

NATURAL RESOURCES TECHNICAL REPORT

**Replace Bridge 45 on SR 2030 (Hollow Bridge Road) over South River
Cumberland and Sampson Counties, North Carolina**

**TIP B-5700
WBS Element No. 45654.1.1**



**THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Project Development and Environmental Analysis Unit
Natural Environment Section**

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1.0 INTRODUCTION

The North Carolina Department of Transportation (NCDOT) proposes to replace bridge number 45 on SR 2030 (Hollow Bridge Road) over South River (TIP B-5700) on the Cumberland/Sampson County line (Figure 1). The following Natural Resources Technical Report (NRTR) has been prepared to assist in the preparation of a Categorical Exclusion (CE) for the proposed project.

2.0 METHODOLOGY AND QUALIFICATIONS

All work was conducted in accordance with the NCDOT Natural Environment Section standard operating procedures and July 2012 NRTR template. Field work was conducted on February 9, 2016. Jurisdictional areas identified in the study area were verified by Liz Hair of the U.S. Army Corps of Engineers (USACE) and Mason Herndon of North Carolina Division of Water Resources (NCDWR). The principal personnel contributing to this document were:

Principal

Investigator:	Kim Hamlin
Education:	M.S. Natural Resources, 2011
Experience:	Project Scientist, SEPI Engineering, 2012-Present
Responsibilities:	Wetland and stream delineations, natural communities assessment, T&E species assessment, and document preparation

Investigator:	Wendee Smith
Education:	B.S. Natural Resources: Ecosystem Assessment, 1999
Experience:	Environmental Director, SEPI Engineering, 2015-Present Environmental Group Manager, Mulkey, Inc. 2005-2015 Environmental Scientist, HSMM, 2001-2005 Environmental Scientist, LandMark Design Group, 1999-2001 Natural Systems Specialist, NCDOT, 1999
Responsibilities:	Natural communities assessment, T&E species assessment, GIS, and document preparation

Additional personnel who contributed to portions of the field work and/or documentation for this project were Elisabeth Webster, Susan Westberry, and Eric Black. Appendix D lists the qualifications of these contributors.

3.0 PHYSICAL RESOURCES

The study area lies in the coastal plain physiographic region of North Carolina (Figure 2). Topography in the project vicinity is comprised of a large swamp system bordered with broad interstream divides and Carolina bays. Elevations in the study area range from approximately 90 ft. to 96 ft. above sea level. Land cover in the project vicinity consists primarily of forested swampland and uplands. The town of Autryville is located north of the project and scattered agriculture is present to the west and south.

3.1 Soils

The Cumberland County Soil Survey identifies two soil types within the study area and the Sampson County Soil Survey identifies two soil types within the study area (Table 1).

Table 1. Soils in the study area

Soil Series	Mapping Unit	Drainage Class	Hydric Status
Goldsboro loamy sand	Go	Moderately Well Drained	Nonhydric
Johnston loam	JT	Very Poorly Drained	Hydric
Bibb and Johnston Soils	BH	Poorly Drained and Very Poorly Drained	Hydric
Cainhoy sand	Ca	Somewhat Excessively Drained	Nonhydric

3.2 Water Resources

Water resources in the study area are part of the Cape Fear River basin [U.S. Geological Survey (USGS) Hydrologic Unit 03030006]. One stream was identified in the study area (Table 2). The location of this stream is shown on Figure 3. The physical characteristics of this stream are provided in Table 3.

Table 2. Water resources in the study area

Stream Name	Map ID	NCDWR Index Number	Best Usage Classification
South River	South River	18-68-12-(0.5)	C; Sw

Table 3. Physical characteristics of water resources in the study area

Map ID	Bank Height (ft)	Bankful Width (ft)	Water Depth (in)	Channel Substrate	Velocity	Clarity
South River	2-4	80	36-72	Sand	Moderate	Clear

One pond is located in the study area in the southeast quadrant (Figure 3). This pond consists of an artificially excavated pit that is sustained by high groundwater levels. Approximately 0.4 acres of the pond are located in the study area. It has no surface water connection to any jurisdictional stream features.

There are no designated Outstanding Resource Waters (ORW), High Quality Waters (HQW), or water supply watersheds (WS-I or WS-II) within 1.0 mile downstream of the study area. There are no designated anadromous fish waters or Primary Nursery Areas (PNA) present in the study area. South River does not appear on the North Carolina 2014 Final 303(d) list of impaired waters. There are no water bodies listed on the North Carolina 2014 Final 303(d) list within 1.0 mile downstream of the study area.

4.0 BIOTIC RESOURCES

4.1 Terrestrial Communities

Three terrestrial communities were identified in the study area: maintained/disturbed, cypress-gum swamp (blackwater type), and wet pine flatwood. Figure 4 shows the location and extent of these terrestrial communities in the study area. A brief description of each community type follows. Scientific names of all species identified are included in Appendix B.

4.1.1 Maintained/Disturbed

Maintained/disturbed areas are along roadside shoulder and bridge slopes throughout the length of the study area. The vegetation in this community is comprised of low growing grasses and herbs, including fescue, clover, wild onion, Japanese honeysuckle, Chinese privet, and dandelion.

4.1.2 Cypress-Gum Swamp (Blackwater Subtype)

The cypress-gum swamp community occurs along the floodplain of South River where periodic overbank flooding from the river occurs. Bald cypress, water tupelo, laurel oak, and water oak dominate the overstory canopy, while sweetgum, giant cane, and coral greenbrier occur in the understory. Wetland WA north of the bridge partially occurs within this community and is classified as a Bottomland Hardwood Forest using the NCWAM classification.

4.1.3 Wet Pine Flatwood

The wet pine flatwood community exists in the southern quadrants of the study area, where moderate slopes occur along the valley of South River. Dominant species in this community include loblolly pine and short leaf pine in the overstory, and Chinese privet, sweetgum, roundleaf greenbrier, Japanese honeysuckle, poison ivy, American holly, wax myrtle, horse sugar, red maple and southern magnolia in the understory and ground layers. Wetland WA also partially occurs within this community south of the bridge and is classified as a Bottomland Hardwood Forest using the NCWAM classification.

