that maximum depth of inundation is greater than 2 feet
	<input type="checkbox"/> B	<input type="checkbox"/> B	Evidence that maximum depth of inundation is between 1 and 2 feet
	<input checked="" type="checkbox"/> C	<input checked="" type="checkbox"/> C	Evidence that maximum depth of inundation is less than 1 foot

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	<input checked="" type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland NNN is a palustrine emergent wetland located within the Farrington Road VMF area. Wetland NNN provides the headwaters to Stream N.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland NNN Date 12/11/13
Wetland Type Non-Tidal Freshwater Marsh Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<u>NA</u>
		Sub-Surface Storage and Retention	<u>NA</u>
Water Quality	Pathogen Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Particulate Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Soluble Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Physical Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
Pollution Change	Condition	<u>NA</u>	
	Condition/Opportunity	<u>NA</u>	
	Opportunity Presence? (Y/N)	<u>NA</u>	
Habitat	Physical Structure	Condition	<u>MEDIUM</u>
	Landscape Patch Structure	Condition	<u>LOW</u>
	Vegetation Composition	Condition	<u>MEDIUM</u>

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	<u>HIGH</u>
Water Quality	Condition	<u>HIGH</u>
	Condition/Opportunity	<u>HIGH</u>
	Opportunity Presence? (Y/N)	<u>YES</u>
Habitat	Condition	<u>MEDIUM</u>

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland O	Date 7/17/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion Piedmont	Nearest Named Water Body New Hope Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.954432, -78.980868	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-pow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland O is a palustrine forested wetland located in the New Hope Creek floodplain.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland O Date 7/17/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
		Landscape Patch Structure	HIGH
		Vegetation Composition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland OOO		Date 1/21/14
Wetland Type	Basin Wetland	Assessor Name/Organization BP -STV
Level III Ecoregion	Piedmont	Nearest Named Water Body New Hope Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.951201, -78.982724

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

GS VS

- | | | |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-pow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

Surf Sub

- | | | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input checked="" type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

AA WT

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input checked="" type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|----------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability)
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

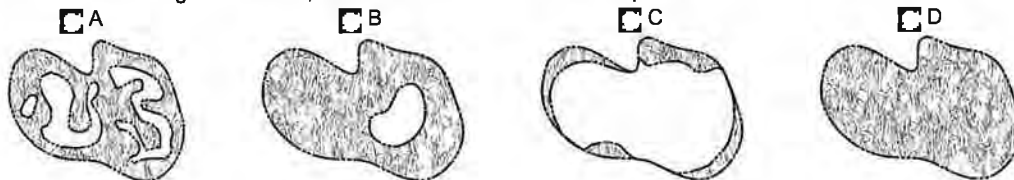
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland 000 is a palustrine emergent wetland located in a constructed sediment basin adjacent to development.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland 000 Date 1/21/14
Wetland Type Basin Wetland Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<u>NA</u>
		Sub-Surface Storage and Retention	<u>NA</u>
Water Quality	Pathogen Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Particulate Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Soluble Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Physical Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
Pollution Change	Condition	<u>LOW</u>	
	Condition/Opportunity	<u>LOW</u>	
	Opportunity Presence? (Y/N)	<u>NO</u>	
Habitat	Physical Structure	Condition	<u>LOW</u>
	Landscape Patch Structure	Condition	<u>LOW</u>
	Vegetation Composition	Condition	<u>MEDIUM</u>

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	<u>LOW</u>
Water Quality	Condition	<u>LOW</u>
	Condition/Opportunity	<u>LOW</u>
	Opportunity Presence? (Y/N)	<u>NO</u>
Habitat	Condition	<u>LOW</u>

Overall Wetland Rating LOW

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland P	Date 7/17/13
Wetland Type Bottomland Hardwood Forest	Assessor Name/Organization BP-STV
Level III Ecoregion Piedmont	Nearest Named Water Body New Hope Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.953257, -78.982328

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|----------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |

 Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input checked="" type="checkbox"/> H | <input checked="" type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

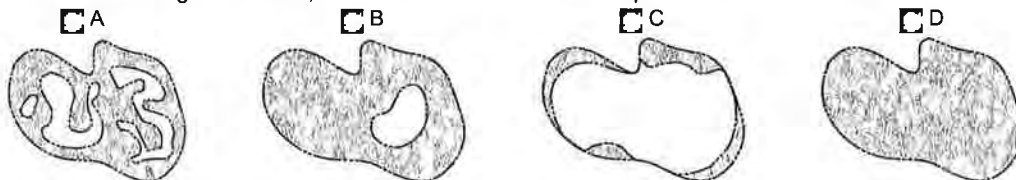
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersed between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland P is a palustrine forested wetland located in the New Hope Creek floodplain. Wetland P is located at the end of Stream P.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland P Date 7/17/13
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP-STV

Notes on Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) NO
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-Surface Storage and Retention	Condition	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland Q		Date 7/17/13
Wetland Type	Bottomland Hardwood Forest	Assessor Name/Organization BP-STV
Level III Ecoregion	Piedmont	Nearest Named Water Body New Hope Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.953280, -78.983068

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|----------------------------|----------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input checked="" type="checkbox"/> H | <input checked="" type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G	From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H	From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I	From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J	From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K	< 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A $\geq 25\%$ coverage of vegetation
 B $< 25\%$ coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12 -inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12 -inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

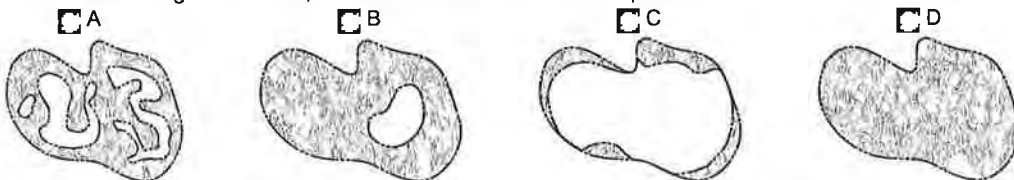
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland Q is a palustrine forested wetland located in the New Hope Creek floodplain. Wetland Q provides the headwaters to Stream Q.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland Q Date 7/17/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP-STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-Surface Storage and Retention	Condition	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	MEDIUM

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland R	Date 7/17/13
Wetland Type Headwater Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body New Hope Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.953257, -78.982328

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input checked="" type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|----------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G	From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H	From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I	From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J	From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K	< 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).



17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
- B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
- B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
- B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
- C Majority of canopy trees are < 6 inches DBH or no trees.

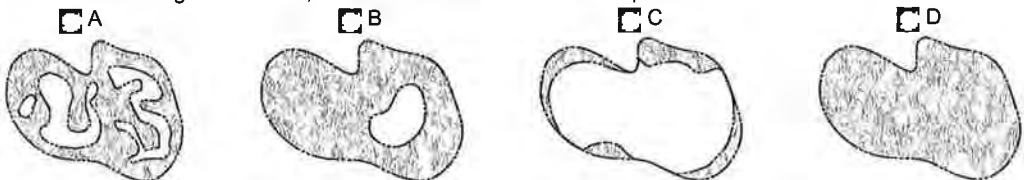
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
- B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
- B Overbank flow is severely altered in the assessment area.
- C Overland flow is severely altered in the assessment area.
- D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland R is a palustrine forested wetland located adjacent to commercial development and I-40. Wetland R is a basin that drains through stormwater piping under the McFarland Drive commercial development.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland R Date 7/17/13
 Wetland Type Headwater Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) YES
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	LOW
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	LOW
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	MEDIUM
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland S		Date 7/17/13
Wetland Type	Headwater Forest	Assessor Name/Organization BP/STV
Level III Ecoregion	Piedmont	Nearest Named Water Body New Hope Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.946871, -78.999477

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|----------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|----------------------------|----------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G	From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H	From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I	From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J	From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K	< 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).



17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
- B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
- B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
- B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
- C Majority of canopy trees are < 6 inches DBH or no trees.

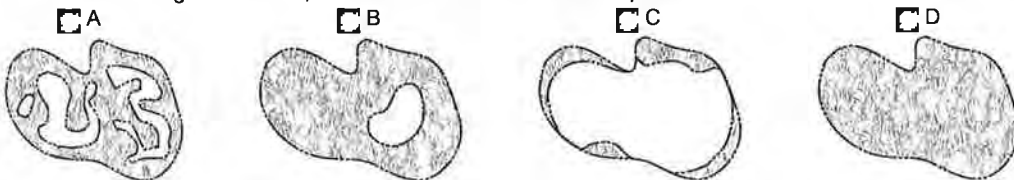
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
- B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
- B Overbank flow is severely altered in the assessment area.
- C Overland flow is severely altered in the assessment area.
- D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland S is a palustrine forested wetland located west of North White Oak Drive and provides the headwaters for Stream R.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland S Date 7/17/13
Wetland Type Headwater Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	MEDIUM
	Sub-Surface Storage and Retention	Condition	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	MEDIUM
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland T	Date 7/17/13
Wetland Type Headwater Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body New Hope Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.947070, -78.998468

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|--|---------------------------------------|---------------------------------------|--|
| | <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|--|---------------------------------------|---------------------------------------|--|
| | <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
- B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
- C Loamy or clayey soils not exhibiting redoximorphic features
- D Loamy or clayey gleyed soil
- E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
- B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
- B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 - Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 - Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 - A ≥50 feet
 - B From 30 to < 50 feet
 - C From 15 to < 30 feet
 - D From 5 to < 15 feet
 - E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 - ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 - Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 - Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 - Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

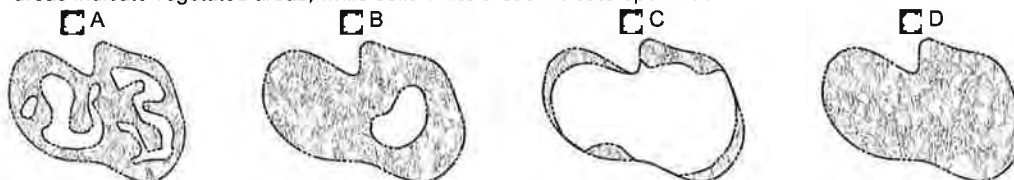
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland T is a palustrine scrub-shrub wetland located adjacent to Stream R. Wetland T has been created in a highly disturbed area that was previously forested.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland T Date 7/17/13
Wetland Type Headwater Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	LOW
		Sub-Surface Storage and Retention	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	LOW
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	LOW
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland TTT	Date 12/11/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Sandy Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.982194, -78.956699	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-pow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="radio"/> A	<input checked="" type="radio"/> A	<input checked="" type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersed vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland TTT is a palustrine forested wetland abutting both sides of Stream GG. Wetland TTT is drained by Stream GG, which drains to Stream J (Sandy Creek).

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland TTT Date 12/11/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland U	Date 7/18/13
Wetland Type Basin Wetland	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body New Hope Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.959323, -78.979621	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-prow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥ 500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland U is a palustrine forested wetland located adjacent to the New Hope Creek floodplain. Wetland U is a basin wetland located adjacent to Stream S.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland U Date 7/18/13
Wetland Type Basin Wetland Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	NA
		Sub-Surface Storage and Retention	Condition
Water Quality	Pathogen Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Particulate Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
Pollution Change	Condition	MEDIUM	
	Condition/Opportunity	MEDIUM	
	Opportunity Presence? (Y/N)	YES	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	MEDIUM
	Condition/Opportunity	MEDIUM
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating **MEDIUM**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland UUU		Date 1/21/14
Wetland Type	Bottomland Hard wood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion	Piedmont	Nearest Named Water Body Sandy Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.954829, -78.974272

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|-----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

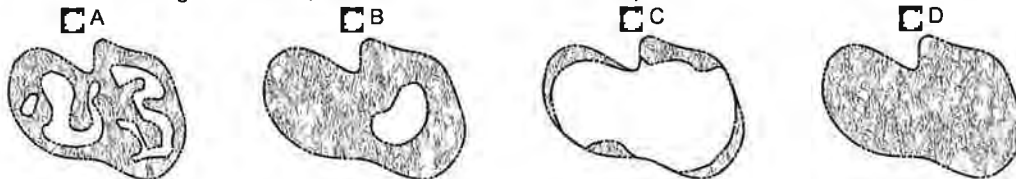
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland UUU is a palustrine forested wetland located in the Sandy Creek floodplain.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland UUU Date 1/21/14
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
		Landscape Patch Structure	HIGH
		Vegetation Composition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Conditon	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland V	Date 7/18/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body New Hope Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.959323, -78.980116	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

GS VS

- | | | |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-pow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

Surf Sub

- | | | |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

AA WT

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersed vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland V is a palustrine forested wetland located in the New Hope Creek floodplain located south of and adjacent to US 15/501. Wetland V abuts Stream S.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland V Date 7/18/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	LOW
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	LOW
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence? (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland VV	Date 11/05/13
Wetland Type Non-Tidal Freshwater Marsh	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body New Hope Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.959164, -78.982133	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-pow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|----------------------------|----------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|----------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland VV is a palustrine emergent wetland located in the New Hope Creek floodplain, located north of and adjacent to US 15/501. Wetland VV abuts Stream S.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland VV Date 11/05/13
Wetland Type Non-Tidal Freshwater Marsh Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) YES
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	NA
		Sub-Surface Storage and Retention	Condition
Water Quality	Pathogen Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Particulate Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Soluble Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
	Physical Change	Condition	NA
		Condition/Opportunity	NA
		Opportunity Presence? (Y/N)	NA
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	MEDIUM
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	MEDIUM
Water Quality	Condition	LOW
	Condition/Opportunity	LOW
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland VVV	Date 1/21/14
Wetland Type <input type="text" value="Bottomland Hard wood Forest"/>	Assessor Name/Organization BP -STV
Level III Ecoregion <input type="text" value="Piedmont"/>	Nearest Named Water Body Sandy Creek
River Basin <input type="text" value="Cape Fear"/>	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.955307, -78.973797

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

GS VS

- | | | |
|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

Surf Sub

- | | | |
|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

AA WT

- | | | | |
|-----|----------------------------|----------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G	From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H	From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I	From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J	From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K	< 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well Loosely

- | | | |
|----------------------------|----------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥500 acres |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 100 to < 500 acres |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 100 acres |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 10 to < 50 acres |
| <input type="checkbox"/> E | <input type="checkbox"/> E | < 10 acres |
| <input type="checkbox"/> F | <input type="checkbox"/> F | Wetland type has a poor or no connection to other natural habitats |

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

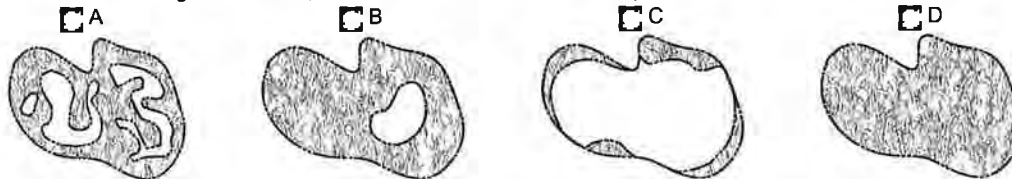
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland VVV is a palustrine forested wetland located in the Sandy Creek floodplain.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland VVV Date 1/21/14
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>NO</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>YES</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention	Condition	<u>HIGH</u>	
	Sub-Surface Storage and Retention	Condition	<u>LOW</u>	
Water Quality	Pathogen Change	Condition	<u>HIGH</u>	
		Condition/Opportunity	<u>HIGH</u>	
		Opportunity Presence? (Y/N)	<u>YES</u>	
	Particulate Change	Condition	<u>HIGH</u>	
		Condition/Opportunity	<u>HIGH</u>	
		Opportunity Presence? (Y/N)	<u>YES</u>	
	Soluble Change	Condition	<u>HIGH</u>	
		Condition/Opportunity	<u>HIGH</u>	
		Opportunity Presence? (Y/N)	<u>YES</u>	
	Physical Change	Condition	Condition	<u>LOW</u>
			Condition/Opportunity	<u>LOW</u>
			Opportunity Presence? (Y/N)	<u>YES</u>
Pollution Change		Condition	<u>NA</u>	
		Condition/Opportunity	<u>NA</u>	
		Opportunity Presence? (Y/N)	<u>NA</u>	
Habitat	Physical Structure	Condition	<u>HIGH</u>	
	Landscape Patch Structure	Condition	<u>HIGH</u>	
	Vegetation Composition	Condition	<u>HIGH</u>	

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	<u>HIGH</u>
Water Quality	Condition	<u>HIGH</u>
	Condition/Opportunity	<u>HIGH</u>
	Opportunity Presence? (Y/N)	<u>YES</u>
Habitat	Conditon	<u>HIGH</u>

Overall Wetland Rating HIGH

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland W	Date 7/30/13
Wetland Type Bottomland Hardw ood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Little Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.958192, -78.982022	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plov lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|----------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|----------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersed vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland W is a palustrine forested/emergent wetland located in the New Hope Creek floodplain, located south of and adjacent to US 15/501.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland W Date 7/30/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland WW	Date 11/05/13
Wetland Type Bottomland Hardwood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Chapel Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.905366, -79.028462	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|-----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

Surf Sub

- A A Little or no evidence of pollutants or discharges entering the assessment area
 B B Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area
 C C Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor)

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

WS 5M 2M

- A A A ≥10% impervious surfaces
 B B B < 10% impervious surfaces
 C C C Confined animal operations (or other local, concentrated source of pollutants)
 D D D ≥20% coverage of pasture
 E E E ≥20% coverage of agricultural land (regularly plowed land)
 F F F ≥20% coverage of maintained grass/herb
 G G G ≥20% coverage of clear-cut land
 H H H Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area.

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

WT WC

- A A ≥100 feet
 B B From 80 to < 100 feet
 C C From 50 to < 80 feet
 D D From 40 to < 50 feet
 E E From 30 to < 40 feet
 F F From 15 to < 30 feet
 G G From 5 to < 15 feet
 H H < 5 feet

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

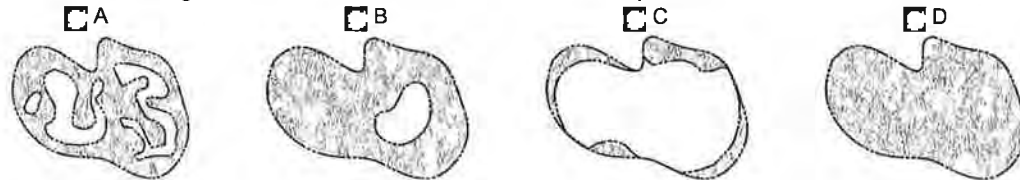
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland WW is a palustrine forested/emergent wetlands located adjacent to Chapel Branch, a NCDWR mitigation stream. Wetland WW is on park lands.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland WW Date 11/05/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>YES</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	LOW
	Sub-Surface Storage and Retention	Condition	LOW
Water Quality	Pathogen Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	LOW
Water Quality	Condition	MEDIUM
	Condition/Opportunity	MEDIUM
	Opportunity Presence? (Y/N)	NO
Habitat	Condition	LOW

Overall Wetland Rating **LOW**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland WWW	Date 1/22/14
Wetland Type <input type="text" value="Bottomland Hardwood Forest"/>	Assessor Name/Organization BP -STV
Level III Ecoregion <input type="text" value="Piedmont"/>	Nearest Named Water Body New Hope Creek
River Basin <input type="text" value="Cape Fear"/>	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.952950, -78.978619

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Not severely altered |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|-----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

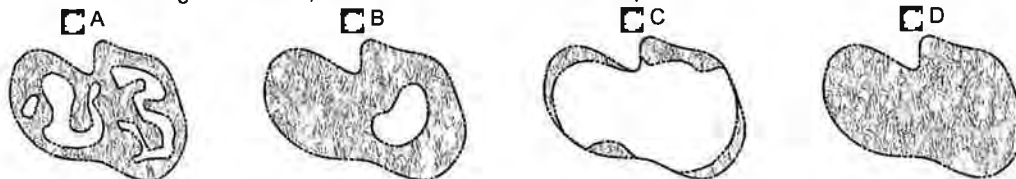
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersions between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland WWW is a palustrine forested wetland located in the New Hope Creek floodplain.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland WWW Date 1/22/14
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
		Landscape Patch Structure	HIGH
		Vegetation Composition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland XX	Date 9/18/13
Wetland Type Bottomland Hardwood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body New Hope Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	
Latitude/Longitude (deci-degrees) 35.954826, -78.977794	

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-prow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤ 1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|----------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input checked="" type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|----------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | <input type="checkbox"/> A | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Evidence that maximum depth of inundation is between 1 and 2 feet |
| | <input checked="" type="checkbox"/> C | <input type="checkbox"/> C | Evidence that maximum depth of inundation is less than 1 foot |

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥ 1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 10% impervious surfaces |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥ 20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥ 20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥ 20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥ 20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥ 50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤ 15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥ 2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|---------------------------------------|---------------------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥ 100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input checked="" type="checkbox"/> E | <input checked="" type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D From 25 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E From 10 to < 25 acres
<input type="radio"/> F	<input type="radio"/> F	<input type="radio"/> F From 5 to < 10 acres
<input type="radio"/> G	<input type="radio"/> G	<input type="radio"/> G From 1 to < 5 acres
<input type="radio"/> H	<input type="radio"/> H	<input type="radio"/> H From 0.5 to < 1 acre
<input type="radio"/> I	<input type="radio"/> I	<input type="radio"/> I From 0.1 to < 0.5 acre
<input type="radio"/> J	<input type="radio"/> J	<input type="radio"/> J From 0.01 to < 0.1 acre
<input type="radio"/> K	<input type="radio"/> K	<input type="radio"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥ 90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input checked="" type="radio"/> A	<input type="radio"/> A ≥ 500 acres
<input type="radio"/> B	<input type="radio"/> B From 100 to < 500 acres
<input type="radio"/> C	<input type="radio"/> C From 50 to < 100 acres
<input type="radio"/> D	<input type="radio"/> D From 10 to < 50 acres
<input type="radio"/> E	<input type="radio"/> E < 10 acres
<input type="radio"/> F	<input type="radio"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥ 40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

- A ≥ 25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland XX is a palustrine forested wetland located in the New Hope Creek floodplain.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland XX Date 9/18/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>NO</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	NO
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	MEDIUM
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	NO
Habitat	Condition	HIGH

Overall Wetland Rating HIGH

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland Y	Date 7/31/13
Wetland Type Basin Wetland	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Little Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.914784, -78.995006

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| | GS | VS | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| | Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input checked="" type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input checked="" type="checkbox"/> F | <input checked="" type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).