4.1.4 Terrestrial Community Impacts

Terrestrial communities in the study area may be impacted by project construction as a result of grading and paving of portions of the study area. At this time, decisions regarding the final location and design of the proposed bridge replacement have not been made. Therefore, community data are presented in the context of total coverage of each type within the study area (Table 4). Once a final alignment and preliminary design have been determined, probable impacts to each community type will be calculated.

Table 4. Coverage of terrestrial communities in the study area

Community	Coverage (ac.)
Maintained/ Disturbed	0.4
Cypress-Gum Swamp (Blackwater subtype)	0.4
Wet Pine Flatwood	0.7
Total	1.5

4.2 Terrestrial Wildlife

Terrestrial communities in the study area are comprised of both natural and disturbed habitats that may support a diversity of wildlife species (those species actually observed are indicated with *). Mammal species that commonly exploit forested habitats, wetlands, and stream corridors found within the study area include species such as eastern gray squirrel*, gray fox, striped skunk, white-footed mouse, eastern cottontail, raccoon, Virginia opossum, and white-tailed deer. Birds common to the area include 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, pileated woodpecker, mourning dove, blue jay, American goldfinch, northern flicker, European starling, and tufted titmouse. Reptile and amphibian species that may use terrestrial communities located in the study area include the rough green snake, copperhead, rat snake, eastern box turtle, eastern fence lizard, American toad, green anole, gray treefrog, and five-lined skink.

4.3 Aquatic Communities

The aquatic community in the study area consists of a large perennial stream and associated swamp system. The stream portion of South River could support longnose gar, American eel, various shiners, white catfish, Eastern mudminnow, various sunfish, and various darters. The swamp system is likely to support brown watersnake, mud snake, river cooter, and eastern mud turtle.

4.4 Invasive Species

Two species from the NCDOT Invasive Exotic Plant List for North Carolina were found to occur in the study area. The species identified were Chinese privet (Threat) and Japanese honeysuckle (Moderate Threat). NCDOT will manage invasive plant species as appropriate.

5.0 JURISDICTIONAL ISSUES

5.1 Clean Water Act Waters of the U.S.

One jurisdictional stream was identified in the study area (Table 5). The location of this stream is shown on Figure 3. USACE and NCDWR stream delineation forms are included in Appendix C. The physical characteristics and water quality designations of

the jurisdictional stream is detailed in Section 3.2. South River has been designated as a warm water stream 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
South River	150	Perennial	Yes	Not Subject
Total	150			

One jurisdictional wetland was identified within the study area (Figure 3). 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 03030006). USACE wetland delineation forms and NCDWR wetland rating forms for each site are included in Appendix C. Descriptions of the terrestrial communities at each wetland site are presented in Section 4.1. Wetland WA is included within the cypress-gum swamp and wet pine flatwood communities.

Table 6. Jurisdictional characteristics of wetlands in the study area

Map ID	NCWAM Classification	Hydrologic Classification	NCDWR Wetland Rating	Area (ac.)
WA	Bottomland Hardwood Forest	Riparian	68	0.89
			Total	0.89

5.2 Clean Water Act Permits

The proposed project has been designated as a Categorical Exclusion (CE) for the purposes of National Environmental Policy Act (NEPA) documentation. As a result, a Nationwide Permit (NWP) 23 will likely be applicable. A NWP No. 33 may also apply for temporary construction activities such as stream dewatering, work bridges, or temporary causeways that are often used during bridge construction or rehabilitation. The USACE holds the final discretion as to what permit will be required to authorize project construction. If a Section 404 permit is required then a Section 401 Water Quality Certification (WQC) from the NCDWR will be needed.

5.3 Coastal Area Management Act Areas of Environmental Concern

Neither Cumberland nor Sampson Counties are designated as coastal counties in North Carolina; therefore, Coastal Area Management Act (CAMA) regulations do not apply.

5.4 Construction Moratoria

In a letter dated February 17, 2016, the North Carolina Wildlife Resources Commission (WRC) states that no moratoria would be required for this project. There is designated anadromous fish spawning habitat within the Cape Fear River in Cumberland and Sampson Counties, but the proposed project would not impact the designated areas.

5.5 N.C. River Basin Buffer Rules

There are no buffer rules in effect within Cumberland or Sampson Counties for the Cape Fear River Basin.

5.6 Rivers and Harbors Act Section 10 Navigable Waters

In the project study area, South River has not been designated by the USACE as a Navigable Water under Section 10 of the Rivers and Harbors Act.

5.7 Wetland and Stream Mitigation

5.7.1 Avoidance and Minimization of Impacts

The NCDOT will attempt to avoid and minimize impacts to streams and wetlands to the greatest extent practicable in choosing a preferred alternative and during project design. At this time, no final decisions have been made with regard to the location or design of the preferred alternative.

5.7.2 Compensatory Mitigation of Impacts

The NCDOT will investigate potential on-site stream and wetland mitigation opportunities once a final decision has been rendered on the location of the preferred alternative. If on-site mitigation is not feasible, mitigation will be provided by North Carolina Department of Environmental Quality (DEQ), Division of Mitigation Services (DMS).

5.8 Endangered Species Act Protected Species

As of December 26, 2012, the United States Fish and Wildlife (USFWS) lists seven federally protected species for Cumberland County, and as of July 2, 2012, the USFWS lists four federally protected species for Sampson County (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 referenced literature and/or USFWS.