17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
- B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
- B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
- B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
- C Majority of canopy trees are < 6 inches DBH or no trees.

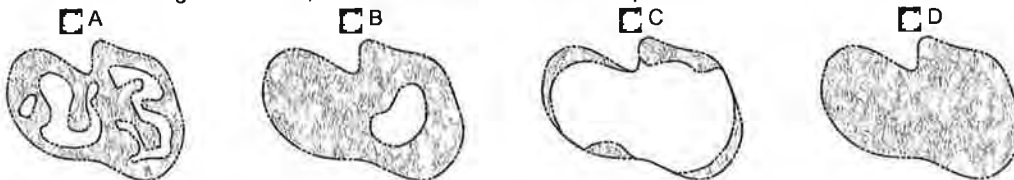
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
- B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
- B Overbank flow is severely altered in the assessment area.
- C Overland flow is severely altered in the assessment area.
- D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland Y is a palustrine forested wetland located adjacent to George King Road. Wetland Y is an isolated basin located in an upland forest

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland Y Date 7/31/13
Wetland Type Basin Wetland Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N)	<u>YES</u>
Presence of regulatory considerations (Y/N)	<u>YES</u>
Wetland is intensively managed (Y/N)	<u>NO</u>
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N)	<u>NO</u>
Assessment area is substantially altered by beaver (Y/N)	<u>NO</u>
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N)	<u>NO</u>
Assessment area is on a coastal island (Y/N)	<u>NO</u>

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<u>NA</u>
		Sub-Surface Storage and Retention	<u>NA</u>
Water Quality	Pathogen Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Particulate Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Soluble Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Physical Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
Pollution Change	Condition	<u>MEDIUM</u>	
	Condition/Opportunity	<u>MEDIUM</u>	
	Opportunity Presence? (Y/N)	<u>YES</u>	
Habitat	Physical Structure	Condition	<u>HIGH</u>
	Landscape Patch Structure	Condition	<u>LOW</u>
	Vegetation Composition	Condition	<u>HIGH</u>

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	<u>HIGH</u>
Water Quality	Condition	<u>MEDIUM</u>
	Condition/Opportunity	<u>MEDIUM</u>
	Opportunity Presence? (Y/N)	<u>YES</u>
Habitat	Condition	<u>MEDIUM</u>

Overall Wetland Rating **MEDIUM**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland YY		Date 09/19/13
Wetland Type	Non-Tidal Freshwater Marsh	Assessor Name/Organization BP/STV
Level III Ecoregion	Piedmont	Nearest Named Water Body Chapel Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.905386, -79.01855

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric


Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|----------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|----------------------------|----------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

7a. Is assessment area within 50 feet of a tributary or other open water?

- Yes No If Yes, continue to 7b. If No, skip to Metric 8.

Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.

7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.

- A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches

7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.

- ≤15-foot wide > 15-foot wide Other open water (no tributary present)

7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?

- Yes No

7e. Is tributary or other open water sheltered or exposed?

- Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well Loosely

<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

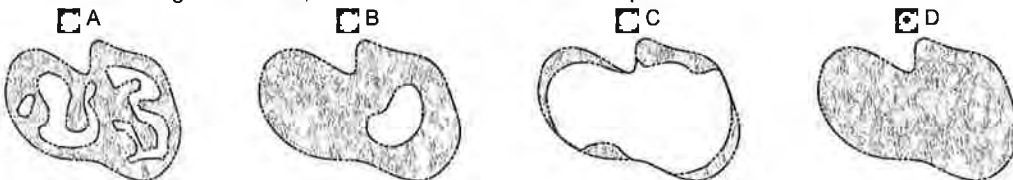
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersed between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland YY is a palustrine emergent wetland located adjacent to Finley Golf Course Road and upland forest. Wetland YY provides the headwaters to Stream SS.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland YY Date 09/19/13
Wetland Type Non-Tidal Freshwater Marsh Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	<u>NA</u>
		Sub-Surface Storage and Retention	<u>NA</u>
Water Quality	Pathogen Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Particulate Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Soluble Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
	Physical Change	Condition	<u>NA</u>
		Condition/Opportunity	<u>NA</u>
		Opportunity Presence? (Y/N)	<u>NA</u>
Pollution Change	Condition	<u>NA</u>	
	Condition/Opportunity	<u>NA</u>	
	Opportunity Presence? (Y/N)	<u>NA</u>	
Habitat	Physical Structure	Condition	<u>MEDIUM</u>
	Landscape Patch Structure	Condition	<u>LOW</u>
	Vegetation Composition	Condition	<u>MEDIUM</u>

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	<u>HIGH</u>
Water Quality	Condition	<u>MEDIUM</u>
	Condition/Opportunity	<u>HIGH</u>
	Opportunity Presence? (Y/N)	<u>YES</u>
Habitat	Condition	<u>MEDIUM</u>

Overall Wetland Rating **MEDIUM**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland YYY	Date 1/22/14
Wetland Type <input type="text" value="Bottomland Hardwood Forest"/>	Assessor Name/Organization BP -STV
Level III Ecoregion <input type="text" value="Piedmont"/>	Nearest Named Water Body New Hope Creek
River Basin <input type="text" value="Cape Fear"/>	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (decli-degrees) 35.953209, -78.978240

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

GS VS

- | | | |
|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

Surf Sub

- | | | |
|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

AA WT

- | | | | |
|-----|----------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input checked="" type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. **Soil Texture/Structure – assessment area condition metric**

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. **Discharge into Wetland – opportunity metric**

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. **Land Use – opportunity metric**

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. **Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric**

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. **Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)**

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|----------------------------|----------------------------|-----------------------|
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

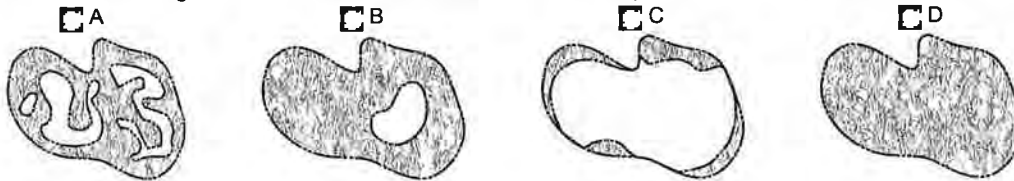
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland YYY is a palustrine forested wetland located in the New Hope Creek floodplain.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland YYY Date 1/22/14
 Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
 Presence of regulatory considerations (Y/N) YES
 Wetland is intensively managed (Y/N) NO
 Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
 Assessment area is substantially altered by beaver (Y/N) NO
 Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
 Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
		Sub-Surface Storage and Retention	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
		Landscape Patch Structure	HIGH
		Vegetation Composition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland Z	Date 7/31/13
Wetland Type Bottomland Hardwood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion Piedmont	Nearest Named Water Body Little Creek
River Basin Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?	Latitude/Longitude (deci-degrees) 35.913953, -78.996808

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | GS | VS | |
|---------------------------------------|---------------------------------------|----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric


Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | Surf | Sub | |
|---------------------------------------|---------------------------------------|-----|--|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | AA | WT | |
|-----|---------------------------------------|---------------------------------------|---|
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | Surf | Sub | |
|---------------------------------------|---------------------------------------|---|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | WS | 5M | 2M | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | <input type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-feet wide > 15-feet wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | WT | WC | |
|---------------------------------------|---------------------------------------|-----------------------|
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

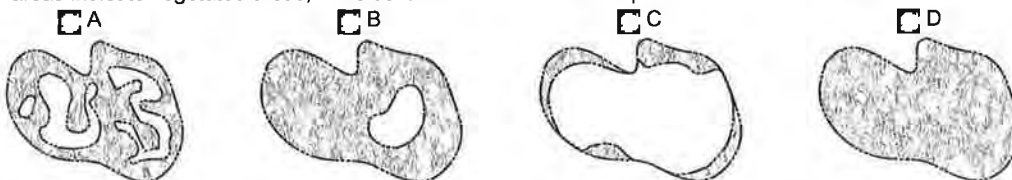
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland Z is a palustrine forested/emergent wetland located in the floodplain forest of the Corps Waterfowl lands.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland Z Date 7/31/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) NO
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	HIGH
	Sub-Surface Storage and Retention	Condition	LOW
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Particulate Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	NO
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	NO
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	HIGH
	Landscape Patch Structure	Condition	HIGH
	Vegetation Composition	Condition	HIGH

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland ZZ		Date 7/17/13
Wetland Type	Bottomland Hardw ood Forest	Assessor Name/Organization BP/STV
Level III Ecoregion	Piedmont	Nearest Named Water Body Chapel Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.905663, -79.029793

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | |
|---------------------------------------|----------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | | |
|-----|---------------------------------------|---------------------------------------|---|
| | AA | WT | |
| 3a. | <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| | <input type="checkbox"/> B | <input type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| | <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| | <input checked="" type="checkbox"/> D | <input checked="" type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. | <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| | <input type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|----------------------------|----------------------------|---|
| Surf | Sub | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|----------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)
<input type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K < 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely
<input type="checkbox"/> A	<input type="checkbox"/> A ≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E < 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts. Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation **for all marshes only**. Skip to 17c for non-marsh wetlands.

A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. **Check a box in each column for each stratum.** Evaluate this portion of the metric **for non-marsh wetlands**. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

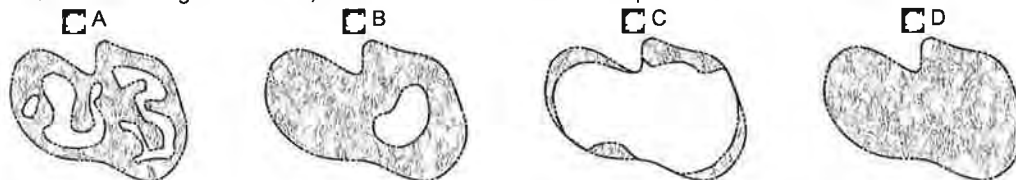
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland ZZ is a palustrine forested/emergent wetlands located adjacent to the US 501 Highway and a school. Wetland ZZ provides the headwaters to Stream UU.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland ZZ Date 7/17/13
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP/STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) NO
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating
Hydrology	Surface Storage and Retention	Condition	MEDIUM
	Sub-Surface Storage and Retention	Condition	MEDIUM
Water Quality	Pathogen Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Particulate Change	Condition	MEDIUM
		Condition/Opportunity	MEDIUM
		Opportunity Presence? (Y/N)	YES
	Soluble Change	Condition	HIGH
		Condition/Opportunity	HIGH
		Opportunity Presence? (Y/N)	YES
	Physical Change	Condition	LOW
		Condition/Opportunity	LOW
		Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA	
	Condition/Opportunity	NA	
	Opportunity Presence? (Y/N)	NA	
Habitat	Physical Structure	Condition	LOW
	Landscape Patch Structure	Condition	LOW
	Vegetation Composition	Condition	MEDIUM

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	MEDIUM
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	LOW

Overall Wetland Rating **MEDIUM**

NC WAM WETLAND ASSESSMENT FORM
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland ZZZ		Date 1/22/14
Wetland Type	Bottomland Hard wood Forest	Assessor Name/Organization BP -STV
Level III Ecoregion	Piedmont	Nearest Named Water Body New Hope Creek
River Basin	Cape Fear	USGS 8-Digit Catalogue Unit 03030002
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Precipitation within 48 hrs?		Latitude/Longitude (deci-degrees) 35.953209, -78.978240

Evidence of stressors affecting the assessment area (may not be within the assessment area)

Please circle and/or make note on last page if evidence of stressors is apparent. Consider departure from reference, if appropriate, in recent past (for instance, approximately within 10 years). Noteworthy stressors include, but are not limited to the following.

- Hydrological modifications (examples: ditches, dams, beaver dams, dikes, berms, ponds, etc.)
- Surface and sub-surface discharges into the wetland (examples: discharges containing obvious pollutants, presence of nearby septic tanks, underground storage tanks (USTs), hog lagoons, etc.)
- Signs of vegetation stress (examples: vegetation mortality, insect damage, disease, storm damage, salt intrusion, etc.)
- Habitat/plant community alteration (examples: mowing, clear-cutting, exotics, etc.)

Is the assessment area intensively managed? Yes No

Regulatory Considerations (select all that apply to the assessment area)

- Anadromous fish
- Federally protected species or State endangered or threatened species
- NCDWQ riparian buffer rule in effect
- Abuts a Primary Nursery Area (PNA)
- Publicly owned property
- N.C. Division of Coastal Management Area of Environmental Concern (AEC) (including buffer)
- Abuts a stream with a NCDWQ classification of SA or supplemental classifications of HQW, ORW, or Trout
- Designated NCNHP reference community
- Abuts a 303(d)-listed stream or a tributary to a 303(d)-listed stream

What type of natural stream is associated with the wetland, if any? (check all that apply)

- Blackwater
- Brownwater
- Tidal (if tidal, check one of the following boxes) Lunar Wind Both

Is the assessment area on a coastal island? Yes No

Is the assessment area's surface water storage capacity or duration substantially altered by beaver? Yes No

Does the assessment area experience overbank flooding during normal rainfall conditions? Yes No

1. Ground Surface Condition/Vegetation Condition – assessment area condition metric

Check a box in each column. Consider alteration to the ground surface (GS) in the assessment area and vegetation structure (VS) in the assessment area. Compare to reference wetland if applicable (see User Manual). If a reference is not applicable, then rate the assessment area based on evidence of an effect.

- | | | |
|---------------------------------------|---------------------------------------|--|
| GS | VS | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Not severely altered |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Severely altered over a majority of the assessment area (ground surface alteration examples: vehicle tracks, excessive sedimentation, fire-plow lanes, skidder tracks, bedding, fill, soil compaction, obvious pollutants) (vegetation structure alteration examples: mechanical disturbance, herbicides, salt intrusion [where appropriate], exotic species, grazing, less diversity [if appropriate], hydrologic alteration) |

2. Surface and Sub-Surface Storage Capacity and Duration – assessment area condition metric

Check a box in each column. Consider surface storage capacity and duration (Surf) and sub-surface storage capacity and duration (Sub). Consider both increase and decrease in hydrology. Refer to the current NRCS lateral effect of ditching guidance for North Carolina hydric soils (see USACE Wilmington District website) for the zone of influence of ditches in hydric soils. A ditch ≤1 foot deep is considered to affect surface water only, while a ditch > 1 foot deep is expected to affect both surface and ditch sub-surface water. Consider tidal flooding regime, if applicable.

- | | | |
|---------------------------------------|---------------------------------------|--|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Water storage capacity and duration are not altered. |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Water storage capacity or duration are altered, but not substantially (typically, not sufficient to change vegetation). |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Water storage capacity or duration are substantially altered (typically, alteration sufficient to result in vegetation change) (examples: draining, flooding, soil compaction, filling, excessive sedimentation, underground utility lines). |

3. Water Storage/Surface Relief – assessment area/wetland type condition metric (answer for non-marsh wetlands only)

Check a box in each column for each group below. Select the appropriate storage for the assessment area (AA) and the wetland type (WT).

- | | | |
|---------------------------------------|---------------------------------------|---|
| AA | WT | |
| 3a. <input type="checkbox"/> A | <input type="checkbox"/> A | Majority of wetland with depressions able to pond water > 1 foot deep |
| <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> B | Majority of wetland with depressions able to pond water 6 inches to 1 foot deep |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Majority of wetland with depressions able to pond water 3 to 6 inches deep |
| <input type="checkbox"/> D | <input type="checkbox"/> D | Depressions able to pond water < 3 inches deep |
| 3b. <input type="checkbox"/> A | | Evidence that maximum depth of inundation is greater than 2 feet |
| <input checked="" type="checkbox"/> B | | Evidence that maximum depth of inundation is between 1 and 2 feet |

 C Evidence that maximum depth of inundation is less than 1 foot

4. Soil Texture/Structure – assessment area condition metric

Check a box from each of the three soil property groups below. Dig soil profile in the dominant assessment area landscape feature. Make soil observations within the 12 inches. Use most recent National Technical Committee for Hydric Soils guidance for regional indicators.

- 4a. A Sandy soil
 B Loamy or clayey soils exhibiting redoximorphic features (concentrations, depletions, or rhizospheres)
 C Loamy or clayey soils not exhibiting redoximorphic features
 D Loamy or clayey gleyed soil
 E Histosol or histic epipedon
- 4b. A Soil ribbon < 1 inch
 B Soil ribbon ≥1 inch
- 4c. A No peat or muck presence
 B A peat or muck presence

5. Discharge into Wetland – opportunity metric

Check a box in each column. Consider surface pollutants or discharges (Surf) and sub-surface pollutants or discharges (Sub). Examples of sub-surface discharges include presence of nearby septic tank, underground storage tank (UST), etc.

- | | | |
|---------------------------------------|---------------------------------------|---|
| Surf | Sub | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | Little or no evidence of pollutants or discharges entering the assessment area |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Noticeable evidence of pollutants or discharges entering the wetland and stressing, but not overwhelming the treatment capacity of the assessment area |
| <input type="checkbox"/> C | <input type="checkbox"/> C | Noticeable evidence of pollutants or discharges (pathogen, particulate, or soluble) entering the assessment area and potentially overwhelming the treatment capacity of the wetland (water discoloration, dead vegetation, excessive sedimentation, odor) |

6. Land Use – opportunity metric

Check all that apply (at least one box in each column). Evaluation involves a GIS effort with field adjustment. Consider sources draining to assessment area within entire upstream watershed (WS), within 5 miles and within the watershed draining to the assessment area (5M), and within 2 miles and within the watershed draining to the assessment area (2M). Effective riparian buffers are considered to be 50 feet wide in the Coastal Plain and Piedmont ecoregions and 30 feet wide in the Blue Ridge Mountains ecoregion.