Table 7. Federally protected species listed for Cumberland & Sampson Counties

Scientific Name	Common Name	County	Federal Status	Habitat Present	Biological Conclusion
<i>Alligator mississippiensis</i>	American alligator	C/S	T(S/A)	Yes	Not Required
<i>Picoides borealis</i>	Red-cockaded woodpecker	C/S	E	N/A	Unresolved
<i>Mycteria americana</i>	Wood stork	S	T	Yes	MANLAA
<i>Neonympha mitchellii francisci</i>	Saint Francis' satyr butterfly	C	E	No	No Effect
<i>Schwalbea americana</i>	American chaffseed	C	E	No	No Effect
<i>Rhus michauxii</i>	Michaux's sumac	C	E	No	No Effect
<i>Lindera melissifolia</i>	Pondberry	C/S	E	Yes	No Effect
<i>Lysimachia asperulaefolia</i>	Rough-leaved loosestrife	C	E	No	No Effect

E - Endangered

T - Threatened

T(S/A) - Threatened due to similarity of appearance

MANLAA – May Affect-Not Likely to Adversely Affect

C – Species listed in Cumberland County

S – Species listed in Sampson County

American alligator

USFWS optimal survey window: year round (only warm days in winter)

Habitat Description: In North Carolina, alligators have been recorded in nearly every coastal county, and many inland counties to the fall line. The alligator is found rivers, streams, canals, lakes, swamps, and coastal marshes. Adult animals are highly tolerant of salt water, but the young are apparently more sensitive, with salinities greater than 5 parts per thousand considered harmful. The American alligator remains on the protected species list due to its similarity in appearance to the Endangered American crocodile.

Biological Conclusion: Not Required

Species listed as threatened due to similarity of appearance do not require Section 7 consultation with the USFWS. Additionally, a review of NCNHP records, updated in October 2015, indicates no known occurrences of American alligator within 1.0 mile of the study area.

Red-cockaded woodpecker

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

Habitat Description: The red-cockaded woodpecker (RCW) typically occupies open, mature stands of southern pines, particularly longleaf pine, for foraging and nesting/roosting habitat. The RCW excavates cavities for nesting and roosting in living pine trees, aged 60 years or older, and which are contiguous with pine

stands at least 30 years of age to provide foraging habitat. The foraging range of the RCW is normally no more than 0.5 miles.

Biological Conclusion: Unresolved

Assessment of habitat for RCW will be conducted at a later date. A review of NCNHP records, updated in October 2015, indicates one known occurrence of RCW within and surrounding the study area. According to the data records, these occurrences are considered historic, and the last sighting associated with the record was in 1979.

Wood stork

USFWS optimal survey window: June-September

Habitat Description: Wood storks are known to occur in several coastal North Carolina counties, and records indicate that they have been breeding in North Carolina since 2005. Wood storks typically construct their nests in medium to tall trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water. In many areas, bald cypress and red mangrove trees are preferred. During the nonbreeding season or while foraging, wood storks occur in a wide variety of wetland habitats, including freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. Because of their specialized feeding behavior, the most attractive feeding areas are swamp or marsh depressions where fish become concentrated during dry periods.

Biological Conclusion: May Affect, Not Likely to Adversely Affect

Suitable habitat for wood stork is present within the study area along the edges of South River and within the associated swamp system. Surveys for the species were conducted on June 7, 2016, and no individuals were observed. A review of NCNHP records, updated in October 2015, indicates no known occurrences within 1.0 mile of the study area.

Saint Francis' satyr butterfly

USFWS optimal survey window: May 5 – June 6 and July 26 – August 21

Habitat Description: The Saint Francis' satyr butterfly is only known from the Sandhills of North Carolina, although its historic range may have been much larger. This butterfly is known to inhabit wide, wet meadows dominated by sedges and other wetland graminoids. These wetlands are often relicts of beaver activity and are boggy areas that are acidic and ephemeral. These sites must be continually maintained to persist as open areas. The larval host of the Saint Francis' satyr is thought to be grasses, sedges and rushes.

Biological Conclusion: No Effect

As a result of the habitat assessment on April 11, 2016 and results of an NCNHP database review, suitable habitat for the Saint Francis' satyr butterfly does not

occur within the limits of the project study area, thereby making a survey for the species unnecessary because of the lack of habitat. The project study area specifically does not contain any wide, wet meadows that are often relicts of beaver activity and frequently subject to burning, flooding, or otherwise regularly maintained and dominated by a high diversity of sedges and other wetland graminoids. The project study area is situated over 29 miles away from the approximated known element occurrence of the species as depicted by the NCNHP database.

American chaffseed

USFWS optimal survey window: May-August (1-2 months after a fire)

Habitat Description: American chaffseed generally occurs in habitats described as open, moist to dryish Mesic Pine Flatwoods and longleaf pine flatlands, Pine Savannas, Pine/Scrub Oak Sandhills, Sandhill Seeps, and other open grass/sedge-dominated communities. This herb also occurs in the ecotonal areas between peaty wetlands and xeric sandy soils and on the upper ecotones of, or sites close, to Streamhead Pocosins. The species prefers sandy peat or sandy loam, acidic, seasonally moist to dry soils in sunny or partly sunny areas subject to frequent fires in the growing season. The plant is dependent on factors such as fire, mowing, or fluctuating water tables to maintain its required open to partly-open habitat. Most extant occurrences, and all of the most vigorous occurrences, are in areas subject to frequent fire. This species is also known to occur on road cuts and power line rights-of-way that experience frequent mowing or clearing. Soil series that it is found on include Blaney, Candor, Gelead, Fuquay, Lakeland, and Vacluse.

Biological Conclusion: No Effect

Suitable habitat for American chaffseed does not exist in the study area. Forests in the study area are comprised of a closed hardwood and pine canopy and sub-canopy. A review of NCNHP records, updated in October 2015, indicates no known occurrences of American chaffseed within 1.0 mile of the study area.

Michaux's sumac

USFWS optimal survey window: May-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.

Biological Conclusion: No Effect

Suitable habitat for Michaux's sumac is not present in the study area. Roadside shoulders and bridge slopes consist of fill materials and appear to be disturbed at a frequency that is unaccommodating to the species. A review of NCNHP records, updated October 2015, indicates no known occurrences within 1.0 mile of the study area.