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|--|
| WS | 5M | 2M | |
| <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> A | ≥10% impervious surfaces |
| <input type="checkbox"/> B | <input type="checkbox"/> B | <input type="checkbox"/> B | < 10% impervious surfaces |
| <input type="checkbox"/> C | <input type="checkbox"/> C | <input type="checkbox"/> C | Confined animal operations (or other local, concentrated source of pollutants) |
| <input type="checkbox"/> D | <input type="checkbox"/> D | <input type="checkbox"/> D | ≥20% coverage of pasture |
| <input type="checkbox"/> E | <input type="checkbox"/> E | <input type="checkbox"/> E | ≥20% coverage of agricultural land (regularly plowed land) |
| <input type="checkbox"/> F | <input type="checkbox"/> F | <input type="checkbox"/> F | ≥20% coverage of maintained grass/herb |
| <input type="checkbox"/> G | <input type="checkbox"/> G | <input type="checkbox"/> G | ≥20% coverage of clear-cut land |
| <input type="checkbox"/> H | <input type="checkbox"/> H | <input type="checkbox"/> H | Little or no opportunity to improve water quality. Lack of opportunity may result from hydrologic alterations that prevent drainage or overbank flow from affecting the assessment area. |

7. Wetland Acting as Vegetated Buffer – assessment area/wetland complex condition metric

- 7a. Is assessment area within 50 feet of a tributary or other open water?
 Yes No If Yes, continue to 7b. If No, skip to Metric 8.
 Wetland buffer need only be present on one side of the water body. Make buffer judgment based on the average width of the wetland. Record a note if a portion of the buffer has been removed or disturbed.
- 7b. How much of the first 50 feet from the bank is wetland? Descriptor E should be selected if ditches effectively bypass the buffer.
 A ≥50 feet
 B From 30 to < 50 feet
 C From 15 to < 30 feet
 D From 5 to < 15 feet
 E < 5 feet or buffer bypassed by ditches
- 7c. Tributary width. If the tributary is anastomosed, combine widths of channels/braids for a total width.
 ≤15-foot wide > 15-foot wide Other open water (no tributary present)
- 7d. Do roots of assessment area vegetation extend into the bank of the tributary/open water?
 Yes No
- 7e. Is tributary or other open water sheltered or exposed?
 Sheltered – adjacent open water with width < 2500 feet and no regular boat traffic.
 Exposed – adjacent open water with width ≥2500 feet or regular boat traffic.

8. Wetland Width at the Assessment Area – wetland type/wetland complex metric (evaluate for riparian wetlands only)

Check a box in each column. Select the average width for the wetland type at the assessment area (WT) and the wetland complex at the assessment areas (WC). See User Manual for WT and WC boundaries.

- | | | |
|----------------------------|----------------------------|-----------------------|
| WT | WC | |
| <input type="checkbox"/> A | <input type="checkbox"/> A | ≥100 feet |
| <input type="checkbox"/> B | <input type="checkbox"/> B | From 80 to < 100 feet |
| <input type="checkbox"/> C | <input type="checkbox"/> C | From 50 to < 80 feet |
| <input type="checkbox"/> D | <input type="checkbox"/> D | From 40 to < 50 feet |
| <input type="checkbox"/> E | <input type="checkbox"/> E | From 30 to < 40 feet |
| <input type="checkbox"/> F | <input type="checkbox"/> F | From 15 to < 30 feet |
| <input type="checkbox"/> G | <input type="checkbox"/> G | From 5 to < 15 feet |
| <input type="checkbox"/> H | <input type="checkbox"/> H | < 5 feet |

9. Inundation Duration – assessment area condition metric

Answer for assessment area dominant landform.

- A Evidence of short-duration inundation (< 7 consecutive days)
- B Evidence of saturation, without evidence of inundation
- C Evidence of long-duration inundation or very long-duration inundation (7 to 30 consecutive days or more)

10. Indicators of Deposition – assessment area condition metric

Consider recent deposition only (no plant growth since deposition).

- A Sediment deposition is not excessive, but at approximately natural levels.
- B Sediment deposition is excessive, but not overwhelming the wetland.
- C Sediment deposition is excessive and is overwhelming the wetland.

11. Wetland Size – wetland type/wetland complex condition metric

Check a box in each column. Involves a GIS effort with field adjustment. This metric evaluates three aspects of the wetland area: the size of the wetland type (WT), the size of the wetland complex (WC), and the size of the forested wetland (FW) (if applicable, see User Manual). See the User Manual for boundaries of these evaluation areas. If assessment area is clear-cut, select "K" for the FW column.

WT	WC	FW (if applicable)	
<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	<input type="checkbox"/> D	From 25 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	<input type="checkbox"/> E	From 10 to < 25 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	<input type="checkbox"/> F	From 5 to < 10 acres
<input type="checkbox"/> G	<input type="checkbox"/> G	<input type="checkbox"/> G	From 1 to < 5 acres
<input type="checkbox"/> H	<input type="checkbox"/> H	<input type="checkbox"/> H	From 0.5 to < 1 acre
<input type="checkbox"/> I	<input type="checkbox"/> I	<input type="checkbox"/> I	From 0.1 to < 0.5 acre
<input type="checkbox"/> J	<input type="checkbox"/> J	<input type="checkbox"/> J	From 0.01 to < 0.1 acre
<input type="checkbox"/> K	<input type="checkbox"/> K	<input type="checkbox"/> K	< 0.01 acre <u>or</u> assessment area is clear-cut

12. Wetland Intactness – wetland type condition metric (evaluate for Pocosins only)

- A Pocosin is the full extent (≥90%) of its natural landscape size.
- B Pocosin is < 90% of the full extent of its natural landscape size.

13. Connectivity to Other Natural Areas – landscape condition metric

13a. Check appropriate box(es) (a box may be checked in each column). Involves a GIS effort with field adjustment. This evaluates whether the wetland is well connected (Well) and/or loosely connected (Loosely) to the landscape patch, the contiguous metric naturally vegetated area and open water (if appropriate). Boundaries are formed by four-lane roads, regularly maintained utility line corridors the width of a four-lane road or wider, urban landscapes, fields (pasture open and agriculture), or water > 300 feet wide.

Well	Loosely	
<input type="checkbox"/> A	<input type="checkbox"/> A	≥500 acres
<input type="checkbox"/> B	<input type="checkbox"/> B	From 100 to < 500 acres
<input type="checkbox"/> C	<input type="checkbox"/> C	From 50 to < 100 acres
<input type="checkbox"/> D	<input type="checkbox"/> D	From 10 to < 50 acres
<input type="checkbox"/> E	<input type="checkbox"/> E	< 10 acres
<input type="checkbox"/> F	<input type="checkbox"/> F	Wetland type has a poor or no connection to other natural habitats

13b. Evaluate for marshes only.

- Yes No Wetland type has a surface hydrology connection to open waters/stream or tidal wetlands.

14. Edge Effect – wetland type condition metric (skip for all marshes)

May involve a GIS effort with field adjustment. Estimate distance from wetland type boundary to artificial edges. Artificial edges include non-forested areas ≥40 feet wide such as fields, development, roads, regularly maintained utility line corridors and clear-cuts.

Consider the eight main points of the compass.

- A No artificial edge within 150 feet in all directions
- B No artificial edge within 150 feet in four (4) to seven (7) directions
- C An artificial edge occurs within 150 feet in more than four (4) directions or assessment area is clear-cut

15. Vegetative Composition – assessment area condition metric (skip for all marshes and Pine Flat)

- A Vegetation is close to reference condition in species present and their proportions. Lower strata composed of appropriate species, with exotic plants absent or sparse within the assessment area.
- B Vegetation is different from reference condition in species diversity or proportions, but still largely composed of native species characteristic of the wetland type. This may include communities of weedy native species that develop after clearcutting or clearing. It also includes communities with exotics present, but not dominant, over a large portion of the expected strata.
- C Vegetation severely altered from reference in composition. Expected species are unnaturally absent (planted stands of non-characteristic species or at least one stratum inappropriately composed of a single species). Exotic species are dominant in at least one stratum.

16. Vegetative Diversity – assessment area condition metric (evaluate for Non-tidal Freshwater Marsh only)

- A Vegetation diversity is high and is composed primarily of native species (<10% cover of exotics).
- B Vegetation diversity is low or has > 10% to 50% cover of exotics.
- C Vegetation is dominated by exotic species (>50% cover of exotics).

17. Vegetative Structure – assessment area/wetland type condition metric

17a. Is vegetation present?

- Yes No If Yes, continue to 17b. If No, skip to Metric 18.

17b. Evaluate percent coverage of assessment area vegetation for all marshes only. Skip to 17c for non-marsh wetlands.

- A ≥25% coverage of vegetation
 B < 25% coverage of vegetation

17c. Check a box in each column for each stratum. Evaluate this portion of the metric for non-marsh wetlands. Consider structure in airspace above the assessment area (AA) and the wetland type (WT) separately.

	AA	WT	
Canopy	<input checked="" type="checkbox"/> A	<input type="checkbox"/> A	Canopy closed, or nearly closed, with natural gaps associated with natural processes
	<input type="checkbox"/> B	<input type="checkbox"/> B	Canopy present, but opened more than natural gaps
	<input type="checkbox"/> C	<input type="checkbox"/> C	Canopy sparse or absent
Mid-Story	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense mid-story/sapling layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density mid-story/sapling layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Mid-story/sapling layer sparse or absent
Shrub	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense shrub layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density shrub layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Shrub layer sparse or absent
Herb	<input type="checkbox"/> A	<input type="checkbox"/> A	Dense herb layer
	<input type="checkbox"/> B	<input type="checkbox"/> B	Moderate density herb layer
	<input type="checkbox"/> C	<input type="checkbox"/> C	Herb layer sparse or absent

18. Snags – wetland type condition metric

- A Large snags (more than one) are visible (> 12-inches DBH, or large relative to species present and landscape stability).
 B Not A

19. Diameter Class Distribution – wetland type condition metric

- A Majority of canopy trees have stems > 6 inches in diameter at breast height (DBH); many large trees (> 12 inches DBH) are present.
 B Majority of canopy trees have stems between 6 and 12 inches DBH, few are > 12-inch DBH.
 C Majority of canopy trees are < 6 inches DBH or no trees.

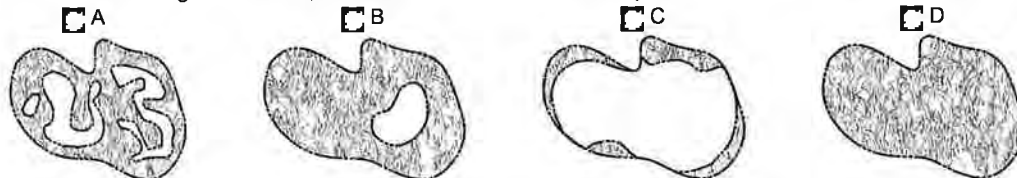
20. Large Woody Debris – wetland type condition metric

Include both natural debris and man-placed natural debris.

- A Large logs (more than one) are visible (> 12 inches in diameter, or large relative to species present and landscape stability).
 B Not A

21. Vegetation/Open Water Dispersion – wetland type/open water condition metric (evaluate for Non-Tidal Freshwater Marsh only)

Select the figure that best describes the amount of interspersion between vegetation and open water in the growing season. Patterned areas indicate vegetated areas, while solid white areas indicate open water.



22. Hydrologic Connectivity – assessment area condition metric (evaluate for riparian wetlands only)

Examples of activities that may severely alter hydrologic connectivity include intensive ditching, fill, sedimentation, channelization, diversion, man-made berms, beaver dams, and stream incision.

- A Overbank and overland flow are not severely altered in the assessment area.
 B Overbank flow is severely altered in the assessment area.
 C Overland flow is severely altered in the assessment area.
 D Both overbank and overland flow are severely altered in the assessment area.

Notes

Wetland ZZZ is a palustrine forested wetland located in the New Hope Creek floodplain.

NC WAM Wetland Rating Sheet
Accompanies User Manual Version 4.1
Rating Calculator Version 4.1

Wetland Site Name TTA Wetland ZZZ Date 1/22/14
Wetland Type Bottomland Hardwood Forest Assessor Name/Organization BP -STV

Notes on Field Assessment Form (Y/N) YES
Presence of regulatory considerations (Y/N) YES
Wetland is intensively managed (Y/N) NO
Assessment area is located within 50 feet of a natural tributary or other open water (Y/N) YES
Assessment area is substantially altered by beaver (Y/N) NO
Assessment area experiences overbank flooding during normal rainfall conditions (Y/N) YES
Assessment area is on a coastal island (Y/N) NO

Sub-function Rating Summary

Function	Sub-function	Metrics	Rating	
Hydrology	Surface Storage and Retention	Condition	HIGH	
		Sub-Surface Storage and Retention	LOW	
Water Quality	Pathogen Change	Condition	HIGH	
		Condition/Opportunity	HIGH	
		Opportunity Presence? (Y/N)	YES	
	Particulate Change	Condition	HIGH	
		Condition/Opportunity	HIGH	
		Opportunity Presence? (Y/N)	YES	
	Soluble Change	Condition	Condition	HIGH
			Condition/Opportunity	HIGH
			Opportunity Presence? (Y/N)	YES
		Physical Change	Condition	LOW
			Condition/Opportunity	LOW
			Opportunity Presence? (Y/N)	YES
Pollution Change	Condition	NA		
	Condition/Opportunity	NA		
	Opportunity Presence? (Y/N)	NA		
Habitat	Physical Structure	Condition	HIGH	
	Landscape Patch Structure	Condition	HIGH	
	Vegetation Composition	Condition	HIGH	

Function Rating Summary

Function	Metrics/Notes	Rating
Hydrology	Condition	HIGH
Water Quality	Condition	HIGH
	Condition/Opportunity	HIGH
	Opportunity Presence? (Y/N)	YES
Habitat	Condition	HIGH

Overall Wetland Rating **HIGH**



Appendix E: Coordination Correspondence

August 9, 2011

Linda Pearsall, Program Director
The North Carolina Natural Heritage Program
1601 Mail Service Center
Raleigh, NC 27699-1601

(919) 715-4195 linda.pearsall@ncdenr.gov

Dear Ms. Pearsall,

The New Hope Creek Corridor Advisory Committee is a body set up in 1992 by the City and County of Durham, Orange County and the Town of Chapel Hill to advise them on implementation of the New Hope Corridor Plan. (1) The Committee is presently reviewing a Triangle Transit draft Alternatives Analysis (AA) study that will identify a "Locally Preferred Alternative (LPA)" for a Light Rail Transit (LRT) "mainline" between Chapel Hill and Durham. (2)

The route currently identified as "preferred" is shown crossing the bottomlands of the New Hope Creek Corridor at a new "mid-block" location, south of 15-501 and north of Old Chapel Hill Road, and running east-west between the vicinity of Garrett Road and Southwest Durham Drive (previously known as Watkins Road). (3) The area of this proposed crossing is identified in the NCNHP's Durham County Inventory of Important Natural Areas, Plants and Wildlife as "the 15/501 Bottomlands," a significant natural area occupying "a highly strategic location within the New Hope Wildlife Corridor... between the New Hope Gamelands and the Korstian and Durham Divisions of Duke Forest." The Executive Summary of the Inventory goes on to state that, the "New Hope Creek Bottomland Forest [which includes the 15/501 Bottomlands as an internal section] contains some of the best Piedmont/Mountain Swamp Forest and Piedmont/Mountain Bottomland Forest remaining in North Carolina. ... The 800-acre site also provides important wildlife habitat." (4)

The Inventory also states (pdf p. 77) that the "15/501 Bottomlands" area is an "extensive tract of bottomland hardwood forest providing habitat needed by forest-interior species," and that it is a "critical link in the New Hope and Mud Creek Wildlife Corridors." It says (pdf p. 21), "the sites that comprise the New Hope Corridor...combine to create a macro-site that is ranked as Regionally Significant, based not only on its overall size and habitat values, but also on its connections to other key refuge areas in Orange and Chatham counties.") It further states (pdf p. 46) "that the sites identified in [the Inventory, of which the 15/501 Bottomlands is one,] still possess functioning ecosystems is probably as much a reflection of the strength of the connection between them as their intrinsic features such as size, forest maturity, of lack of internal fragmentation. In a connected system of natural areas, population losses at any one site can to some degree be compensated by animals moving in from sites where reproduction has been more successful."

The Inventory expresses its concern about threats to connectivity in the area in question. In describing the "Mount Moriah Bottomlands and Slopes," the next New Hope Corridor natural area site up stream (and across US 15-501) from the 15/501 Bottomlands, it states the area's "proximity to the rapidly developing US 15-501 commercial strip also makes it the link in this [corridor] system most likely to break, at least with regard to the more disturbance-sensitive species of wildlife." (pdf p. 58) It speaks of the openness to wildlife of this section of the New Hope Wildlife Corridor being kept, in part, by "the existence of large tracts of unfragmented bottomlands on either side of the highway." (pdf p. 59)

There is an additional concern expressed in the Inventory regarding the floodplain nature of most of the Corridor lands in the area in question. "Buffers areas are ...needed to protect key tracts along even some of the largest expanses of forested habitat found in the region. Despite their size and fairly high level of protection, most of the protected sites along New Hope Creek ... are essentially bottomlands. During the winter floods, most of their acreage can be under water,... [One] of the main consequences of development of the adjoining uplands is that all the habitat available to certain terrestrial species will again become "edge," at least during the late winter - typically during the time when stresses on animal populations are at their greatest." (pdf p. 45)

The New Hope Advisory Committee is concerned that building the mainline of a transit system directly through this wetland ecosystem would have significant negative impacts on the natural functions that have been identified by the Inventory.

The draft TTA document also proposes up slope and to the west of the 15/501 Bottomlands, an 18 acre "Patterson Place Maintenance Facility" with a rail line spur, along the western edge of the New Hope Creek floodplain, to connect the Facility with the LRT mainline, LPA, route mentioned above. In addition to the problem of its covering land up slope from the 15/501 Bottomlands with a significant amount of impervious surface we feel a facility that would wash rail cars and store and use lubricants and other chemicals, a "spill" type land use, could pose special long term negative impacts to the Corridor. (5)

There is also proposed, also up slope and to the west of the 15/501 Bottomlands, a "Patterson Place" LRT station, just to the west of SW Durham Drive. . This is the easternmost, and nearest to the 15/501 Bottomlands, of the several locations considered. (6) It is our opinion that any LRT station area will be the focus of intense development, "crucial to the viability of the LRT project" (as the project proponents put it) and will have potential long term negative impacts on the Corridor. This would be especially so for a LRT station area located just west of SW Durham Drive.

The Committee is profoundly concerned about the impacts to natural systems and to recreational and educational uses that would be created by any crossings of the New Hope Creek Corridor, except where crossings currently exist. (7) Any rail line structures built for a transit system, even elevated, will permanently fragment the Corridor and introduce noise and vibration into it. (8)

The Committee believes there is an alternative route with much less environmental impact. It would go directly adjacent to the south side of new US 15-501 bridge. One clear advantage of this route for an LRT alignment across the New Hope Creek floodplain is that it would avoid not only the new break in the forest canopy but also the two additional edge areas that the proposed "mid-block" alignment would impact, since it would use the existing edge area along the south side of the existing US 15-501 right-of-way. (9) We also believe there are better areas, away from the slopes above the Corridor lands, than those proposed for an LRT maintenance facility and a transit station.

The Committee is writing to request the NC Natural Heritage Program to review and comment on the transit corridor proposed by Triangle Transit as it relates to the resources identified in the NHP natural resources inventory studies. It would be most helpful if the Program could answer the question of impacts to the New Hope Creek Corridor of the proposed "mid-block" transit route and an alternative route directly adjacent to the south side of new US 15-501 bridge. Also, comments on impacts to the New Hope Creek Corridor of the sites proposed for an LRT maintenance facility (and connecting rail spur) and a transit station would be appreciated.

Yours truly,

Robert G. Healy
Chair, New Hope Creek Corridor Advisory Committee



North Carolina Department of Environment and Natural Resources
Office of Conservation, Planning, and Community Affairs

Beverly Eaves Perdue, Governor

Linda Pearsall, Director

Dee Freeman, Secretary

September 9, 2011

Robert G. Healy, Chair
New Hope Creek Corridor Advisory Committee
839 Sedgefield Street
Durham, NC 27705

Re: Locally Preferred Alternative Study, Light Rail Transit, New Hope Creek Corridor

Dear Mr. Healy,

Thank you for bringing this matter to our attention. Although we attended meetings during an earlier phase in the development of this project, we have not been informed of any recent progress, including the implementation of a Locally Preferred Alternative Study. You are correct that the selection of alternative routes across the natural area we have identified along New Hope Creek is an issue that concerns us.