Pondberry

USFWS optimal survey window: February-October

Habitat Description: Pondberry occurs in seasonally flooded wetlands, sandy sinks, pond margins, and swampy depressions. This deciduous, aromatic shrub occurs in bottomland hardwood forests with perched water tables along inland areas of the southeastern United States. In the Coastal Plain of the Carolinas, the species occurs at the margins of limestone sinks and ponds and in undrained, shallow depressions of longleaf pine and pond pine forests. Known occurrences in North Carolina occur in the Small Depression Pocosin natural community, grow in soils with sandy sediments and high water table, contain high peat content in the subsurface, and include a prevalence of shrubs due to historically frequent or intense fires. It generally grows in somewhat shaded areas, but can tolerate full sun.

Biological Conclusion: No Effect

Suitable habitat for pondberry is present in the study area. The floodplain of South River is seasonally flooded and partially to fully shaded. A field survey for pondberry was conducted on February 9, 2016. No individuals were observed. A review of NCNHP records, updated October 2015, indicates no known pondberry within 1.0 mile of the study area.

Rough-leaved loosestrife

USFWS optimal survey window: mid May-June

Habitat Description: Rough-leaved loosestrife, endemic to the Coastal Plain and Sandhills of North and South Carolina, generally occurs in the ecotones or edges between longleaf pine uplands and pond pine pocosins in dense shrub and vine growth on moist to seasonally saturated sands and on shallow organic soils overlaying sand (spodosolic soils). Occurrences are found in such disturbed habitats as roadside depressions, maintained power and utility line rights-of-way, firebreaks, and trails. The species prefers full sunlight, is shade intolerant, and requires areas of disturbance (*e.g.*, clearing, mowing, periodic burning) where the overstory is minimal. It can, however, persist vegetatively for many years in overgrown, fire-suppressed areas. Blaney, Gilead, Johnston, Kalmia, Leon,

Mandarin, Murville, Torhunta, and Vaocluse are some of the soil series that the plant occurs on.

Biological Conclusion: No Effect

Suitable habitat for rough-leave loosestrife is not present in the study area. The cypress-gum swamp and wet pine flatwood communities are too dense for the light requirements of the plant. Although the study area contains Johnston soils, the open areas are roadside shoulders and bridge slopes that consist of fill materials and appear to be disturbed at a frequency that is unaccommodating to the species. A review of NCNHP records, updated October 2015, indicates no known occurrences within 1.0 mile of the study area.

Northern Long-eared Bat

The US Fish and Wildlife Service has developed a programmatic biological opinion (PBO) in conjunction with the Federal Highway Administration (FHWA), USACE, and NCDOT for the northern long-eared bat (NLEB) in eastern North Carolina. The PBO covers the entire NCDOT program in Divisions 1-8, including all NCDOT projects and activities. The programmatic determination for NLEB for the NCDOT program is “May Affect, Likely to Adversely Affect.” The PBO provides incidental take coverage for NLEB and will ensure compliance with Section 7 of the Endangered Species Act for five years for all NCDOT projects with a federal nexus in Divisions 1-8, which includes Sampson and Cumberland Counties, where TIP B-5700 is located.

5.9 Bald Eagle and Golden Eagle Protection Act

Habitat for the bald eagle primarily consists of mature forest in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within 1.0 mile of open water.

A desktop-GIS assessment of the project study area, as well as the area within a 1.13-mile radius (1.0 mile plus 660 feet) of the project limits, was performed on February 2, 2016 using 2014 color aerials. South River has a wide stream channel (80+ feet) that supports fish throughout the study area. The study area is in the vicinity of several large ponds and water bodies totaling more than 10 acres within 1.13 miles of the study area. A visual survey for nest trees was conducted on March 9, 2016 within 660 feet of the study area. No nest trees were observed.

A review of the NCNHP database, updated October 2015, revealed no known occurrences of this species within 1.0 mile of the project study area. The project is not expected to have any adverse effects on the bald eagle.

5.10 Endangered Species Act Candidate Species

As of December 26, 2012 (Cumberland County) and July 2, 2012 (Sampson County) there are no Candidate species listed for either county.

5.11 Essential Fish Habitat

Cumberland and Sampson Counties are considered inland counties. No Essential Fish Habitat is present in or within 1.0 mile of the study area.

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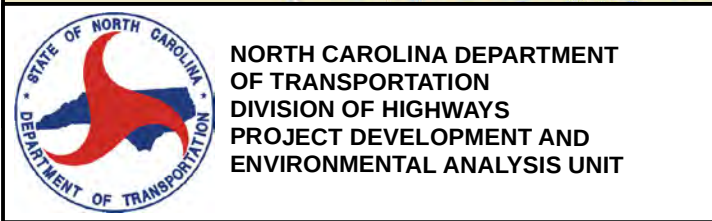
United States Fish and Wildlife Service. 2012. Endangered Species, Threatened Species, Federal Species of Concern, and Candidate Species, Sampson County, North Carolina. Updated July 2, 2012.

United States Geological Survey. 2013. Autryville, North Carolina, Topographic Quadrangle (7.5-minute series).

Webster, W.D., J.F. Parnell, and W.C. Biggs. 1985. Mammals of the Carolinas, Virginia, and Maryland. Chapel Hill, University of North Carolina Press. 255 pp.

Appendix A

Figures

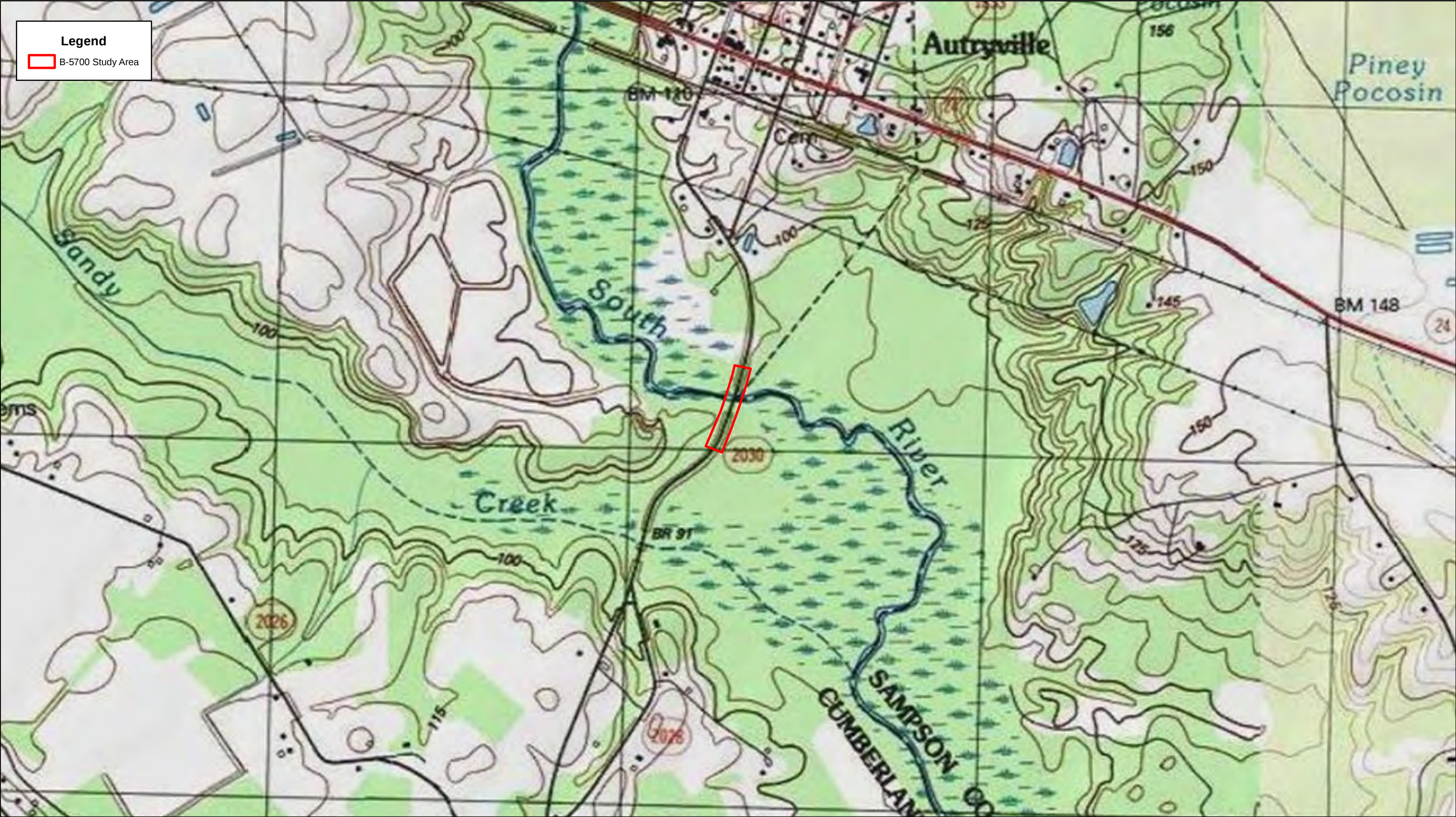


VICINITY MAP
Replace Bridge No. 45 on SR 303
over South River in Cumberland County
TIP Project B-5700

0 0.75
Miles

Div: 6 TIP# B-5700
Date: DECEMBER 2015

Figure 1



This Exhibit is for planning purposes only, and therefore is not for design, construction, or recording. The Exhibit was compiled from available information obtained from the sources listed below.
Wetlands: All features located in the field were recorded using a handheld Geo-XH GNSS receiver and Zephyr Model 2 antenna.
Streams: All stream features were approximated using color aeriels and LiDAR.

Sources: ESRI Base Mapping, SEPI, USGS Topographic Quadrangle Autryville, NC

June 2016

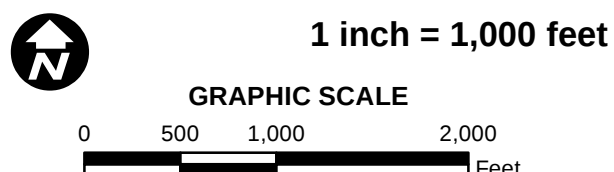


Figure 2: Project Study Area Map

B-5700, Cumberland and Sampson Counties



SEPI
ENGINEERING &
CONSTRUCTION



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Wetlands: All features located in the field were recorded using a handheld Geo-XH GNSS receiver and Zephyr Model 2 antenna.
Streams: All stream features were approximated using color aerials and LiDAR.

Sources: ESRI Base Mapping, NCDOT, SEPI

June 2016

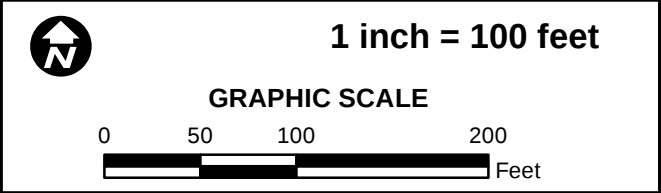


Figure 3: Jurisdictional Features Map

B-5700, Cumberland and Sampson Counties

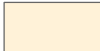
Legend

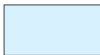
 B-5700 Study Area

 Perennial Stream

 Open Water

Natural Community

 Maintained/Disturbed

 Cypress-Gum Swamp (Blackwater subtype)

 Wet Pine Flatwood



This Exhibit is for planning purposes only, and therefore is not for design, construction, or recording. The Exhibit was compiled from available information obtained from the sources listed below.
Wetlands: All features located in the field were recorded using a handheld Geo-XH GNSS receiver and Zephyr Model 2 antenna.
Streams: All stream features were approximated using color aerials and LIDAR.