In cooperation with Durham and Orange counties, the Natural Heritage Program has documented the ecological significance of the New Hope Creek Corridor in reports going back to 1987. The portion of the corridor that occurs in vicinity of the proposed project is described in both our general natural areas inventory of Durham County (Hall and Sutter 1999) and in a survey of the Corps lands surrounding the Jordan Lake project (LeGrand 1999). Sections upstream are included in our inventory of Orange County natural areas (Sather and Hall 1988; Sorrie 2004) and sections downstream in our inventory of Chatham County (Hall and Boyer 1992). These surveys document the presence of a number of exemplary natural communities and rare species of plants and animals within the New Hope floodplain. Within the immediate vicinity of the proposed project, we have recorded high quality occurrences of the Piedmont/Mountain Levee Forest and Piedmont/Mountain Bottomland Forest natural communities and the State Threatened Big Shellbark Hickory (*Carya laciniosa*). Equally important, these surveys have all noted that New Hope Creek floodplain is an integral part of a much larger system of natural areas, extending from Duke Forest in the headwater area down to the Jordan Lake Game Lands and even farther downstream along the Cape Fear all the way into the Coastal Plain.

As you note in your letter, the citizens, conservation groups, and local governments in the Durham area, along with the State, have already made major investments in protecting the continuity of this corridor. The construction by NC DOT of the new bridge at the US 15-501 crossing of New Hope Creek is one of the most noteworthy examples in the state where efforts were made to accommodate the passage of wildlife beneath the span. The ongoing acquisition of conservation preserves and easements to bridge the gap between Duke Forest and the Jordan Lake Project lands, involving the efforts of multiple parties, has also strongly contributed to maintaining the connectivity along this vast natural landscape.

We hope that these examples will be matched by the careful selection of a route for the Light Rail Transit across the New Hope Floodplain that will minimize as much as possible the disruptive impacts to its wildlife and natural

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ecosystems. We strongly prefer an alignment that adjoins the existing US 15-501 corridor, keeping the disturbance within an already highly disturbed area.

In addition to the direct impacts of the alignment across the floodplain, we have concerns about the potential for significant secondary and cumulative impacts to result from this project. In particular, we note in the Addendum to the Alternatives Analysis that a transit station (Patterson Place Station) has been proposed to be located immediately adjoining the New Hope floodplain on the western side of the LTR alignment that crosses the floodplain to the south of the existing US 15-501 corridor. We also understand that a LTR maintenance facility is being considered for the same general area. Both of these projects have the potential to contribute a significant amount of noise and traffic to this area, as well as other impacts such as water quality degradation. We believe that the selection of sites for these additional projects will be strongly linked to the selection of the preferred alignment of the LTR and should be considered – along with their potential impacts -- as part of the Locally Preferred Alternative Study.

We are glad to provide information for the Alternatives study directly, and to work with the Durham City-County Planning Department, NC Department of Transportation, Triangle Transit Authority, Army Corps of Engineers, and local conservation organizations, such as your own, to try to identify an alternative that poses the least harm to the New Hope ecosystems. Please let us know if there is any other information that we can supply to you.

Sincerely,

A handwritten signature in cursive script that reads "Linda Pearsall".

Linda Pearsall, Director

Cc: Andy Henry, Durham-Chapel Hill-Carrboro Metropolitan Planning Organization
David King, Triangle Transit Authority
Helen Youngblood, Durham City-County Planning Department
Sheri Bryant, NC Wildlife Resources Commission
Francis Farrell, US Army Corps of Engineers



North Carolina Department of Environment and Natural Resources

Division of Water Quality
Charles Wakild, P.E.
Director

Beverly Eaves Perdue
Governor

Dee Freeman
Secretary

June 6, 2012



MEMORANDUM

To: Juanita Shearer-Swink, Triangle Transit

From: Rob Ridings, NC Division of Water Quality, Transportation Permitting Unit *RR*

Subject: Scoping comments on proposed Durham-Orange Light Rail Transit Project in Durham and Orange Counties.

The following is DWQ's scoping comments for the referenced project. Preliminary analysis of the project reveals the potential for impacts to streams, buffers, and jurisdictional wetlands in the project area. More specifically, potential impacts to the following streams and/or their tributaries:

Stream Name	River Basin & Subbasin	Stream Classifications	Stream Index Number	303(d) Listing?
Morgan Creek	Cape Fear 06	WS-IV; NSW	16-41-2-(5.5)	Yes
Bolin Creek	Cape Fear 06	WS-IV; NSW	16-41-1-15-1-(4)	No
Little Creek	Cape Fear 06	WS-IV; NSW	16-41-1-15-(0.5)	Yes
New Hope Creek	Cape Fear 05	WS-IV; NSW	16-41-1-(11.5)	Yes
Sandy Creek	Cape Fear 05	WS-V; NSW	16-41-1-11	No
Third Fork Creek	Cape Fear 05	WS-IV; NSW	16-41-1-12	No
Ellerbe Creek	Neuse 01	WS-IV; NSW	27-5-(0.7)	Yes

Further investigations at a higher resolution should be undertaken to verify the presence of other streams and/or jurisdictional wetlands in the area. In the event that any jurisdictional areas are identified, the Division of Water Quality requests that Triangle Transit consider the following environmental issues for the proposed project:

Project Specific Comments:

1. The streams in the project corridor are WS-IV (or WS-V); NSW waters of the State. NCDWQ is very concerned with sediment and erosion impacts that could result from this project. NCDWQ recommends that highly protective sediment and erosion control BMPs be implemented to reduce the risk of nutrient runoff to these streams. NCDWQ requests that design plans provide treatment of the storm water runoff through best management practices as detailed in the most recent version of NCDWQ's *Stormwater Best Management Practices*.

Transportation and Permitting Unit
1650 Mail Service Center, Raleigh, North Carolina 27699-1617
Location: 512 N. Salisbury St. Raleigh, North Carolina 27604
Phone: 919-807-6300 \ FAX: 919-807-6492
Internet: www.ncwaterquality.org



2. Morgan Creek, Little Creek, New Hope Creek, and Ellerbe Creek are on the state's 303(d) list for impaired use for aquatic life. NCDWQ is very concerned with sediment and erosion impacts that could result from this project. NCDWQ recommends that the most protective sediment and erosion control BMPs be implemented in accordance with *Design Standards in Sensitive Watersheds* (15A NCAC 04B .0124) to reduce the risk of further impairment to these waters. NCDWQ requests that design plans provide treatment of the storm water runoff through best management practices as detailed in the most recent version of NCDWQ *Stormwater Best Management Practices*.

3. This project is within the Jordan Lake and Neuse River Basins. Riparian buffer impacts shall be avoided and minimized to the greatest extent possible pursuant to 15A NCAC 2B.0267 and 15A NCAC 2B.0233, respectively. New development activities located in the protected 50-foot wide riparian areas within the basin shall be limited to "uses" identified within and constructed in accordance with 15A NCAC 2B.0267 and 15A NCAC 2B.0233. Buffer mitigation may be required for buffer impacts resulting from activities classified as "allowable with mitigation" within the "Table of Uses" section of the Buffer Rules or require a variance under the Buffer Rules. A buffer mitigation plan, including use of the NC Ecosystem Enhancement Program, must be provided to NCDWQ prior to approval of the Water Quality Certification. Buffer mitigation may be required for buffer impacts resulting from activities classified as "allowable with mitigation" within the "Table of Uses" section of the Buffer Rules or require a variance under the Buffer Rules. A buffer mitigation plan, including use of the NC Ecosystem Enhancement Program, must be provided to NCDWQ prior to approval of the Water Quality Certification.

General Project Comments:

1. The environmental document should provide a detailed and itemized presentation of the proposed impacts to wetlands, buffers and streams with corresponding mapping. If mitigation is necessary as required by 15A NCAC 2H.0506(h), it is preferable to present a conceptual (if not finalized) mitigation plan with the environmental documentation. Appropriate mitigation plans will be required prior to issuance of a 401 Water Quality Certification.
2. Environmental impact statement alternatives shall consider design criteria that reduce the impacts to streams and wetlands from storm water runoff. These alternatives shall include road designs that allow for treatment of the storm water runoff through best management practices as detailed in the most recent version of NCDWQ's *Stormwater Best Management Practices Manual*, July 2007, such as grassed swales, buffer areas, preformed scour holes, retention basins, etc.
3. After the selection of the preferred alternative and prior to an issuance of the 401 Water Quality Certification, the applicant is respectfully reminded that they will need to demonstrate the avoidance and minimization of impacts to wetlands (and streams) to the maximum extent practical. In accordance with the Environmental Management Commission's Rules {15A NCAC 2H.0506(h)}, mitigation will be required for impacts of greater than 1 acre to wetlands. In the event that mitigation is required, the mitigation plan shall be designed to replace appropriate lost functions and values. The NC Ecosystem Enhancement Program may be available for use as wetland mitigation.
4. In accordance with the Environmental Management Commission's Rules {15A NCAC 2H.0506(h)}, mitigation will be required for impacts of greater than 150 linear feet to any single stream. In the event that mitigation is required, the mitigation plan shall be designed to replace appropriate lost functions and values. The NC Ecosystem Enhancement Program may be available for use as stream mitigation.

5. Future documentation, including the 401 Water Quality Certification Application, shall continue to include an itemized listing of the proposed wetland , buffer, and stream impacts with corresponding mapping.
6. NCDWQ is very concerned with sediment and erosion impacts that could result from this project. The applicant shall address these concerns by describing the potential impacts that may occur to the aquatic environments and any mitigating factors that would reduce the impacts.
7. An analysis of cumulative and secondary impacts anticipated as a result of this project is required. The type and detail of analysis shall conform to the NC Division of Water Quality Policy on the assessment of secondary and cumulative impacts dated April 10, 2004.
8. The applicant is respectfully reminded that all impacts, including but not limited to, bridging, fill, excavation and clearing, and rip rap to jurisdictional wetlands, streams, and riparian buffers need to be included in the final impact calculations. These impacts, in addition to any construction impacts, temporary or otherwise, also need to be included as part of the 401 Water Quality Certification Application.
9. Where streams must be crossed, NCDWQ prefers bridges be used in lieu of culverts. However, we realize that economic considerations often require the use of culverts. Please be advised that culverts should be countersunk to allow unimpeded passage by fish and other aquatic organisms. Moreover, in areas where high quality wetlands or streams are impacted, a bridge may prove preferable. When applicable, the applicant should not install the bridge bents in the creek, to the maximum extent practicable.
10. Whenever possible, NCDWQ prefers spanning structures. Spanning structures usually do not require work within the stream or grubbing of the streambanks and do not require stream channel realignment. The horizontal and vertical clearances provided by bridges shall allow for human and wildlife passage beneath the structure. Fish passage and navigation by canoeists and boaters shall not be blocked. Bridge supports (bents) should not be placed in the stream when possible.
11. Bridge deck drains shall not discharge directly into the stream. Stormwater shall be directed across the bridge and pre-treated through site-appropriate means (grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. Please refer to the most current version of NCDWQ's *Stormwater Best Management Practices*.
12. Sediment and erosion control measures should not be placed in wetlands or streams.
13. Borrow/waste areas should avoid wetlands to the maximum extent practical. Impacts to wetlands in borrow/waste areas will need to be presented in the 401 Water Quality Certification and could precipitate compensatory mitigation.
14. The 401 Water Quality Certification application will need to specifically address the proposed methods for stormwater management. More specifically, stormwater shall not be permitted to discharge directly into streams or surface waters.
15. This project will require a 404 application to the Corps of Engineers and corresponding 401 Water Quality Certification. Please be advised that a 401 Water Quality Certification requires satisfactory protection of water quality to ensure that water quality standards are met and no wetland or stream uses are lost. Final permit authorization will require the submittal of a formal application by the applicant and written concurrence from NCDWQ. Please be aware that any approval will be

contingent on appropriate avoidance and minimization of wetland and stream impacts to the maximum extent practical, the development of an acceptable stormwater management plan, and the inclusion of appropriate mitigation plans where appropriate.

16. If concrete is used during construction, a dry work area shall be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete shall not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills.
17. If temporary access roads or detours are constructed, the site shall be graded to its preconstruction contours and elevations. Disturbed areas shall be seeded or mulched to stabilize the soil and appropriate native woody species shall be planted. When using temporary structures the area shall be cleared but not grubbed. Clearing the area with chain saws, mowers, bush-hogs, or other mechanized equipment and leaving the stumps and root mat intact allows the area to re-vegetate naturally and minimizes soil disturbance.
18. Unless otherwise authorized, placement of culverts and other structures in waters and streams shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and down stream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by NCDWQ. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact NCDWQ for guidance on how to proceed and to determine whether or not a permit modification will be required.
19. If multiple pipes or barrels are required, they shall be designed to mimic natural stream cross section as closely as possible including pipes or barrels at flood plain elevation, floodplain benches, and/or sills may be required where appropriate. Widening the stream channel should be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage.
20. If foundation test borings are necessary; it shall be noted in the document. Geotechnical work is approved under Nationwide Permit No. 6 for Survey Activities.
21. Sediment and erosion control measures sufficient to protect water resources must be implemented and maintained in accordance with the most recent version of North Carolina Sediment and Erosion Control Planning and Design Manual and the most recent version of NCS000250.
22. All work in or adjacent to stream waters shall be conducted in a dry work area. Approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other diversion structures shall be used to prevent excavation in flowing water.
23. While the use of National Wetland Inventory (NWI) maps, NC Coastal Region Evaluation of Wetland Significance (NC-CREWS) maps and soil survey maps are useful tools, their inherent inaccuracies require that qualified personnel perform onsite wetland delineations prior to permit approval.

24. Heavy equipment should be operated from the bank rather than in stream channels in order to minimize sedimentation and reduce the likelihood of introducing other pollutants into streams. This equipment shall be inspected daily and maintained to prevent contamination of surface waters from leaking fuels, lubricants, hydraulic fluids, or other toxic materials.
25. Riprap shall not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed.
26. Riparian vegetation (native trees and shrubs) shall be preserved to the maximum extent possible. Riparian vegetation must be reestablished within the construction limits of the project by the end of the growing season following completion of construction

Thank you for requesting our input at this time. The applicant is reminded that issuance of a 401 Water Quality Certification requires that appropriate measures be instituted to ensure that water quality standards are met and designated uses are not degraded or lost. If you have any questions or require additional information, please contact Rob Ridings at 919-807-6403.

cc: US Army Corps of Engineers, Raleigh Field Office
Chris Militscher, Environmental Protection Agency (electronic copy only)
File Copy



⊠ North Carolina Wildlife Resources Commission ⊠

Gordon Myers, Executive Director

MEMORANDUM

TO: Juanita Shearer-Swink, FASLA
Project Manager, Triangle Transit

FROM: Travis Wilson, Highway Project Coordinator
Habitat Conservation Program

DATE: June 12, 2012

SUBJECT: Response to the scoping notification regarding fish and wildlife concerns for the proposed Durham-Orange Light Rail Transit Project, Durham and Orange Counties, North Carolina.

This memorandum responds to a request for our concerns regarding impacts on fish and wildlife resources resulting from the subject project. Biologists on the staff of the N. C. Wildlife Resources Commission (NCWRC) have reviewed the proposed project. Our comments are provided in accordance with certain provisions of the National Environmental Policy Act (42 U.S.C. 4332(2)(c)) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

The Triangle Transit Authority in coordination with the Federal Transit Authority has initiated the scoping process for the Durham-Orange Light Rail Transit Project. The proposed project will include the development of approximately 17 miles of light rail transit service from UNC hospitals in Orange County to east Durham in Durham County. The following are specific items of concerns within this corridor:

The project study area includes a portion of Jordan Game Land. Located on US Army Corps of Engineers (USACE) property, Jordan Game Land is managed by NCWRC for public use, and included in this section of the game land is the Upper Little Creek waterfowl impoundment. This area has also been documented as Little Creek Bottomlands and Slopes Significant Natural Heritage Area (SNHA) by NC Department of Natural Resources, Natural Heritage Program. Public conservation areas are an important resource; however in an urbanizing setting such as this the significance of these areas is elevated. As the surrounding landscape develops habitat is minimized and the continuity of that habitat is fragmented. Coinciding with that loss is the difficulty to mitigate for impacts to these areas. Direct impacts to the Little Creek portion of Jordan Game Land would likely have significant and irremediable effects to this area. Therefore NCWRC request that TTA broaden the study area to develop an avoidance alternative for the Jordan Game Land.

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

New Hope Creek is also traversed by this project, although the project does not directly impact conservation property, the New Hope Creek corridor provides an important ecological connection between Duke Forest and Jordan Game Land. Extensive conservation effort in this area has resulted in the preservation of multiple properties within this corridor by NC Ecosystem Enhancement Program and NC Clean Water Management Trust Fund. Additionally, during the planning and design of the recent Highway 15/501 improvements federal and state agencies as well as local organizations coordinated with NCDOT to incorporate a longer bridge crossing at New Hope Creek to improve habitat connectivity. Any light rail crossing in this area should not undermine the efforts and funding that provided a much improved ecological linkage.

To help facilitate document preparation and the review process our general informational needs are outlined below:

1. Description of fishery and wildlife resources within the project area, including a listing of federally or state designated threatened, endangered, or special concern species. Potential borrow areas to be used for project construction should be included in the inventories. A listing of designated plant species can be developed through consultation with:

NC Natural Heritage Program
Dept. of Environment & Natural Resources
1601 Mail Service Center
Raleigh, NC 27699-1601.
WWW.ncnhp.org

and,

NCDA Plant Conservation Program

P. O. Box 27647
Raleigh, N. C. 27611
(919) 733-3610

2. Description of any streams or wetlands affected by the project. The need for channelizing or relocating portions of streams crossed and the extent of such activities.
3. Cover type maps showing wetland acreages impacted by the project. Wetland acreages should include all project-related areas that may undergo hydrologic change as a result of ditching, other drainage, or filling for project construction. Wetland identification may be accomplished through coordination with the U. S. Army Corps of Engineers (USACE). If the USACE is not consulted, the person delineating wetlands should be identified and criteria listed.
4. Cover type maps showing acreages of upland wildlife habitat impacted by the proposed project. Potential borrow sites should be included.
5. The extent to which the project will result in loss, degradation, or fragmentation of wildlife habitat (wetlands or uplands).

6. Mitigation for avoiding, minimizing or compensating for direct and indirect degradation in habitat quality as well as quantitative losses.
7. A cumulative impact assessment section which analyzes the environmental effects of construction and quantifies the contribution of this individual project to environmental degradation.
8. A discussion of the probable impacts on natural resources which will result from secondary development facilitated by the project.
9. If construction of this facility is to be coordinated with other state, municipal, or private development projects, a description of these projects should be included in the environmental document, and all project sponsors should be identified.

Thank you for the opportunity to provide input in the early planning stages for this project. If we can further assist your office, please contact me at (919) 528-9886.

cc: Sarah McRae, USFWS
Rob Ridings, NCDWQ
John Thomas, USACE
Michael Hosey, USACE
Brian Smart, FTA
Jeff Weisner, URS
Melba McGee, DENR
Allison Weakley, NHP



Received
18 June 12

June 14, 2012

Cindy Yu-Robinson
Public Outreach Coordinator
Durham-Orange LRT Project
P.O. Box 580
Morrisville, North Carolina 27560
By fax to 919.461.1415
By email to info@ourtransitfuture.com

RE: Comments on Scoping for Durham-Orange LRT Project: NEPA requires that locating the tracks within the Right of Way of 15-501 be evaluated

Dear Ms. Yu-Robinson,

Thank you for your service to our region in helping to expand public transit opportunities. As your transit plan correctly identifies, there is a need for more options for public transit as projected growth increases traffic on our roads and pollution of our air. Planning for this growth puts pressure on the remaining green space and wildlife habitat remaining in the Triangle, space that local land trusts and conservation organizations have fought hard to protect. As we plan for new transit options it is critical that we not plan on damaging what remains of wildlife habitat and green space.