Sources: ESRI Base Mapping, NCDOT, SEPI

June 2016



1 inch = 100 feet

GRAPHIC SCALE

0 50 100 200
Feet

Figure 4: Terrestrial Communities Map

B-5700, Cumberland and Sampson Counties



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CONSTRUCTION

Appendix B

Scientific Names of Species Identified in Report

Plants

Common Name

American holly
Bald cypress
Chinese privet
Clover
Coral greenbrier
Dandelion
Fescue
Giant cane
Horse sugar
Japanese honeysuckle
Laurel oak
Loblolly pine
Poison ivy
Red maple
Roundleaf greenbrier
Short leaf pine
Southern magnolia
Sweetgum
Water oak
Water tupelo
Wax myrtle
Wild onion

Scientific Name

Ilex opaca
Taxodium distichum
Ligustrum sinense
Trifolium sp.
Smilax walteri
Taraxacum sp.
Festuca sp.
Arundinaria gigantea
Symplocos tinctoria
Lonicera japonica
Quercus laurifolia
Pinus taeda
Toxicodendron radicans
Acer rubrum
Smilax rotundifolia
Pinus echinata
Magnolia grandiflora
Liquidambar styraciflua
Quercus nigra
Nyssa aquatica
Morella cerifera
Allium sp.

Animals

Common Name

American crow
American eel
American goldfinch
American robin
American toad
Blue jay
Brown watersnake
Carolina wren
Copperhead
Darters
Eastern bluebird
Eastern box turtle

Scientific Name

Corvus brachyrhynchos
Anguilla rostrate
Spinus tristis
Turdus migratorius
Anaxyrus americanus
Cyanocitta cristata
Nerodia taxispilota
Thryothorus ludovicianus
Agkistrodon contortrix
Percina sp.
Sialia sialis
Terrapene carolina

Common Name

Eastern cottontail
Eastern fence lizard
Eastern gray squirrel
Eastern mud turtle
Eastern mudminnow
Eastern towhee
European starling
Five-lined skink
Gray fox
Gray treefrog
Green anole
Longnose gar
Mourning dove
Mud snake
Northern cardinal
Northern flicker
Northern long-eared bat
Northern mockingbird
Pileated woodpecker
Raccoon
Rat snake
Red-shoulder hawk
Red-tailed hawk
River cooter
Rock dove
Rough green snake
Shiners
Song sparrow
Striped skunk
Sunfish
Tufted titmouse
Turkey vulture
Virginia opossum
White catfish
White-footed mouse
White-tailed deer
White-throated sparrow

Scientific Name

Sylvilagus floridanus
Sceloporus undulates
Sciurus carolinensis
Kinosternon subrubrum
Umbra pygmaea
Pipilo erythrophthalmus
Sturnus vulgaris
Plestiodon inexpectatus
Urocyon cinereoargenteus
Hyla versicolor
Anolis carolinensis
Lepisosteus osseus
Zenaida macroura
Farancia abacura
Cardinalis cardinalis
Colaptes auratus
Myotis septentrionalis
Mimus polyglottos
Hylatomus pileatus
Procyon lotor
Elaphe sp.
Buteo lineatus
Buteo jamaicensis
Pseudemys concinna
Columbia livia
Opheodrys aestivus
Notropis sp.
Melospiza melodia
Mephitis mephitis
Centrarchidae
Baeolophus bicolor
Cathartes aura
Didelphis virginiana
Ictalurus catus
Peromyscus leucopus
Odocoileus virginianus
Zonotrichia albicollis

Appendix C

Stream and Wetland Forms

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: B5700/Bridge 45 **City/County:** Cumberland **Sampling Date:** 09-Feb-16
Applicant/Owner: NCDOT **State:** NC **Sampling Point:** B-5700 WA Up
Investigator(s): K. Hamlin, W. Smith **Section, Township, Range:** S T R
Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** none **Slope:** 0.0 % / 0.0 °
Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 34.9874 **Long.:** -78.6413 **Datum:** NAD83
Soil Map Unit Name: GoA - Goldsboro fine sandy loam, 0 to 2 percent slopes **NWI classification:** PFO1