The mission of Triangle Land Conservancy (TLC) is to protect important open space - stream corridors, forests, wildlife habitat, farmland and natural areas - in Chatham, Durham, Johnston, Lee, Orange, and Wake Counties to help keep our region a healthy and vibrant place to live and work. For this reason, we thank you for your commitment to fully analyze a track alignment that would place the tracks within the existing right of way of 15-501 for the Durham-Orange LRT Project as an alternative under the NEPA process.

On the edge of two of the fastest-growing cities in North Carolina, New Hope Creek is a gift of nature within an hour's drive of a million people. In its upper reaches north of Chapel Hill, the New Hope tumbles like a rugged mountain stream, boulder-strewn and wild, twisting below rock bluffs and snaking through a narrow valley in Duke Forest. Below, the lower New Hope changes character abruptly. There, in the highly developed corridor between Durham and Chapel Hill, New Hope becomes a lazy floodplain stream meandering its way south to Jordan Lake, the drinking water supply for thousands of Triangle residents. Miraculously, New Hope remains clean and forested for almost its entire length, a haven for hikers and wildlife, even as it winds between the two towns' shopping centers, offices, and subdivisions. But it will stay that way only through concerted public and private action.

The New Hope Creek Corridor south of 15-501 [the "15-501 Bottomlands"] extending to Old Chapel Hill Road is a forested, wetland area, with New Hope Creek essentially flowing down

the center of it. The Scoping Booklet you produced acknowledges the value of these lands. The Scoping Booklet says:

“New Hope Creek: Because of the ecologically sensitive wetlands associated with New Hope and Sandy Creeks and potential impacts to nature trails and publically owned lands, reasonable alternative design options including, but not limited to a LRT alignment in the New Hope Creek area that is adjacent to, or within the existing US 15-501 right-of-way, will also be studied in the DEIS to investigate ways to minimize or avoid impacts to environmental resources.” See Booklet at pages 8-9.

While the maps in the Scoping Booklet show that the route through the 15-501 bottomlands is the only “Route to be Studied Further,” the text of the Scoping Booklet indicates that you have committed to evaluating an alternative routing within the right of way of 15-501. We understand this to mean that the text supersedes the map legend and that routing within the right of way of 15-501 will be studied further within the DEIS itself. You may wish to clear up this point on your maps as you go forward.

In the scoping process, all reasonable alternatives must be considered and evaluated, even if the agency has already decided it prefers another alternative. Analysis of alternatives is the “heart” of an environmental impact statement. See 40 C.F.R. § 1502.14. Indeed, this is true *especially* when an agency has identified a preferred alternative. While some residents may not wish to have US 15-501 right of way routing considered, it is not reasonable to exclude it from consideration. NC DOT specifically designed aspects of the 15-501 bridge over New Hope Creek to allow this possibility.

The 15-501 Bottomlands is not an isolated natural area, but a central and strategic link in a much larger block of wetlands called the “New Hope Creek Bottomland Forest,” which extends from the shores of Jordan Lake to a point just beyond Erwin Road in the Duke Forest. According to the NC Natural Heritage Program, this larger block of wildlands is one of the two best remaining of its type in North Carolina. Most of the adverse environmental impacts associated with “locally preferred alternative” crossing of New Hope Creek could be avoided by locating the tracks within the Right of Way of 15-501 with the main New Hope Creek transit crossing at the new highway bridge. This alternative has been supported by many local organizations including the Durham Open Space and Trails Commission (DOST) and the New Hope Creek Corridor Advisory Committee.

We thank you for committing to evaluate this alternative in your scoping booklet. We look forward to further opportunities to partner with you in future to protect this valuable resource.

Sincerely,



Thomas H. McGuire
Interim Executive Director
Triangle Land Conservancy



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

15 June 2012

Triangle Regional Transit Program
Attn: Juanita Shearer-Swink
PO Box 530
Morrisville, NC 27650

Dear Ms. Shearer-Swink:

This letter is in response to your request for scoping comments from the U.S. Fish and Wildlife Service (Service) on the potential environmental effects of the proposed Durham-Orange Light Rail Transit Project in Durham and Orange Counties, North Carolina. These comments provide information in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661-667d) and section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

The Federal Transit Administration (FTA) and the Triangle Transit plan to develop approximately 17 miles of light rail transit service from UNC Hospitals in Chapel Hill, Orange County to NCCU in Durham, Durham County. There are currently no known occurrences of federally protected species in the vicinity of the proposed project, however, the Service has concerns regarding the potential environmental impacts to wetland resources within the proposed corridor.

The proposed study area for alignment options C1 and C2 crosses Little Creek at the Orange/Durham County line. This portion of the corridor crosses the Jordan Game Land which is owned by the US Army Corps of Engineers (USACE) and managed by the NC Wildlife Resources Commission (NCWRC). This area has been designated by the NC Natural Heritage Program (NCNHP) as the Little Creek Bottomlands and Slopes Significant Natural Heritage Area (SNHA), which is an area of land and/or water that has been recognized as being important for the protection of the State's biodiversity, including high-quality or rare natural communities, rare species, and special animal habitats. The Service is concerned not only about impacts to the ecological integrity of SNHA and ability of the public to use the area as a game land, but also those potential impacts to the Upper Little Creek waterfowl impoundment which serve as mitigation for adverse impacts from the construction of Jordan Lake. The Service requests that the study area be expanded to include areas that may not impact the Game Land.

The proposed project also crosses New Hope Creek near the Orange/Durham County line. In the early 1990s as part of the National Wetlands Priority Conservation Planning mandate from the Emergency Wetlands Resources Act of 1986, the Service designated approximately 1,500 acres of the New Hope Creek Corridor as a regionally important wetland that warrants protection because of resource value and vulnerability. The significance of this piedmont swamp forest is as an ecological corridor that connects habitat between Duke Forest and Jordan Game Land. There are several recognized SNHAs in the vicinity of this study area, including the Dry Creek/Mount Moriah Bottomland, New Hope Creek Aquatic Habitat, New Hope Creek Slopes and New Hope Creek Bottomland Forest. Considerable conservation efforts have resulted in significant habitat connectivity along the New Hope Creek corridor. A rail crossing in the New Hope Creek Study Area should not impact habitat connections that have been established.

For transportation improvement projects, the Service recommends the following general conservation

measures to avoid or minimize environmental impacts to fish and wildlife resources:

1. Wetland and forest impacts should be avoided and minimized to the maximal extent practical. Areas exhibiting high biodiversity or ecological value important to the watershed or region should be avoided. Proposed highway/rail projects should be aligned along or adjacent to existing roadways, utility corridors or other previously disturbed areas in order to minimize habitat loss and fragmentation. Highway shoulder and median widths should be reduced through wetland areas;
2. Crossings of streams and associated wetland systems should use existing crossings and/or occur on a bridge structure wherever feasible. Bridges should be long enough to allow for sufficient wildlife passage along stream corridors. Where bridging is not feasible, culvert structures that maintain natural water flow and hydraulic regimes without scouring or impeding fish and wildlife passage should be employed;
3. Bridges and approaches should be designed to avoid any fill that will result in damming or constriction of the channel or flood plain. To the extent possible, piers and bents should be placed outside the bank-full width of the stream. If spanning the flood plain is not feasible, culverts should be installed in the flood plain portion of the approach to restore some of the hydrological functions of the flood plain and reduce high velocities of flood waters within the affected area;
4. Bridge designs should include provisions for roadbed and deck drainage to flow through a vegetated buffer prior to reaching the affected stream. This buffer should be large enough to alleviate any potential effects from run-off of storm water and pollutants;
5. Off-site detours should be used rather than construction of temporary, on-site bridges. For projects requiring an on-site detour in wetlands or open water, such detours should be aligned along the side of the existing structure which has the least and/or least quality of fish and wildlife habitat. At the completion of construction, the detour area should be entirely removed and the impacted areas be planted with appropriate vegetation, including trees if necessary;
6. If unavoidable wetland or stream impacts are proposed, a plan for compensatory mitigation to offset unavoidable impacts should be provided early in the planning process. Opportunities to protect mitigation areas in perpetuity via conservation easements, land trusts or by other means should be explored at the outset;
7. Wherever appropriate, construction in sensitive areas should occur outside fish spawning and migratory bird nesting seasons. In waterways that may serve as travel corridors for fish, in-water work should be avoided during moratorium periods associated with migration, spawning and sensitive pre-adult life stages. The general moratorium period for anadromous fish is February 15 - June 30;
8. Best Management Practices (BMP) for Construction and Maintenance Activities should be implemented; and
9. Activities within designated riparian buffers should be avoided or minimized.

Section 7(a)(2) of the Endangered Species Act requires that all federal action agencies (or their designated non-federal representatives), in consultation with the Service, insure that any action federally authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any

federally-listed threatened or endangered species. A biological assessment/evaluation may be prepared to fulfill the section 7(a)(2) requirement and will expedite the consultation process. To assist you, a county-by-county list of federally protected species known to occur in North Carolina and information on their life histories and habitats can be found on our web page at <http://nc-es.fws.gov/es/countyfr.html>.

Although the NCNHP database does not indicate any known occurrences of federally listed species near the project vicinity, use of the NCNHP data should not be substituted for actual field surveys if suitable habitat occurs near the project site. The NCNHP database only indicates the presence of known occurrences of listed species and does not necessarily mean that such species are not present. It may simply mean that the area has not been surveyed. If suitable habitat occurs within the project vicinity for any listed species, surveys should be conducted to determine presence or absence of the species.


If you determine that the proposed action may affect (i.e., likely to adversely affect or not likely to adversely affect) a listed species, you should notify this office with your determination, the results of your surveys, survey methodologies, and an analysis of the effects of the action on listed species, including consideration of direct, indirect, and cumulative effects, before conducting any activities that might affect the species. If you determine that the proposed action will have no effect (i.e., no beneficial or adverse, direct or indirect effect) on listed species, then you are not required to contact our office for concurrence.

We reserve the right to review any federal permits that may be required for this project, at the public notice stage. Therefore, it is important that resource agency coordination occur early in the planning process in order to resolve any conflicts that may arise and minimize delays in project implementation. In addition to the above guidance, we recommend that the environmental documentation for this project include the following in sufficient detail to facilitate a thorough review of the action:

1. A clearly defined and detailed purpose and need for the proposed project, supported by tabular data, if available, and including a discussion of the project's independent utility;
2. A description of the proposed action with an analysis of all alternatives being considered, including a "no action" alternative;
3. A description of the fish and wildlife resources, and their habitats, within the project impact area that may be directly or indirectly affected;
4. The extent and acreage of waters of the U.S., including wetlands, that are to be impacted by filling, dredging, clearing, ditching, or draining. Acres of wetland impact should be differentiated by habitat type based on the wetland classification scheme of the National Wetlands Inventory (NWI). Wetland boundaries should be verified by the U.S. Army Corps of Engineers;
5. The anticipated environmental impacts, both temporary and permanent, that would be likely to occur as a direct result of the proposed project. The assessment should also include the extent to which the proposed project would result in indirect and cumulative effects to natural resources;
6. Design features and construction techniques which would be employed to avoid or minimize impacts to fish and wildlife resources, both direct and indirect, and including fragmentation and direct loss of habitat;
7. Design features, construction techniques, or any other mitigation measures which would be employed at wetland crossings and stream channel relocations to avoid or minimize impacts to waters of the US; and,

8. If unavoidable wetland or stream impacts are proposed, project planning should include a compensatory mitigation plan for offsetting the unavoidable impacts.

The Service appreciates the opportunity to comment on this project. Please continue to advise us during the progression of the planning process, including your official determination of the impacts of this project. If you have any questions regarding our response, please contact Sarah McRae at sarah_mcrac@fws.gov or 919-856-4520x16.

Sincerely,

Pete Benjamin
Field Supervisor

Cc: Brian Smart, FTA
Travis Wilson, NCWRC
Michael Hosey, USACE
Allison Weakley, NCNHP
John Kent, New Hope Creek Corridor Advisory Committee



North Carolina Department of Environment and Natural Resources
Office of Conservation, Planning, and Community Affairs

Beverly Eaves Perdue
Governor

Linda Pearsall
Director

Dee Freeman
Secretary

June 18, 2012

SUBMITTED VIA EMAIL AND US MAIL

Juanita Shearer-Swink
Triangle Regional Transit Program
P.O. Box 530
Morrisville, NC 27560

SUBJECT: Scoping – Durham-Orange Light Rail Transit Project

Dear Ms. Shearer-Swink:

We are writing in response to the request for comments during scoping for the proposed Durham-Orange Light Rail Transit project. The North Carolina Natural Heritage Program (NCNHP) has previously commented on the Locally Preferred Alternative Study conducted for this project. We appreciate this opportunity to provide information about the possible direct, secondary, or cumulative impacts to Significant Natural Heritage Areas (SNHAs) located along alternative alignments for the proposed Light Rail Transit (LRT) on Little Creek and New Hope Creek.

Direct Impacts

Alignment Alternatives C1 and C2 both cross the Little Creek Bottomlands and Slopes SNHA. Of the two, Alternative C1 would have the greater direct impact to the natural area, since it crosses the Little Creek floodplain along a proposed new alignment that will pass through currently undeveloped forest. Land that will be affected by this alternative is on property owned by the US Army Corps of Engineers (USACOE) that was acquired specifically to mitigate for wildlife habitat lost during the construction of the Jordan Reservoir project. This area is currently managed by the State of North Carolina as a part of the Jordan Lake Game Land.

Alternative C2 follows existing roadways, crossing the Little Creek floodplain adjacent to NC 54 and then following George King Road, a currently unpaved road that divides the USACOE-owned property, all of which is included in the SNHA. Although this alternative follows existing travel corridors, some use may be made of the USACOE property in order to construct the LRT.

Only one alignment across the New Hope Creek floodplain was considered in the Locally Preferred Alternatives Study, transecting a wide tract of bottomland forest located on a privately owned property just north (about 0.1 miles) of the USACOE/NC Game Land boundary. We commend the decision – mentioned in the Scoping Booklet – to include an

Mailing address: 1601 Mail Service Center, Raleigh, North Carolina 27699-1601

Location: 217 W. Jones Street, Raleigh NC 27604

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additional alternative along the US 15-501 right-of-way within the NEPA review process. The exact alignment of this alternative, however, is not illustrated in the Booklet.

The direct impacts resulting from the construction of the LRT along either of these alignments may cause the loss of some high quality habitats classified by the Natural Heritage Program as Piedmont Bottomland Forest (on both New Hope and Little Creeks), Mesic Mixed Hardwood Forest (on Little Creek) and Piedmont Levee Forest (on New Hope Creek). Of particular concern are potential impacts to the population of *Carya laciniosa* (Big Shellbark Hickory) in the New Hope Creek Bottomland Forest SNHA, south of US15-501; this is the only population of this species known to occur in the Piedmont, one of only 5 known to occur in the state, and this is considered to be the best quality population.

Additional rare species that are reported from the vicinity of the proposed project are listed below:

Significant Natural Heritage Area (SNHA)	Species (Common name)	Federal Status	State Status	Last Observation
Little Creek Bottomlands and Slopes	<i>Carex bushii</i> (Bush's Sedge)		SR-P	1968
Little Creek Bottomlands and Slopes	<i>Dichanthelium annulum</i> (Ringed Witch Grass)		SR-P	Pre-1902
Little Creek Bottomlands and Slopes	<i>Monotropsis odorata</i> (Sweet Pinesap)	FSC	SC-V	1927
Little Creek Bottomlands and Slopes	<i>Tridens chapmanii</i> (Chapman's Redtop)		T	1894
New Hope Creek Bottomland Forest	<i>Carya laciniosa</i> (Big Shellbark Hickory)		T	1999

FSC = Federal Species of Concern

T = State Threatened

SC-V = State Special Concern, Vulnerable

SR-P = Significantly Rare in North Carolina, Peripheral

Secondary (Indirect) Impacts

All of these proposed alternatives are likely to have significant secondary impacts, particularly the alternatives along new alignments. In addition to the direct effects of habitat loss resulting from land clearing, opening the canopy of the forest will create edge effects on the remaining stands, which is likely to encourage the growth of invasive species. Effects extending well beyond the actual footprint of the project will result from disruption of animal movements along these important travel corridors. Impacts to the New Hope Creek floodplain are especially important in this regard because it provides connections between the Jordan Lake Game Land to the south and several other protected natural areas to the north, including Duke Forest, Boulevard Lands, and New Hope Preserve. The Little Creek floodplain similarly provides a connection between the Jordan Lake Game Land and a series undeveloped, predominately publically-owned tracts extending west to US 15-501 and located in the 100 year floodplain of Jordan Lake, which gives them at least some protection from development.

Cumulative Impacts

Impacts of this project will take place in the context of a large amount of development that is either already happening around the margins of New Hope Creek and Little Creek floodplains – we have reviewed several in the last few years – or that is currently in the planning and review stage, or that can be expected to occur in the near future. A significant portion of this development can be expected to result from this project itself. As stated in the Scoping Booklet, construction of the LRT is not only intended to expand transit options between Durham and Chapel Hill but also to foster development within certain areas and to promote economic growth. This linkage between the LRT and future development is very clearly stated in the NC 54-I40 Corridor Study, which we recently reviewed and submitted comments on. For the area covered by this study, selection of alternative alignments for the LRT is strongly tied with development that will closely impinge upon the SNHA and public lands. For many species of wildlife, close proximity to dense human development and other activities is very disruptive, leading to effective loss, degradation, and fragmentation of habitats, even where the vegetation and physical features of the landscape remain otherwise the same.

Recommendations for Analysis of Impacts

All three types of expected impacts should be thoroughly addressed in any environmental documents produced for this project. Field surveys should be conducted to determine the significance of direct impacts as well as the indirect impacts on adjoining areas of habitat. For the analysis of indirect impacts, we suggest that the study area be extended from the USACOE-owned lands to US 15-501 along Little Creek and to both the Korstian and Durham Divisions of Duke Forest along New Hope and Mud Creeks. The Natural Heritage Program has conducted inventories of some of these tracts in the past, which may be of some use in this analysis (LeGrand, 1999; Hall and Sutter, 1999). Cumulative impacts should be considered both in terms of the development the project itself will contribute to – including transit stations and associated facilities, shopping centers, and planned developments – as well as additional development that is projected to occur within the overall study area of this project (as modified above).

In assessing the potential for impacts to the SNHAs resulting from this project, we request that the analysis include a greater range of alternative alignments than were considered in the Locally Preferred Alternative Study. Specifically, we echo the request made by NC Wildlife Resources Commission that consideration be given to modifying the C-1 alternative so that it avoids direct impact to Jordan Game Lands and the Significant Natural Heritage Areas. We also recommend that an alternative which follows existing transportation corridors, including the NC 54 right-of-way from the Friday Center to I-40, and then following the I-40 right-of-way north to the proposed Leigh Farms transit hub be studied. This alignment would involve the least amount of impact to the Little Creek floodplain, Jordan Game Lands and the SNHA. Similarly, we would like to see a full assessment be given to an alignment following the US 15-501 right-of-way across New Hope Creek as noted in at the bottom of page 8 in the scoping booklet.

Recommendations for Avoidance, Minimization, and Mitigation of Impacts

In general, we would like to see the following design features be incorporated into the proposed project:

- Selection of alignments that avoid or minimize impacts as much as possible to significant natural areas, following already disturbed transportation corridors as much as possible.

Juanita Shearer-Swink
June 18, 2012

- Design of floodplain crossings that maintain or enhance wildlife movements.
- Establishment of buffers between the identified natural areas and any development that results from or is otherwise associated with the creation of the LRT and related transportation improvements.

We commend the effort this project represents to plan and manage the tremendous growth that is occurring within this area. However, we would like to point out that protection of local natural areas and the species and ecosystems they support results from the efforts of Orange and Durham counties with strong support of their citizens and various state agencies. Protection of the wildlife movement corridor along New Hope Creek in particular has received a great deal of attention, with private conservation organizations, county government agencies, and state agencies all contributing to the protection of natural areas within this area. For example, the new bridge on US 15-501 was designed explicitly to accommodate the movement of animals between the USACOE lands at the upper end of Jordan Lake and Duke Forest and other conservation lands located north of US 15-501.