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 ☒ No ☐ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☒ No ☐	Is the Sampled Area within a Wetland? Yes ☐ No ☒
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply) ☐ Surface Water (A1) ☐ Aquatic Fauna (B13) ☒ High Water Table (A2) ☐ Marl Deposits (B15) (LRR U) ☒ Saturation (A3) ☐ Hydrogen Sulfide Odor (C1) ☐ Water Marks (B1) ☐ Oxidized Rhizospheres along Living Roots (C3) ☐ Sediment Deposits (B2) ☐ Presence of Reduced Iron (C4) ☐ Drift Deposits (B3) ☐ Recent Iron Reduction in Tilled Soils (C6) ☐ Algal Mat or Crust (B4) ☐ Thin Muck Surface (C7) ☐ Iron Deposits (B5) ☐ Other (Explain in Remarks) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Water-Stained Leaves (B9)		Secondary Indicators (minimum of 2 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) ☐ Geomorphic Position (D2) ☐ Shallow Aquitard (D3) ☐ FAC-Neutral Test (D5) ☐ Sphagnum moss (D8) (LRR T, U)
Field Observations: Surface Water Present? Yes ☐ No ☒ Depth (inches): _____ Water Table Present? Yes ☒ No ☐ Depth (inches): 4 Saturation Present? (includes capillary fringe) Yes ☒ No ☐ Depth (inches): 0	Wetland Hydrology Present? Yes ☒ No ☐	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Tree Stratum (Plot size: 50')					Dominant Species?	Indicator Status	Sampling Point: B-5700 WA UP	
					Absolute % Cover	Rel.Strat. Cover		
1.	Pinus taeda	20	☒	50.0%	FAC	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) Prevalence Index worksheet: Total % Cover of: <u>40</u> Multiply by: <u>22.5</u> OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>5</u> x 2 = <u>10</u> FAC species <u>65</u> x 3 = <u>195</u> FACU species <u>5</u> x 4 = <u>20</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>75</u> (A) <u>225</u> (B) Prevalence Index = B/A = <u>3.000</u>		
2.	Liquidambar styraciflua	10	☒	25.0%	FAC			
3.	Acer rubrum	10	☒	25.0%	FAC			
4.		0	☐	0.0%				
5.		0	☐	0.0%				
6.		0	☐	0.0%				
7.		0	☐	0.0%				
8.		0	☐	0.0%				
50% of Total Cover: <u>20</u> 20% of Total Cover: <u>8</u>		40	= Total Cover					
Sapling or Sapling/Shrub Stratum (Plot size:)								
1.		0	☐	0.0%		Hydrophytic Vegetation Indicators: ☐ 1 - Rapid Test for Hydrophytic Vegetation ☒ 2 - Dominance Test is > 50% ☒ 3 - Prevalence Index is ≤3.0 ¹ ☐ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.		
2.		0	☐	0.0%				
3.		0	☐	0.0%				
4.		0	☐	0.0%				
5.		0	☐	0.0%				
6.		0	☐	0.0%				
7.		0	☐	0.0%				
8.		0	☐	0.0%				
50% of Total Cover: <u>0</u> 20% of Total Cover: <u>0</u>		0	= Total Cover					
Shrub Stratum (Plot size: 30')								
1.	Ilex opaca	10	☒	50.0%	FAC	Definition of Vegetation Strata: Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall. Shrub - Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine - All woody vines, regardless of height.		
2.	Morella cerifera	10	☒	50.0%	FAC			
3.		0	☐	0.0%				
4.		0	☐	0.0%				
5.		0	☐	0.0%				
6.		0	☐	0.0%				
7.		0	☐	0.0%				
8.		0	☐	0.0%				
50% of Total Cover: <u>10</u> 20% of Total Cover: <u>4</u>		20	= Total Cover					
Herb Stratum (Plot size:)								
1.		0	☐	0.0%		Hydrophytic Vegetation Present? Yes ☒ No ☐		
2.		0	☐	0.0%				
3.		0	☐	0.0%				
4.		0	☐	0.0%				
5.		0	☐	0.0%				
6.		0	☐	0.0%				
7.		0	☐	0.0%				
8.		0	☐	0.0%				
9.		0	☐	0.0%				
10.		0	☐	0.0%				
11.		0	☐	0.0%				
12.		0	☐	0.0%				
50% of Total Cover: <u>0</u> 20% of Total Cover: <u>0</u>		0	= Total Cover					
Woody Vine Stratum (Plot size: 15')								
1.	Smilax laurifolia	5	☒	33.3%	FACW			
2.	Lonicera japonica	5	☒	33.3%	FACU			
3.	Toxicodendron radicans	5	☒	33.3%	FAC			
4.		0	☐	0.0%				
5.		0	☐	0.0%				
50% of Total Cover: <u>7.5</u> 20% of Total Cover: <u>3</u>		15	= Total Cover					

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: B-5700 WA UP

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)	%	Tvpe ¹	Loc ²		
0-6	10YR	2/1	100				Clay Loam	
6-12+	10YR	6/3	90				Sandy Clay Loam	
6-12+	10YR	6/6	10					

¹ Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated 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)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)

- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☐ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils³:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ 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:

WETLAND DETERMINATION DATA FORM - Atlantic and Gulf Coastal Plain Region

Project/Site: B5700/Bridge 45 **City/County:** Cumberland **Sampling Date:** 09-Feb-16
Applicant/Owner: NCDOT **State:** NC **Sampling Point:** B-5700 WA WET
Investigator(s): K. Hamlin, W. Smith **Section, Township, Range:** S T R
Landform (hillslope, terrace, etc.): Flat **Local relief (concave, convex, none):** none **Slope:** 0.0 % / 0.0 °
Subregion (LRR or MLRA): MLRA 133A in LRR P **Lat.:** 34.9874 **Long.:** -78.6413 **Datum:** NAD83
Soil Map Unit Name: GoA - Goldsboro fine sandy loam, 0 to 2 percent slopes **NWI classification:** PFO1

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 ☒ No ☐	Is the Sampled Area within a Wetland? Yes ☒ No ☐
Hydric Soil Present? Yes ☒ No ☐	
Wetland Hydrology Present? Yes ☒ No ☐	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of 2 required)	
Primary Indicators (minimum of one required; check all that apply)			
☐ Surface Water (A1)	☐ Aquatic Fauna (B13)	☐ Surface Soil Cracks (B6)	
☒ High Water Table (A2)	☐ Marl Deposits (B15) (LRR U)	☐ Sparsely Vegetated Concave Surface (B8)	
☒ Saturation (A3)	☐ Hydrogen Sulfide Odor (C1)	☐ Drainage Patterns (B10)	
☐ Water Marks (B1)	☐ Oxidized Rhizospheres along Living Roots (C3)	☐ Moss Trim Lines (B16)	
☐ Sediment Deposits (B2)	☐ Presence of Reduced Iron (C4)	☐ Dry Season Water Table (C2)	
☐ Drift Deposits (B3)	☐ Recent Iron Reduction in Tilled Soils (C6)	☐ Crayfish Burrows (C8)	
☐ Algal Mat or Crust (B4)	☐ Thin Muck Surface (C7)	☐ Saturation Visible on Aerial Imagery (C9)	
☐ Iron Deposits (B5)	☐ Other (Explain in Remarks)	☐ Geomorphic Position (D2)	
☐ Inundation Visible on Aerial Imagery (B7)		☐ Shallow Aquitard (D3)	
☐ Water-Stained Leaves (B9)		☐ FAC-Neutral Test (D5)	
		☐ Sphagnum moss (D8) (LRR T, U)	
Field Observations:		Wetland Hydrology Present? Yes ☒ No ☐	
Surface Water Present? Yes ☐ No ☒	Depth (inches): _____		
Water Table Present? Yes ☒ No ☐	Depth (inches): 0		
Saturation Present? (includes capillary fringe) Yes ☒ No ☐	Depth (inches): 0		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:			
Remarks:			

VEGETATION (Five/Four Strata) - Use scientific names of plants.