The above mentioned bridge on US 15-501 clearly illustrates that transportation planning can be done in conjunction with protecting, or even enhancing, the functions of natural ecosystems. We would like to see that example be followed in the development of the LRT and related transportation plans. A cooperative, collaborative planning effort, involving conservation-minded citizens and agencies as well as transportation and land use planners, will facilitate the development of a truly comprehensive solution to the problems associated with future growth within this region.

Thank you for the opportunity to comment on this proposed project during the scoping process. Please feel free to contact us if you have any questions or we can assist further.

Sincerely,



Linda Pearsall

cc: Brian Smart, FTA
Melba McGee, NCDENR
Sarah McRae, USFWS
Michael Hosey, USACOE
Rob Ridings, NCDWQ
Andy Henry, DCHC MPO

MEMO

TO: Greg Northcutt, Director of Capital Development
FROM: Ed Harrison

SUBJECT: Comments on scoping for LPA PEIS, Durham-Orange corridor

DATE: June 18, 2012

REPLY TO: ed.harrison@mindspring.com

I am familiar with the project and its environs for a number of reasons: three decades of continuous natural community fieldwork and identification in Durham and Orange Counties; 18 years of association with Triangle Transit's regional planning process, including the past 2.5 years as a member of the Board of Trustees; over a decade as a Chapel Hill Town Council member, with the last 2.5 years dealing with corridor concerns.

My remarks focus on three station areas and/or corridors and associated issues:

1. An uncommon/"vulnerable" natural community type potentially within the C-1 alternative corridor
2. Possible inadequate length of bridging in C-1 corridor
3. Potential impact on built lot by C-1 corridor at eastern edge of Meadowmont
4. Pedestrian access issues for the Hamilton Road station
5. Ability to extend future fixed guideway to west/north of UNC Hospitals station (Consult ToCH staff)

1. AN UNCOMMON/"VULNERABLE" NATURAL COMMUNITY TYPE POTENTIALLY WITHIN THE C-1 ALTERNATIVE CORRIDOR

Natural community of concern: Piedmont Swamp Forest

As defined by the adopted LPA, the C-1 corridor where it crosses the Little Creek floodplain, appears to intersect with an area with inundation periods greater than would be expected in an "average" Piedmont Bottomland Hardwood Forest in the Triassic Basin. This is based on satellite photos of the area that were not in the LPA documents.

In Michael Schafale's 2011 edition of the "Guide to the Natural Communities of North Carolina – Fourth Approximation," he differentiates between the true "Piedmont Swamp Forest" and Piedmont Bottomland Hardwood Forest. Shown first is the differentiation, and then the community description.

DIFFERENTIATING PIEDMONT SWAMP FROM BOTTOMLAND FOREST

Comments: There has been substantial confusion in the nomenclature of Piedmont swamps versus bottomland forests. The oak-dominated, broad Triassic basin floodplains have been called swamps in some of the literature and bottomlands

elsewhere. However, these floodplains include both wetter swamps that stay flooded for long periods, and slightly drier oak-dominated areas that correspond to this subtype. The 3rd Approximation contributed to the confusion by mixing descriptions of these heterogeneous floodplains. The 4th Approximation attempts to reduce confusion by defining Piedmont Bottomland Forest as the portion of the flooding gradient where most oaks occur, and defining Piedmont Swamp Forest as the wettest sites, where only the most water-tolerant trees (including *Quercus lyrata* but not most other oak species) predominate.

PIEDMONT SWAMP FOREST GNR

Synonyms: *Acer rubrum* - *Fraxinus pennsylvanica* / *Saururus cernuus* Forest (CEGL006606). Ecological Systems: Southern Piedmont Large Floodplain Forest (CES202.324).

Concept: Type covers communities of the wetter parts of large Piedmont floodplains, generally backswamps and large sloughs but possibly depressions on terraces. These areas are flooded for prolonged periods and support species tolerant of longer hydroperiod, such as *Fraxinus pennsylvanica*, *Ulmus americana*, *Acer rubrum* var. *trilobum*, and *Quercus lyrata*.

Distinguishing Features: Piedmont Swamp Forest is distinguished from all other Piedmont floodplain types by its flood-tolerant species composition, generally dominated by *Fraxinus pennsylvanica*, *Ulmus americana*, *Acer rubrum*, or *Quercus lyrata*. The lower strata are similarly water-tolerant, with a relatively depauperate herb layer, generally dominated by *Carex* spp., *Saururus cernuus*, or *Boehmeria cylindrica*.

In my recent examination of known examples of this community type, the predominance of wetland obligate trees such as Overcup Oak (*Q. lyrata*) and Black Willow (*Salix nigra*) shading wide sloughs full of Lizardtail (*Saururus cernuus*) seems to capture the essence of Piedmont Swamp Forest. No other oak species are visible. Also, there are frequently visible Marsh Rabbits – seen nowhere else in the Piedmont landscape.

The “GNR” appellation indicates that it is “Globally Not Ranked.” I’m told that this is because neighboring states with Piedmont rivers and creeks have not clearly identified the community type, most notably South Carolina.

The closest described NatureServe community type is the Red Maple-Green Ash/Lizard Tail forest.

Reference :

http://www.natureserve.org/explorer/servlet/NatureServe?searchCommunityUid=ELEMENT_GLOBAL.2.685450

Global Status: G3G4 (14Feb2012)

Rounded Global Status: G3 - Vulnerable

Reasons: This association is geographically restricted to the Mid-Atlantic Coastal Plain and in limited areas of the Piedmont. It occurs in small patches, generally less than 20 acres. As of December 2011, it is ranked as S3 in Maryland and S3S4 in Virginia, where it is reportedly widespread in the backswamps of the Coastal Plain. In New Jersey, this type is documented from Great Swamp on the transition from Inner Coastal Plain to Piedmont. This type also is likely to occur in Delaware but its classification requires further resolution there. Beaver impoundments have been observed to threaten this vegetation.

2. POSSIBLE INADEQUATE LENGTH OF BRIDGING IN C-1 CORRIDOR

My examination of the agency supplied satellite photo of the LPA corridor crossing Little Creek, using other topo maps to compare with topo on that one, suggests that the floodplain bridging would need to be extended at least 20 percent in length on the eastern end to deal with likely flooding. Am simply basing this on the latest FEMA elevations. I would recommend a re-examination of likely flooding extent on the eastern end of the crossing.

3. POTENTIAL IMPACT ON BUILT LOT BY C-1 CORRIDOR AT EASTERN EDGE OF MEADOWMONT

Based on field examination today, the easternmost lot now shown as having impact from Corridor C-1 in the adopted LPA, is undergoing site development. The advertised price for the house to be built there, plus the usual pricing for Meadowmont single family lots, suggests that it would be a very expensive condemnation to gain use of that single area, lot 302. The alignment available for examination last year did not show the alignment in that location, although it was a very short distance away. In the event C-1 is used, it should be tweaked to avoid this expensive property – which would be expensive even if unbuilt.

4. PEDESTRIAN ACCESS ISSUES FOR THE HAMILTON ROAD STATION

As someone who has frequently crossed NC 54 at Hamilton Road – most often by bicycle – I see no way to integrate the future redevelopment in Glen Lennox within the station area without a grade-separated crossing. An extended pedestrian signal – which by Triangle standards tops out at 15 seconds – would back peak hour street traffic on NC 54 through adjoining signalized intersections. The approved NC 54 plan (May 9 2012 MPO action) does not appear to include such a grade-separated crossing. Based on recent examples elsewhere in nearby counties, the 2012 cost of such a facility would be in the millions of dollars. Given the importance of the Glen Lennox buildout to the success of this station area, it would be helpful if this access issue could be included in the scope in some way. I was involved with the Glen Lennox planning process as the first Council Member brought into neighborhood meetings on the redevelopment proposal, and then as Council liaison to the Neighborhood Conservation District Committee that produced the concept plan.

5. ABILITY TO EXTEND FUTURE FIXED GUIDEWAY TO NORTHWEST OF UNC HOSPITALS STATION

The UNC Hospitals station location needs to be examined for how it affects the ability of transit providers to extend a fixed guideway to the northwest, toward Carrboro and beyond. Town of Chapel Hill staff have flagged that as a potential issue with the location as shown in the LPA, or as contemplated by UNC.

NOTE: I can be available for follow up on these concerns if it is helpful.



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

June 19, 2012

Regulatory Division

Action ID No. SAW 2012 00957

Mr. Brian Smart
Federal Transit Administration
230 Peachtree Street NW, Suite 800
Atlanta, GA 30303

Dear Mr. Smart:

Reference is made to the e-mail from Ms. Juanita Shearer-Swink with the Triangle Transit received on May 24, 2012, requesting scoping comments on the proposed Durham-Orange Light Rail Transit Project located on new linear alignment from UNC Hospitals in Chapel Hill, Orange County, North Carolina, to Austin Avenue in Durham, Durham County, North Carolina. This correspondence addresses concerns from both the Operations and Regulatory Divisions with the U.S. Army Corps of Engineers, Wilmington District. Comments from Operations address their concerns pertaining to the project's proposed impacts to Corps owned property within the Jordan lake watershed and Regulatory's comments specifically address the project's impacts to waters of the United States, including adjacent wetlands, subject to our regulatory authority pursuant to Section 404 of the Clean Water Act.

First of all, with regards to our concerns pertaining to Operations, please reference the proposed alternatives shown crossing government property along Little Creek at B. Everett Jordan Lake. This property is under the stewardship of US Army Corps of Engineers (USACE), Wilmington District, Operations Division. A route crossing this property would require an easement from the federal government. Requests for use of government property administered by USACE are reviewed in compliance with USACE policies for out granting of government property and the National Environmental Policy Act (NEPA). The decision to approve or deny a requested use would be made after the review process has been completed and the requirements of NEPA have been satisfied. If a route crossing government property is proposed, the EIS being prepared for the Federal Transit Authority (FTA) may satisfy the NEPA requirements for our land use request review process. However, in order to meet our NEPA requirements the discussion of alternatives must include routes that do not impact public lands. The EIS scoping document does not include discussion or depiction of alternatives off of government property. Alternative routes should be added and/or the study area should be increased to include alternatives to the north and east of those currently depicted crossing public lands along Little Creek. The discussion of impacts due to routes crossing public lands should include impacts due to relocation of existing roads, utilities, etc. Routes crossing public land must be avoided, if possible, and impacts minimized, if public lands cannot be avoided. Mitigation would be required for any unavoidable adverse impacts on public lands.

The congressionally authorized purposes of the Jordan Lake project are flood control, water supply, water quality, recreation, and fish and wildlife conservation. In addition to these authorized purposes, the permanent wildlife lands in the area which include the Little Creek Waterfowl Impoundment, serve as mitigation for adverse impacts from the construction of Jordan Lake. The area is leased to the State of North Carolina and managed by the North Carolina Wildlife Resources Commission (NCWRC) as part of their game lands program. Portions of a Significant Natural Heritage Area as designated by the NC Natural Heritage Program (NCNHP) are located in the proposed alignments. The proposed alignments are within the lake's flood storage pool, which is subject to inundation to elevation 245 feet mean sea level. If you require any additional information regarding use of public lands at Jordan Lake, please contact Mr. Michael Hosey, Operations Division at 919-542-4501, extension 26.

In regards to our Regulatory concerns, our review is based on the information provided at the Scoping meeting for regulatory agencies held on May 2, 2012, and the referenced e-mail. It appears that the proposed light

rail project may impact jurisdictional waters of Little Creek and New Hope Creek of the Cape Fear watershed (HUC 03030002). Department of the Army (DA) permit authorization, pursuant to Section 404 of the Clean Water Act of 1977, as amended, will be required for the discharge of excavated or fill material into waters of the United States or any adjacent wetlands in conjunction with this project, including disposal of construction debris. Specific permit requirements will depend on design of the project, extent of fill work within the waters of the United States, construction methods, and other factors including temporary construction, support facilities (i.e. rail stations, maintenance shop facilities), facility maintenance access, mechanized land clearing and dewatering activities.

Please be aware that the Department of the Army and the U.S. Environmental Protection Agency signed a memorandum of agreement (MOA) on November 15, 1989, establishing procedures for DA permit authorization in compliance with Clean Water Act Section 404(b)(1) Guidelines. First of all DA permits are available only for work dependent upon being located within a jurisdictional waters of the United States that are the least environmentally damaging practical alternative. Once that alternative is determined, then the DA permit authorization requires that the project design avoids and minimize impacts to jurisdictional waters. Finally for those impacts that cannot be avoided and minimized appropriate and practical mitigation will be required.

With reference to the provided Scoping Information Booklet (SIB), we offer the following comments:

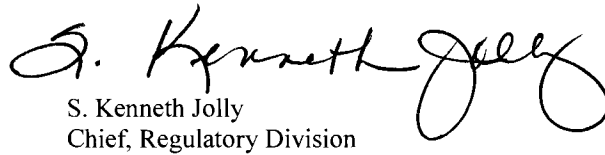
- a. Widening of an existing transportation corridor through a jurisdictional waters systems (i.e. wetlands) most often is preferred over a new alignment or realignment of the existing linear transportation corridor. The existing linear transportation corridor has already impacted the jurisdictional water systems. The SIB includes such an alternative for the crossing of the Little Creek system along the NC 54 corridor. However, the SIB crossing of the New Hope Creek system does not include such an alternative even though such an alternative appears to exist along the US 15/501 corridor. We recommend that such an alternative should be included in the Scoping review. Although not discussed in the SIB, other new alignment alternatives were discussed at in your May 2, 2012, workshop. In our discussions you stated that the details of these reviewed alternatives were available and in documents located on the project web page. We have reviewed the web page documents and could not find the referenced other new alignment alternatives details. Again we request that you provide the referenced details to be included in our scoping review comments for your proposed transportation project.
- b. Linear transportation projects often result in the unavoidable crossings of jurisdictional waters systems with the need to connect logical termini associated with the project purpose. However, these crossings should be made perpendicular and at the narrowest point of the jurisdiction waters system. Maps included with the SIB shows such an opportunity within the defined project study area located north of the C1 alternative for the Little Creek crossing. The SIB maps also show another opportunity for avoidance in the crossing of New Hope Creek adjacent to the US 15/501 bridge crossing. We recommend that such alternatives should be included in the Scoping review.
- c. DA permit authorization requires minimization of unavoidable impacts to jurisdictional waters. Review of construction methods often result in the best opportunities for such required minimization efforts. Although not discussed in the SIB, aerial segments were discussed at your May 2, 2012, workshop and in documents located on the project web page. We recommend the aerial crossings (i.e. bridging) of the proposed projects unavoidable crossings of jurisdictional waters.
- d. The SIB identified two large jurisdictional water systems (i.e. Little Creek and New Hope Creek). However it did not identify other jurisdictional streams channels and/or adjacent wetlands that no doubt exist in a 17 mile linear corridor. Such information is necessary for your planning that should include avoidance and minimization of impacts to jurisdictional waters. We recommend a jurisdictional delineation and mapping of jurisdictional waters for the proposed project 17 mile corridor.
- e. The SIB discusses the use of top down construction to minimize impacts, however, discussions of plans for permanent access roads for the maintenance of the LRT track and the possibility for impacts to jurisdictional waters from the installation of those roads should be included in the scoping review.
- f. Potential boarding stations and maintenance yards were identified in the SIB, however, a more robust discussion regarding impacts to jurisdictional features from the construction of the stations and maintenance yards should be included in the scoping review.

g. Final comment, your scoping review should include discussion of plans for compensatory mitigation of unavoidable impacts to jurisdictional waters associated with the proposed project.

Thank you in advance for completing our Customer Survey Form. This can be accomplished by visiting our web site at <http://per2.nwp.usace.army.mil/survey.html> and completing the survey on-line. We value your comments and appreciate your taking the time to complete a survey each time you interact with our office.

Thank you for the opportunity to comment on the scoping review of your proposed project. We encourage and look forward to the continuing coordination with you in the planning and development of this project. Should you have any questions pertaining to Regulatory concerns, please contact Mr. Thomas at the Raleigh Field Office at 919-554-4884, ext. 25.

Sincerely,


S. Kenneth Jolly
Chief, Regulatory Division



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

Brian:
FYI

July 26, 2012

Regulatory Division

SUBJECT: Action ID. 2012 00957, Durham-Orange Light Rail Transit Project

Ms. Yvette G. Taylor, Ph.D.
Federal Transit Administration
230 Peachtree Street NW, Suite 800
Atlanta, GA 30303



Dear Ms. Taylor:

Reference your letter dated June 27, 2012, in which you invited us to participate as a Cooperating agency in the development of the Environmental Impact Statement (EIS) for the proposed Durham-Orange Light Rail Transit Project located on new linear alignment from UNC Hospitals in Chapel Hill, Orange County, North Carolina, to Austin Avenue in Durham, Durham County, North Carolina. In addition, you have also requested that we participate as a Participating Agency pursuant to Section 6002 of SAFETEA-LU.

In accordance with the Council on Environmental Quality, (40 CFR 1501.6 Cooperating Agencies), we agree to participate as a Cooperating Agency. It is our intention to formally adopt the Federal Transit Administration (FTA) National Environmental Policy Act (NEPA) document, in whole or in part, provided it meets our requirements relative to Section 404 of the Clean Water Act and NEPA when the Record of Decision (or Finding of No Significant Impact, as appropriate) is completed.

Please note that other program commitments will preclude us from funding or writing any portion of the subject document. However, it is our intention to fully participate in the development of the necessary document throughout the NEPA process. It is also our intention that at the end of this process, our requirements pursuant to Section 404 of the Clean Water Act, including our Public Interest Review, and Section 10 of the Rivers and Harbors Act would be fully satisfied. Regarding these identified regulatory requirements, please reference our letter to you dated June 19, 2012. This letter responded to your request for comments concerning your scoping review of the identified project. Please be aware that as a cooperating agency, we would have the same concerns that were identified in our June 19th letter including, but not limited to, the evaluation of alternatives which may have less environmental impact. In the event that your NEPA analysis does not adequately address our program responsibilities, a supplemental NEPA document may become necessary.

Finally, we also agree to Participating Agency status, pursuant to Section 6002 of SAFETEA-LU, and will provide you with issues of concern regarding environmental or socioeconomic

impacts as early as possible in the planning process that could substantially delay or prevent our agency from granting a permit for the project.

Thank you for your time and cooperation. Questions or comments may be addressed to Mr. James Lastinger, Raleigh Regulatory Field Office, 3331 Heritage Trade Drive, Wake Forest, North Carolina, 27587, or telephone 919-554-4884, extension 32.

Thank you in advance for completing our Customer Survey Form. This can be accomplished by visiting our web-site at <http://per2.nwp.usace.army.mil.survey.html> and completing the survey on-line. We value your comments and appreciate your taking the time to complete a survey each time you interact with our office.

Sincerely,



Jean B. Gibby
Acting Chief, Regulatory Division

Copy Furnished:

Mr. Michael Hosey
B. Everett Jordan Dam and Lake
P.O. Box 144
Moncure, NC 27559



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

July 27, 2012



Mr. Brian Smart
Transportation Planner
Federal Transit Administration, Region IV
230 Peachtree Street NW, Suite 800
Atlanta, Georgia 30303

SUBJ: EPA Scoping Comments for the Environmental Impact Statement (EIS) on the Durham-Orange Light Rail Transit Project, Durham and Orange Counties, North Carolina.

Dear Mr. Smart:

Thank you for the opportunity to comment on the above subject document. Pursuant to Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA), Region 4, reviewed materials that include information on the proposed project, and accepted the Federal Transit Administration's (FTA's) request to act as a cooperating and participating agency on the proposed project.

The Durham-Orange Light Rail Transit Project involves light rail transit and station planning in a 17-mile corridor between Durham and UNC Chapel Hill. Bus coverage and frequency will also be expanded. The proposed project will provide connections to North Carolina Central University, downtown Durham, Duke University, Duke University Medical Center, Durham Veterans Administration Medical Center, the Friday Center, UNC Hospitals and several park-and-ride lots. Connections will also be made to Amtrak and various buses in downtown Durham. The purpose of the proposed transit investment in the Durham-Orange County (D-O) Corridor is to provide solutions that address the need to enhance mobility, expand transit options between Durham and Chapel Hill, serve populations with high propensity for transit use and foster compact development.

The proposed project currently includes the development and analysis of three primary alternatives between the University of North Carolina Hospitals and east Durham. The alternatives evaluated include a No-Build Alternative that serves as the baseline condition; a Transportation Systems Management (TSM) Alternative consisting of an enhanced bus network that provides a level of transit service and capacity similar to that of a fixed-guideway transit service; and a Light Rail Transit (LTR) Alternative consisting of a new fixed-guideway rail alignment and support facilities. This alternative represents the locally preferred alternative as currently proposed. EPA notes that the federally preferred alternative for the project will be selected in the FEIS.

EPA wishes to note that we support the use of light-rail transit technology for this project. Optimizing the use of existing transportation corridors can reduce the amount of greenfield acreage that would be disturbed, if new alignments were selected. However, we also understand that such projects are not without their impacts. So, we have attached some detailed comments for your consideration.

EPA appreciates the opportunity to provide these scoping comments and look forward to working with you on the proposed project. If you have any further questions or concerns, you may contact Ntale Kajumba at (404) 562-9620.

Sincerely,



Heinz J. Mueller, Chief
NEPA Program Office
Office of Policy and Management

cc: Detailed EPA Comments

EPA Detailed Scoping Comments on Durham-Orange Light Rail Transit Project

Alternatives: The alternatives analysis evaluation document considered various alignments and the alignments that best met the project purpose and need. The alternatives considered include a No-Build Alternative and two build alternatives. The alternatives analysis and the locals both identified the Light Rail Transit (LRT) Alternative as the technology that best satisfies the purpose and need. Rationale for selection of the alternative is included in the document. EPA notes that there are a few alternative alignments within the corridor (e.g., Alternative C1 and 2) that will require further study. These alternatives also involve environmental resource consideration. The DEIS should indicate and discuss the rationale for rejecting any proposed alternative.

Air Quality: The Draft EIS should contain a discussion of the regulatory transportation air quality requirements, air quality concerns in the project area, and a carbon monoxide (CO) analysis. The document should assess existing air quality conditions in terms of National Ambient Air Quality Standards (NAAQS), Federal Prevention of Significant Deterioration (PSD) increments, and state air quality standards (if they are more stringent than the federal regulations). Based on our review, Durham and Orange County, NC is currently unclassifiable or in attainment of the National Ambient Air Quality Standards. EPA recommends that the project implement overall diesel emission reduction activities through various measures such as: switching to cleaner fuels, retrofitting current equipment with emission reduction technologies, repowering older engines with newer cleaner engines, replacing older vehicles, and reducing idling through operator training and/or contracting policies. EPA can assist in the future development or implementation of these options.

Mobile Sources Air Toxics: Evaluation of project should include consideration of the impacts of air toxics emissions from trains, buses and vehicular traffic on nearby population centers and sensitive populations. The EIS should include an inventory of air toxics emissions (including diesel emissions) from both stationary and mobile sources that serve the facility, including the locomotives, switchers, tractors, and support equipment, etc. It should also include a screening level evaluation of the potential impacts of these emissions on neighboring populations. The screening level evaluation could be conducted using the approach described in EPA's Air Toxics Risk Assessment Reference Library (ATRA Library). We refer the project applicant to the ATRA Library, Volume 1 Section 3.3.3 for further detail (http://epa.gov/ttn/fera/risk_atra_main.html). The evaluation should include a description of recent literature concerning the impact of air toxics emissions on near-transportation receptors, including sensitive receptors such as children and the elderly. If sensitive receptors exist within the project area and mobile source air toxic issues are projected to increase, the evaluation should also describe the methods that will be used to mitigate any unavoidable emissions and impacts.

Water Quality: Pollution Control: Best Management Practices (BMPs) should be used to reduce erosion during and after construction. Typical BMPs include the use of staked hay bales, silt fences, sediment ponds, mulching and reseeding, and appropriate buffer zones along water bodies. The document should include an erosion control plan or reference *North Carolina's Erosion and Sediment Control Planning and Design Manual* and document FTA's and Triangle Transit's commitment to compliance. Compliance should include National Pollutant Discharge Elimination System (NPDES) permit coverage for the construction activity, compliance with the

Storm Water Management Program and proper and maintenance of BMPs. BMPs for the design operational life of the facility should also be considered.

The document should discuss any proposed crossings of water bodies. In general, crossings should be minimized. Unavoidable crossings should be strategically placed to reduce harm by avoiding fish spawning areas, avoiding fringe wetlands, approaching at right angles to streams, etc. If the proposed project includes disturbance of one or more acres of land during construction, and point source discharges into waters of the United, coverage under EPA's storm water NPDES General Permit or state equivalent is required. Contact North Carolina's Department of Environment and Natural Resources Water Quality Division for further information on the NPDES program.

Aquatic Resources: To fully evaluate this proposal, the requirements of the Section 404 (b) (1) Guidelines (Guidelines) must be fully and completely considered if this project is to move forward. The objective of the Guidelines is to require would-be dischargers of fill material to avoid and minimize impacts, and compensate for those which are unavoidable. To do this the applicant will have to, at a minimum, fully consider: developing the least environmentally damaging practicable alternative and associated requirements of section 230.10 (a). The least environmentally damaging alternative is determined by utilizing the project's "basic project purpose". If the basic project purpose can be achieved by less environmentally damaging means then EPA would prefer those. The EIS should also include information which addresses the Guidelines' prohibition on allowing the potential effects of the fill to cause violations of state water quality standards, applicable toxic effluent standards, jeopardize threatened and/or endangered species or their habitat. If unavoidable impacts to wetlands, streams and floodplain are involved, information will be needed outlining how impacts have been avoided and how the unavoidable impacts will be compensated. Compensation for any unavoidable impacts will have to comply with Subpart J, Compensatory Mitigation for Losses of Aquatic Resources (a.k.a., the Mitigation Rule of 2008).

Noise: Noise impacts should be predicted for the no build and each of the build alternatives. State-of-the-art noise modeling should be provided and consistent methods used by North Carolina Department of Transportation. EPA looks to FTA to provide federal oversight and consistency in approach, methodology and mitigation. The EIS should document construction noise attributable to the project. Typical noise levels produced by construction equipment (e.g., trucks, front end loaders, pile drivers, etc.) within 50 feet, which are available in the literature, should be disclosed. The total project construction time (months, years) should also be estimated in order to help assess the magnitude of the construction noise impact. Attempts should also be made to estimate the temporary construction time associated with any one feature along the ROW or section thereof. For example, how long is construction expected to take near any given affected residence or for an average mile of construction? This information will allow affected residents and businesses to approximate their degree of noise disturbance during construction.

Although temporary, construction noise should be reasonably mitigated in residential areas. Construction should not start before 7AM or continue after 7PM during the work week (5-6 days) and be discontinued on Sundays and on locally-observed federal and/or state holidays. In addition, the use of a hush house should be considered around any stationary equipment to shield

noise at its source, and all motorized equipment should be properly tuned to the manufacturer's specifications for additional source reduction. All construction equipment should be equipped with noise attenuation devices, such as mufflers and insulated engine housings. Such mitigative methods should be made a contractual obligation that is periodically reviewed in the field by FTA, Triangle Transit or third-party inspectors.

The document should predict what noise levels can be expected from the project, and the distance to the closest residence/receptor. Background (ambient) noise levels should also be included in the document. EPA prefers that noise impacts are measured using the Leq(h) metric since it provides an average level during peak traffic periods as opposed to the L10 metric which provides a less specific level that is not exceeded more than 10 percent of the time. The NEPA evaluation should also estimate the projected incremental increase of noise. Generally, EPA considers all increases over 10 dBA at any given noise level as a significant increase. Comparisons to any noise guidelines (e.g., DOT/FTA) or city ordinances are also appropriate. EPA has a target noise level (not a guideline or standard) of DNL 55 dBA for outdoor areas where people spend a varying amount of time (such as residences). In addition, OSHA regulations apply for all employees affected by job noises.

Noise abatement should be considered by FTA when project noise impacts approach the DOT Noise Abatement Criteria or if they meet or exceed the existing noise levels by 10 dBA (especially if the existing noise levels are 50 dBA and above). Forms of noise and/or visual mitigation include, but are not limited to, vegetative screens, vegetated earthen berms (suburban areas), fabricated noise barriers, and alignment shifts. Avoiding noise impacts via alignment shifts is frequently more effective than mitigation.

Archeological and Historic Property: The EIS should identify potential archeological sites and historic properties within the project area. If present, the EIS should document that proper coordination with the State Historic Preservation Office (SHPO) has occurred. EPA encourages use of the NEPA process as a mechanism for compliance with Section 106 of the National Historic Preservation Act. The EIS should discuss any avoidance or minimization measures and procedures for events such as unearthing archaeological sites during prospective construction. Such procedures should include work cessation in the area until the SHPO and/ the Tribes approve of continued construction.

Threatened or Endangered Species: EPA principally defers to and encourages continued coordination with the National Marine Fisheries Service (NMFS) and the U.S. Fish & Wildlife Service regarding assessments of federally-protected threatened or endangered species. Impacts to threatened and endangered species should be discussed and assessed in the EIS.

Environmental Justice: Pursuant to the executive order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February 11, 1994) and its accompanying memorandum, the EIS should examine the effect of the transportation facilities on minority and/or low-income populations. The EIS should identify, analyze and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The EIS should include a demographics analysis of the affected project

area. Some of this information can be found at the U.S. Census Bureau, U.S. Bureau of Labor Statistics, LAUS, and the U.S. Bureau of Economic Analysis, REIS. Publically available EPA Web-based tools like *EJView*: <http://http://epamap14.epa.gov/ejmap/entry.html> and *NEPAssist*: <https://oasext.epa.gov/NEPA/> can also be used to conduct preliminary screening level EJ reviews. This information should be used in conjunction with information acquired during the public involvement and ground verification processes. Based on the coordination documents, the public involvement process has been robust and should continue to provide opportunities for communities to help identify potential effects, and minimization and mitigation measures. A summary of the communities' potential environmental justice concerns and the agencies response to those concerns should be included in the EIS. EPA notes that effort to improve access to public meetings, official documents, and notices to affected communities are being made. Efforts to minimize and mitigate adverse impacts should be outlined or analyzed in EISs, whenever feasible, should address significant and adverse environmental effects of proposed federal actions on minority communities and low income communities.

Children's Health: The EIS should evaluate potential environmental and human health effects of the proposed project on children. Information identifying children under 18 (demographics) within the surrounding area and schools in proximity to the transportation corridors and stations should be included in the EIS. Both the impacts and benefits of the proposed project on this population should be assessed.

Indirect and Cumulative Impacts - Transit projects have both direct and indirect effects on the environment. NEPA requires the assessment and disclosure of reasonably foreseeable effects of transportation projects or the indirect effects of the project. Cumulative impacts are "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." It is suggested that the spacial/temporal criteria of the analysis be given and that they be uniform throughout the analyses of the project, if appropriate. Such consideration should include other transit projects in the Durham and Orange County area and other private, local, state, or federal projects in general -- particularly those with similar impacts -- that are existing, proposed or are expected to occur within the reasonably foreseeable future (10-20 year horizon).

M E M O R A N D U M

To: Project File
From: Jeff Weisner, AICP
Planning Department Manager, URS Corporation
Date: August 28, 2013
Subject: Durham-Orange (D-O) Light Rail Transit (LRT) Project
Interagency Meeting, August 27, 2013
RECORD OF MEETING

Attendees:

*indicates attendance by Phone

Myra Immings*	Federal Transit Administration (FTA)
Stan Mitchell*	FTA
Ntale Kajumba*	EPA
Dana Perkins*	FAA
Clarence Coleman	Federal Highway Administration (FHWA)
Michael Hosey	U.S. Army Corps of Engineers (USACE)
Francis Ferrell	USACE
John Thomas	USACE
Sarah McRae	U.S. Fish and Wildlife (USFW)
Ellen Reckhow	Triangle Transit (Board)
Bernadette Pelissier	Triangle Transit (Board)
Ed Harrison	Triangle Transit (Board)
Deloris Hall*	N.C. Office of State Archeology
Allison Weakley	N.C. Department of Environment and Natural Resources (DENR)
Rob Ridings	DENR
Travis Wilson*	N.C. Wildlife Commission
Phillip Vereen*	NCDOT Public Transportation
Tamara Shaw*	NCDOT Public Transportation
Eric Midkiff*	NCDOT – Project Development and Environmental Analysis (PDEA)
Michael Craig	NCDOT – Division 5
Mike Kneis	NCDOT – Division 5
John Hodges-Copple	Triangle J Council of Governments (TJCOG)
David Bonk	Town of Chapel Hill
Andy Henry	Durham Chapel Hill Carrboro Metropolitan Planning Organization (DCHC MPO)
Helen Youngblood	Durham City County Planning Department (Durham Planning)
Hannah Jacobson	Durham Planning
Meg Scully	Durham Planning



Durham-Orange LRT Project Interagency Meeting
Meeting Record
August 28, 2013
Page 2

Charlie Welsh	New Hope Creek Corridor Advisory Committee (NHCCAC)
Bob Healy	NHCCAC
John Kent	NHCCAC
Pam Karriker	Citizen
Terry Rekeweg	Citizen

The Project Team

David King	Triangle Transit
Greg Northcutt	Triangle Transit
Patrick McDonough	Triangle Transit
Deborah Ross*	Triangle Transit
Juanita Shearer-Swink	Triangle Transit
Brad Schultz	Triangle Transit
Geoff Greene	Triangle Transit
Darcy Zorio	Triangle Transit
Tanner Adamson	Triangle Transit
Charlie Benton	URS Corporation
Paul Humberger	URS Corporation
Gavin Poindexter	URS Corporation
Jeff Weisner	URS Corporation
Cyndy Yu-Robinson	URS Corporation
Tom Hepler	CH Engineering

An interagency meeting for the Durham-Orange (D-O) Light Rail Transit (LRT) Project was held on Tuesday, August 27, 2013 at the UNC Friday Center in Chapel Hill, NC, from 1:00 to 3:00 PM. The purpose of the meeting was to discuss the current status of the D-O LRT Project, alternative alignments and proposed station locations, alternative locations for the rail operations and maintenance facility, and the responses to current comments. The August 2013 Draft D-O LRT Project Environmental Methodologies Report was also presented and discussed.

Following is a list of project alignment segments and discussion topics which are covered in detail below:

- UNC-Hospitals Alternative Station Location
- UNC Finley Golf Course / NC 54 Options
- C1/C2 and Minimization Alternatives (Friday Center to Leigh Village Segment)
- I-40 Options Study
- New Hope Creek Area
- Duke Medical Center / Durham VA Medical Center Station Locations



- Track Separation
- Rail Operations and Maintenance Facility Sites
- Environmental Methodologies

UNC-Hospitals Alternative Station Location

The alternative alignments under consideration within the vicinity of UNC Chapel Hill include the Locally Preferred Alternative (LPA) as well as two new alternatives that place the UNC Hospitals station closer to the university in order to penetrate further into campus. The new alternative alignment would also necessitate a slight change with the Mason Farm Road station.

No comments, questions or concerns were expressed with this segment.

UNC Finley Golf Course / NC 54 Options

An alternative alignment has been designed to avoid possible impacts to the tee boxes and the cart paths, most specifically near the third hole. This alignment departs from the LPA in the vicinity of Finley Golf Course Road and would run adjacent to the south side of NC 54.

The Town of Chapel Hill representative asked about the inclusion of a previously identified alternative alignment that would extend southwards from the Friday Center, run south of the hotel and penetrate the proposed Woodmont development, thereby moving the Woodmont LRT station farther away from NC 54. It was indicated that this request would be considered.

C1, C2 and Minimization Alternatives:

It was explained that the Minimization Alternative is being reevaluated as part of addressing comments received during Scoping to include an alternative that completely avoids Federal lands. The three alternative alignments (Minimization, C1 and C2) will be studied in a white paper to document and determine the specific impacts of each alignment on environmental and community resources, as well as from a technical feasibility perspective. It was further explained that comments from residents opposed to the C1 Alternative were received during Scoping; the Minimization Alternative would include C1.

The DENR representative asked why the NC 54/Farrington Road alternative was not still included. It was explained that this alignment was considered during the review of corridors and alignments for further study. It was eliminated from further consideration due to a number of issues including those identified in the NC 54 Interchange Study and further coordination with NCDOT which indicated that this alignment would not be feasible.

A USACE representative asked about the impacts to residents along the Minimization Alternative. It was explained that the effects, which had not yet been studied in depth, will be examined and analyzed as part of the DEIS.

The DENR representative asked a question regarding the mitigation necessary for USACE land acquired as part of a new location alternative. USACE indicated that mitigation would not be



required within any transit easements, but would be required for any new location acquisitions.

Conversation ensued regarding the original transit easement along the Minimization/C1 alternatives. It was explained that while this formed the starting point for analysis, the alignment has shifted slightly through the Alternatives Analysis process.

Triangle Transit Board Member Harrison (also Chapel Hill Mayor Pro Tem) asked about like/contiguous mitigation land and how it impacted the crossings of these natural resources. USACE explained that this would be determined at a future time in the project when more specific details regarding impacts have been analyzed and evaluated. A DENR representative reminded the audience that these lands are already mitigation property.

I-40 Options Study:

The alternative alignments that were considered as part of an I-40 Options Study were presented. These included alternatives to avoid locating the transit alignment within NCDOT right-of-way in order to accommodate any future lane widening. The presentation included a typical cross section of the currently proposed segment of the D-O LRT alignment which provides for programmed future widening, safety and shoulder lanes. The results of the Study were presented, including impacts created by the LPA and alternative alignments to property, grade crossings, wetlands and historic resources as well as general cost.

No questions, comments or concerns were expressed in this segment.

New Hope Creek Area:

A number of alignment options, primarily between the proposed Gateway Station and the proposed MLK Jr. Parkway Station, were explained in great detail including: the LPA, two northern alignments (along US 15-501) and two southern alignments (along Old Chapel Hill Road). Further opportunities and constraints were explained with each of the alternatives. A White Paper, similar to the I-40 Options Study is currently being prepared and will be available for review in the future analyzing the Old Chapel Hill Road alternatives. The two northern US 15-501 options will be carried forward through the DEIS.

A NHCCAC representative asked why, given NCDOT's planned expansion and general policy along US 15-501, the project team would not pursue design options which assume that no lane widening would occur across New Hope Creek. Another NHCCAC representative explained that an EA/FONSI "Greensheet" indicates that a wing-wall design was incorporated into the design of the existing (newly constructed) New Hope Creek Bridge, for specific transit purposes. It was indicated that the project team would continue close coordination with NCDOT regarding the proposed actions along US 15-501 (including possible interchanges as part of the freeway conversion project) and that these comments and questions would be considered as part of the DEIS. The potential impacts to businesses along US 15-501 between Garrett Road and MLK Jr. Parkway as a result of the project were also explained.



A Durham Planning representative asked about the differences in station locations through this area, most notably the Patterson Place and MLK Jr. Parkway Stations. The project team explained that while the initial locations of these stations were determined through the station area planning process, further refinement to these station areas would be determined as the DEIS moves forward and as the alignments are refined.

The NCDENR representative asked why the project did not include any station options closer to US 15-501 either in the vicinity of SW Durham Drive (towards New Hope Commons) or Garrett Road. The project team explained that LRT stations are primarily located in areas that have the potential for easy pedestrian access preferably within a ¼ to ½ mile radius. The station, particularly near Patterson Place, is intended to serve a larger walkable area that would include current and future phases of the overall Patterson Place development including portions of SW Durham Drive. The station area planning process also considers the potential for future higher-density development, not just existing conditions. The US-15 501 corridor presents a major barrier for pedestrian access (even at signalized intersections). The NCDOT proposed interchange at SW Durham Drive as part of the freeway conversion process would provide additional challenges for a station.

The TJCOG representative asked why consideration was not being given to an alternative alignment that passed just south of the LPA in the vicinity of New Hope Creek, crossing the Federal Lands at the narrowest section of wetlands. The project team indicated that this general area would be studied (including costs) in a White Paper, similar to the I-40 Options Study. In response to some initial analysis, the current LPA alignment has already been modified to avoid impacts to Durham County Parcels designated as “Open Space”, which could be construed as a Section 4(f) Resource. Additional challenges including the location of Jurisdictional Wetlands were also discussed.

Concerns regarding the need to maintain and provide for the wildlife connectivity that currently exists along the New Hope Creek Corridor were discussed as were the forested areas remaining in the vicinity of Patterson Place and New Hope Creek and how best to preserve them. A comment was also made regarding the amount of impact an interchange would have on the SW Durham Drive intersection.

The NHCCAC indicated that there was an existing transit easement which was made as part of the development plans for the New Hope Creek Apartments, or Colonial Grande at New Hope that brought the alignment from Patterson Place to US 15-501.

Duke Medical Center / Durham VA Medical Center Stations:

The three station options along Erwin Road in the vicinity of Duke Medical Center and the Durham VA Medical Center (DVAMC) and the reasoning behind each of their respective locations were presented. Through coordination with the DVAMC, Option C, or the Eye Care Center Drive alternative, was determined to be the DVAMC’s preferred station. Relative to the other alternatives, Option C appears to have the least negative impact on Erwin Road and the intersection at Fulton Street, the adjacent medical complexes and overall pedestrian and vehicular



circulation. Coordination with Duke University has not yet occurred.

Triangle Transit Board Member Reckhow (also Durham County Commissioner) indicated that there was a general consensus and support for the Eye Care Center Drive Station location. The project team explained however, that all alternatives would be carried forward during the Station Planning Process as part of the DEIS.

NHCCAC asked about emergency vehicle access along Trent Road. The project team indicated that these issues would be analyzed and addressed through the Transportation/Traffic studies conducted as part of the DEIS.

Track Separation:

The D-O LRT project includes a segment between the 9th Street and Alston Ave/NCCU LRT Station which will operate on separate exclusive tracks within the North Carolina Railroad (NCR) corridor. Current discussions between the project team and representatives of the NCR have indicated that the separation between freight and LRT tracks operating within the NCR corridor may need to be 40-foot and/or 54-foot (rather than approx. 26 feet which occurs in other communities). A brief explanation of the impacts which the 40-foot and 54-foot separation requirements would have on adjacent structures and buildings within this segment of the alignment was given.

A FTA representative asked whether the Federal Railroad Administration (FRA) had weighed in on track separation. Triangle Transit General Manager David King responded that FRA doesn't have a standard regarding this type of track separation. (Once a rail vehicle is more than 25 feet away from operating railroad tracks, it is no longer considered to be adjacent; there are maintenance requirements associated with rail vehicles that would operate with less than 25 feet of separation.)

General discussion continued regarding the evaluation of the impacts of the expanded track separation distances of 40 feet and 54 feet; the basis of original 26-foot separation and the general path forward towards reaching an agreement.

Rail Operations and Maintenance Facility (ROMF)sites

The ongoing analysis of sites for the LRT Rail Operations and Maintenance Facility was discussed along with the type of comments received from various stakeholder groups; the combination of two potential sites into a hybrid site and the addition of a new alternative site at the project terminus in east Durham.

No questions, comments, or concerns were expressed regarding this project element.

Environmental Methodologies Report:

After providing a general overview of the Environmental Methodologies report, the Project Team asked for a general discussion, comments, and any suggestions that would help provide concurrence moving forward. A general review of the corridor and boundaries was given through the use of Google Earth. Questions and discussion of specific topics are covered below:



Socio-Economic Boundary:

A Durham Planning representative suggested that we expand the boundary in several locations after coordination with the Town of Chapel Hill and the City of Durham to help capture contiguous neighborhoods, identified EJ communities, and any other populations that would be important in analyzing effects. A question was asked regarding the status of alternative ROMF site near the Alston Avenue station. It was explained that this has not yet been shown to the public.

Water / Natural Resources:

The project team indicated that while we already have people in the field collecting data, the process is still early enough along to modify based on input, suggestions and comments. A brief review of the standards, manuals, regulations and industry practice that are being used were explained.

NCDENR asked whether DWQ would be involved in the field review and review of the DEIS. The project team clarified that both DWQ and the USACE would be involved.

USACE asked whether the 245 feet above Mean Sea Level (MSL) standard that exists for Jordan Lake would be addressed. The project team said that it would. USACE indicated they would need to be aware should this not be met.

NCDENR wanted to know if both Federal and State-listed species would be analyzed in the DEIS, as this was not clearly defined in the Methodology Report. It was clarified that both Federal and State-listed species would be included.

Cultural/Historic/Archaeological Resources:

A brief explanation was given regarding the Areas of Potential Effect, the general methodology and the initial field work already being conducted.

Concurrence of the methodology was given by the representative from the Office of State Archeology.

There were no further comments, questions, or concerns regarding the Environmental Methodologies Report.

Transportation:

It was explained that due to the complexity of this section as well as the close coordination necessary with the Town of Chapel Hill, City/County of Durham and NCDOT, that this would become a standalone methodology report. A brief review of the types of data collected and the proposed collection and analysis methods were explained. It was further explained that this would include a robust bicycle/pedestrian connectivity component.

No questions, comments or concerns were expressed in this section.

Miscellaneous:

A USACE representative asked about the inclusion and analysis of potential 4(f) resources, as there was no mention in the Environmental Methodology report. The project team indicated that this will be addressed and analyzed in full throughout the DEIS, but that a section in Methodology report would be added to clarify. The project team added that the alignment was only recently shifted slightly to avoid a parcel designated as a potential 4(f) resource and that additional shifts similar to this would occur through design to minimize or avoid potential impacts.

The FAA representative commented that all airports within 5 miles of the project need to be identified. The FAA concerns include the use Best Management Practices for stormwater management or other activities that would create habitat that would encourage wildlife usage, such as water fowl, that could endanger aircraft. A revised circular regarding recommended separation distances was referenced to help address these issues.

A NHCCAC representative asked about future land use projections, buildable/unbuildable lands, and the resulting area available for development. The project team explained that through the Indirect and Cumulative Effects documentation as part of the DEIS, these issues, among others would be fully evaluated and documented. The project team further clarified the difference between using base year projections as well as 2040 projections.

NCDENR asked if the location of the proposed interchanges as part of the freeway conversion project could be placed on a map for visualization purposes. It was indicated that the team would continue to closely work with NCDOT regarding proposed designs and how they may influence the project.

Discussion occurred regarding the release of information related to the Archaeological Report; distribution methods, to whom, and when. It was explained that the technical report is typically only provided on a need-to-know or case-by-case basis due to the sensitive nature of the sites. It was further indicated that the public will not see the report under any circumstances, only a summary. This position is the same as with Threatened and Endangered Species identifications.

The DENR representative asked whether Natural Resources and Parklands would be assessed from an indirect and direct perspective only. It was indicated again that a cumulative effects study would be conducted to address potential impacts to all resources as a result of the project. This would be well-documented in the DEIS. .

FTA indicated that indirect and cumulative effects are of great importance to them as well and they will be interested the forthcoming analysis and documentation.

ACTION ITEMS

- ❑ The Project Team will distribute maps showing the various alignment options and study



area boundaries after the presentation for comment.

- ❑ The Project Team will look at additional various alternative alignments through the New Hope Creek area that impact less area of wetlands.
- ❑ The Project Team will modify the Environmental Methodology Report to reflect both Federal and State-listed species.
- ❑ The Project Team will modify the Environmental Methodology Report to reflect analysis and potential impacts to 4(f) resources.
- ❑ The Project Team will review new FAA circular regarding recommended separation distances.
- ❑ The Project Team will coordinate with NCDOT to determine potential interchange locations along US 15-501.
- ❑ The Project Team will enhance the section regarding Cumulative Effects in the Environmental Methodology, further explaining and clarifying the analysis.
- ❑ Agencies will provide comments within 2 weeks from August 27th, 2013 (September 10th) to the following contact: JShearerSwink@triangletransit.org. ON SEP 10, TRIANGLE TRANSIT EXTENDED THE DUE DATE FOR AGENCY COMMENTS BY 2 WEEKS TO SEPTEMBER 24, 2013.

Meeting Adjourned

The above Meeting Minutes are the author's synopsis of what was stated. The program will rely on these minutes as the record of all matters discussed and conclusions reached during this meeting unless written changes are sent to the author within seven calendar days of receipt of these Minutes.

JW/cyr

cc: Attendees
PMC@TriangleTransit.org
URS File

Benton, Charles

From: Benton, Charles
Sent: Wednesday, July 09, 2014 2:12 PM
To: 'Finnegan, John'
Subject: RE: TTA - DO-LRT EO data request

Thank you.

Regards,

Charlie Benton, P.W.S

Senior Environmental Scientist

URS Corporation-North Carolina
1600 Perimeter Park Drive, Suite 400
Raleigh, North Carolina 27560
charles.benton@urs.com
919.461.1100 Main
919.461.1435 Direct
Please note my NEW Mobile # is now 919.946.3122
919.461.1415 Fax



From: Finnegan, John [<mailto:john.finnegan@ncdenr.gov>]
Sent: Wednesday, July 09, 2014 2:09 PM
To: Benton, Charles
Subject: RE: TTA - DO-LRT EO data request

Hi Charlie,

I've attached a DBF file identifying the EO records. Also attached is document which describes the file attributes. Let me know if you have questions, or if you need more detail on any of the records.

John

John Finnegan, Conservation Information Manager
john.finnegan@ncdenr.gov
919-707-8630

North Carolina Natural Heritage Program
Office of Land and Water Stewardship
North Carolina Department of Environment and Natural Resources
1601 MSC
Raleigh, NC 27699-1601

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Benton, Charles [<mailto:charles.benton@urs.com>]
Sent: Tuesday, July 08, 2014 9:49 AM
To: Finnegan, John
Cc: Poindexter, Gavin; Humberger, Paul
Subject: TTA - DO-LRT EO data request

Dear Mr. Finnegan,

URS is assisting the Triangle Transit Authority (TTA) on planning the Durham-Orange Light Rail Transit (D-O LRT) project in Durham and Orange counties, North Carolina. As part of the is planning effort, URS is preparing environmental documentation that includes a discussion of protected species and communities. We would like to request information on the element occurrences that are documented in your agencies database within a 1-mile buffer of the project alternatives.

Please find attached a DBF file of the selected records that was exported from the EO shapefile attribute table, as well as a map of the study area.

Please let me know if you have any questions regarding this request.

Thank you,

Charlie Benton, P.W.S
Senior Environmental Scientist

URS Corporation-North Carolina
1600 Perimeter Park Drive, Suite 400
Raleigh, North Carolina 27560
charles.benton@urs.com
919.461.1100 Main
919.461.1435 Direct
Please note my NEW Mobile # is now 919.946.3122
919.461.1415 Fax



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**U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT**

CIN 14025

Action Id. 201200957

County: Durham-Orange

U.S.G.S. Quad: Southwest Durham

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner/Agent: Triangletransit / David King

Address:

P.O. Box 13787
Research Triangle Park, NC 27709

Telephone No.: 919 549-9999

Property description:

Size (acres) 400

Nearest Waterway Little-New HopeCreek

USGS IIUC 03030002

Nearest Town Durham-Chapel Hill

River Basin Haw

Coordinates N 35.958951 W -78.981665

Location description Proposed Durham-Orange Light Rail corridor from UNC Hospitals in Chapel Hill, Orange County, North Carolina, to Austin Avenue in Durham, Durham County, North Carolina adjacent to Little Creek and New Hope Creek in the Haw River Basin.

Per your request dated September 4, 2014, this determination is modified to include addendum 1 thru 3 verification of jurisdictional waters as defined by in field flagging and provided mapping included with referenced request.

Indicate Which of the Following Apply:

A. Preliminary Determination

- Based on preliminary information, there may be wetlands on the above described property. We strongly suggest you have this property inspected to determine the extent of Department of the Army (DA) jurisdiction. To be considered final, a jurisdictional determination must be verified by the Corps. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

B. Approved Determination

- There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are waters of the U.S. including wetlands on the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
 - We strongly suggest you have the wetlands on your property delineated. Due to the size of your property and/or our present workload, the Corps may not be able to accomplish this wetland delineation in a timely manner. For a more timely delineation, you may wish to obtain a consultant. To be considered final, any delineation must be verified by the Corps.
 - The waters of the U.S. including wetland on your project area have been delineated and the delineation has been verified by the Corps. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.
 - The waters of the U.S. including wetlands have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on _____. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.
- There are no waters of the U.S., to include wetlands, present on the above described property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

Action ID: _____

The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in Washington, NC, at (252) 946-6481 to determine their requirements.

Placement of dredged or fill material within waters of the US and/or wetlands without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). If you have any questions regarding this determination and/or the Corps regulatory program, please contact John Thomas at 919 554-4884 ext. 25.

C. Basis For Determination

There are stream channels within your project site which are tributaries of Little Creek & New Hope Creek which flows into the Haw River and the Atlantic Ocean.

D. Remarks

F. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B. above)

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

District Engineer, Wilmington Regulatory Division
Attn: Jean Gibby, Project Manager,
Raleigh Regulatory Field Office
3331 Heritage Trade Drive, Suite 105
Wake Forest, North Carolina 27587

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the District Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **July 12, 2014**.

It is not necessary to submit an RFA form to the District Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: _____

Date 05/12/2014

Expiration Date Nov 7, 2014

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at our website at <http://rcgulatory.usacesurvey.com/> to complete the survey online.

Copy furnished:
Brandon Phillips, 900 West Trade Street, Suite 715, Charlotte, NC 28202-1144



United States Department of Agriculture
Natural Resources Conservation Service
4407 Bland Road, Suite 117
Raleigh, North Carolina 27609

Milton Cortés, Assistant State Soil Scientist
Telephone No.: (919) 873-2171
Fax No.: (919) 873-2157
E-mail: milton.cortes@nc.usda.gov

July 31, 2014

Paul Humberger
Environmental Planner
URS Corporation – North Carolina
1600 Perimeter Park Drive
Morrisville, NC 27560

Dear Mr. Humberger;

The following information is in response to your request asking for information on farmlands in the Durham-Orange Light Rail Transit Project, URS Corporation, NC.

Projects are subject to Farmland Protection Policy Act (FPPA) requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency.

For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the Act or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary to be farmland of statewide or local importance.

"Farmland" does not include land already in or committed to urban development or water storage. Farmland "already in" urban development or water storage includes all such land with a density of 30 structures per 40-acre area. Farmland already in urban development also includes lands identified as "urbanized area" (UA) on the Census Bureau Map, or as urban area mapped with a "tint overprint" on the USGS topographical maps, or as "urban-built-up" on the USDA Important Farmland Maps. See over for more information.

Soils inventory on your project location shows highly populated metropolitan areas or committed to urban development. The area in question meets one or more of the above criteria for Non-Farmland. No farmland area will be affected or converted. Documents submitted and a copy of this letter will be saved for any further consultation. You are exempt from filling the CPA-106 neither the AD1006 at this time. Use this letter as proof of exemption.

If you have any questions, do not hesitate to contact me.

Sincerely,

Milton Cortes
Assistant State Soil Scientist

Helping People Help the Land

An Equal Opportunity Provider and Employer



K.21-787

Projects and Activities Subject to FPPA

Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency.

Assistance from a Federal agency includes:

- Acquiring or disposing of land.
- Providing financing or loans.
- Managing property.
- Providing technical assistance

Activities that may be subject to FPPA include:

- State highway construction projects, (through the Federal Highway Administration)
- Airport expansions
- Electric cooperative construction projects
- Railroad construction projects
- Telephone company construction projects
- Reservoir and hydroelectric projects
- Federal agency projects that convert farmland
- Other projects completed with Federal assistance.

Activities not subject to FPPA include:

- Federal permitting and licensing
- Projects planned and completed without the assistance of a Federal agency
- Projects on land already in urban development or used for water storage
- Construction within an existing right-of-way purchased on or before August 4, 1984
- Construction for national defense purposes
- Construction of on-farm structures needed for farm operations
- Surface mining, where restoration to agricultural use is planned
- Construction of new minor secondary structures such as a garage or storage shed.



United States Department of Agriculture
Natural Resources Conservation Service
4407 Bland Road, Suite 117
Raleigh, North Carolina 27609

Milton Cortés, Assistant State Soil Scientist
Telephone No.: (919) 873-2171
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March 24, 2015

Paul Humberger
Environmental Planner
URS Corporation – North Carolina
1600 Perimeter Park Drive
Morrisville, NC 27560

Dear Mr. Humberger;

The following information is in response to your request asking for information on Durham-Orange Light Rail Transit Project-Modified as of March 15, 2015, URS Corporation, NC.

Projects are subject to Farmland Protection Policy Act (FPPA) requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency.

For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the Act or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary to be farmland of statewide or local importance.

"Farmland" does not include land already in or committed to urban development or water storage. Farmland "already in" urban development or water storage includes all such land with a density of 30 structures per 40-acre area. Farmland already in urban development also includes lands identified as "urbanized area" (UA) on the Census Bureau Map, or as urban area mapped with a "tint overprint" on the USGS topographical maps, or as "urban-built-up" on the USDA Important Farmland Maps. See over for more information.

Soils inventory on your project proposed modified alignments locations shows highly populated metropolitan areas or committed to urban development. The area in question meets one or more of the above criteria for Non-Farmland. No farmland area will be affected or converted. Documents submitted the proposed modified alignments and a copy of this letter will be saved for any further consultation. You are exempt from filling the AD1006 or the CPA-106 at this time. Use this letter as proof of exemption.

If you have any questions, do not hesitate to contact me.

Sincerely,

Milton Cortes

Milton Cortes
Assistant State Soil Scientist

Helping People Help the Land

An Equal Opportunity Provider and Employer



K.21-789

Projects and Activities Subject to FPPA

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- Construction of new minor secondary structures such as a garage or storage shed.

Appendix F: Qualifications of Contributors

Contributor:	Charles Benton, PWS, PWD
Education:	B.A. Ecology, 1996
Experience:	Environmental Scientist, AECOM-URS Corporation, 2002–Present Environmental Scientist, Frederick P. Clark Associates, 2000-2002 Environmental Scientist, EcolSciences, Inc, 1998-2000 Environmental Scientist, Booz, Allen, and Hamilton, Inc, 1997-1998
Responsibilities:	Author, data collection
Contributor:	Paul Humberger
Education:	M.E.S. Environmental Studies 2008 B.S. Environmental Science, 2006
Experience:	Environmental Scientist, AECOM-URS Corporation, 2009–Present
Responsibilities:	Author, data collection
Contributor:	Paul Gerlach
Education:	M.E.M. Environmental Management 2013 B.S. Biological Sciences, 2011
Experience:	Environmental Scientist, AECOM-URS Corporation, 2014–Present
Responsibilities:	GIS analysis, document preparation
Contributor:	William B. Fulton, LSS, PSC, PWS
Education:	B.S. Natural Resources, 2003
Experience:	Project Environmental Scientist, STV/RWA, 2011–2014 Principal, Carolina Environmental Consultants, 2009-2011 Field Office Manager, Soil and Environmental Consultants, 2008-2009 Project Manager, Soil and Environmental Consultants, 2004-2008 Environmental Scientist, Environmental Investigations, 2003-2004
Responsibilities:	Wetland and stream delineations, soil evaluations, GPS/GIS mapping, document preparation
Contributor:	Michael Iagnocco, P.W.S.
Education:	B.S. Biological Sciences, 1978
Experience:	Proj. Manager/Sr. Environmental Scientist, STV/RWA, 2003-Present Project Manager/Principal, Law Environmental, 1996-2003 Sr. Environmental Scientist, Woolpert, LLP, 1990-1996 Project Manager, Carpenter Environmental Associates, 1981-1990 Environmental Scientist, Lawler, Matusky & Skelly, Inc., 1980-1981
Responsibilities:	Wetland and stream delineations and assessment, impact assessment, Section 404 permitting, document preparation, quality assurance
Contributor:	Joshua Kotheimer
Education:	Graduate Certificate in G.I.S., 2013 B.S. Environmental Technology and Management, 2011 B.A. Chemistry, 2011
Experience:	Environmental Scientist, STV/RWA, 2013-Present Research Assistant, 2012-2013
Responsibilities:	Wetland and stream delineations, GPS/GIS mapping, document preparation