Tree Stratum (Plot size: 50')					Dominant Species?	Sampling Point: B-5700 WA WET	
	Absolute % Cover	Rel.Strat. Cover	Indicator Status				
1. <u>Pinus taeda</u>	20	☒ 50.0%	FAC		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. <u>Liquidambar styraciflua</u>	10	☒ 25.0%	FAC				
3. <u>Acer rubrum</u>	10	☒ 25.0%	FAC				
4. _____	0	☐ 0.0%					
5. _____	0	☐ 0.0%					
6. _____	0	☐ 0.0%					
7. _____	0	☐ 0.0%					
8. _____	0	☐ 0.0%					
50% of Total Cover: <u>20</u> 20% of Total Cover: <u>8</u> <u>40</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>5</u> x 2 = <u>10</u> FAC species <u>65</u> x 3 = <u>195</u> FACU species <u>5</u> x 4 = <u>20</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>75</u> (A) <u>225</u> (B) Prevalence Index = B/A = <u>3.000</u>			
Sapling or Sapling/Shrub Stratum (Plot size: _____)							
1. _____	0	☐ 0.0%					
2. _____	0	☐ 0.0%					
3. _____	0	☐ 0.0%					
4. _____	0	☐ 0.0%					
5. _____	0	☐ 0.0%					
6. _____	0	☐ 0.0%					
50% of Total Cover: <u>0</u> 20% of Total Cover: <u>0</u> <u>0</u> = Total Cover				Hydrophytic Vegetation Indicators: ☐ 1 - Rapid Test for Hydrophytic Vegetation ☒ 2 - Dominance Test is > 50% ☒ 3 - Prevalence Index is ≤3.0 ¹ ☐ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.			
Shrub Stratum (Plot size: 30')							
1. <u>Ilex opaca</u>	10	☒ 50.0%	FAC				
2. <u>Morella cerifera</u>	10	☒ 50.0%	FAC				
3. _____	0	☐ 0.0%					
4. _____	0	☐ 0.0%					
5. _____	0	☐ 0.0%					
6. _____	0	☐ 0.0%					
50% of Total Cover: <u>10</u> 20% of Total Cover: <u>4</u> <u>20</u> = Total Cover				Definition of Vegetation Strata: Tree - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH). Sapling - Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH. Sapling/Shrub - Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1m) tall. Shrub - Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height. Herb - All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height. Woody vine - All woody vines, regardless of height.			
Herb Stratum (Plot size: _____)							
1. _____	0	☐ 0.0%					
2. _____	0	☐ 0.0%					
3. _____	0	☐ 0.0%					
4. _____	0	☐ 0.0%					
5. _____	0	☐ 0.0%					
6. _____	0	☐ 0.0%					
50% of Total Cover: <u>0</u> 20% of Total Cover: <u>0</u> <u>0</u> = Total Cover				Hydrophytic Vegetation Present? Yes ☒ No ☐			
Woody Vine Stratum (Plot size: 15')							
1. <u>Smilax laurifolia</u>	5	☒ 33.3%	FACW				
2. <u>Lonicera japonica</u>	5	☒ 33.3%	FACU				
3. <u>Toxicodendron radicans</u>	5	☒ 33.3%	FAC				
4. _____	0	☐ 0.0%					
5. _____	0	☐ 0.0%					
50% of Total Cover: <u>7.5</u> 20% of Total Cover: <u>3</u> <u>15</u> = Total Cover							

Remarks: (If observed, list morphological adaptations below).

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

SOIL

Sampling Point: B-5700 WA WET

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		
0-12+	10YR	2/1	100				Clay Loam	
12+	10YR	6/3	95				Sandy Clay Loam	
12+	10YR	6/6	5					mottle

¹ Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated 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)
- ☐ Organic Bodies (A6) (LRR P, T, U)
- ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ☐ Muck Presence (A8) (LRR U)
- ☐ 1 cm Muck (A9) (LRR P, T)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) (MLRA 150A)
- ☐ Sandy Muck Mineral (S1) (LRR O, S)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR P, S, T, U)

- ☐ Polyvalue Below Surface (S8) (LRR S, T, U)
- ☐ Thin Dark Surface (S9) (LRR S, T, U)
- ☐ Loamy Mucky Mineral (F1) (LRR O)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) (LRR U)
- ☐ Depleted Ochric (F11) (MLRA 151)
- ☐ Iron-Manganese Masses (F12) (LRR O, P, T)
- ☒ Umbric Surface (F13) (LRR P, T, U)
- ☐ Delta Ochric (F17) (MLRA 151)
- ☐ Reduced Vertic (F18) (MLRA 150A, 150B)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils³:

- ☐ 1 cm Muck (A9) (LRR O)
- ☐ 2 cm Muck (A10) (LRR S)
- ☐ Reduced Vertic (F18) (outside MLRA 150A,B)
- ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ☐ Red Parent Material (TF2)
- ☐ 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:

WETLAND RATING WORKSHEET Fourth Version

Project Name B-5700 Nearest Road Hollow Bridge Road
 County Cumberland Wetland area 0.89 acres Wetland width 100+ feet
 Name of evaluator K. Hamlin, W. Smith Date 2/9/16

Wetland location

- ☐ on pond or lake
☒ on perennial stream
☐ on intermittent stream
☐ within interstream divide
☐ other: _____

Adjacent land use

- (within ½ mile upstream, upslope, or radius)
☒ forested/natural vegetation 80 %
☒ agriculture, urban/suburban 20 %
☐ impervious surface _____%

Soil series: GoA - Goldsboro fine sandy loam, 0-2%

- ☐ predominantly organic - humus, muck, or peat
☒ predominantly mineral - non-sandy
☐ predominantly sandy

Dominant vegetation

- (1) loblolly pine
 (2) sweet gum
 (3) red maple

Hydraulic factors

- ☐ steep topography
☐ ditched or channelized
☒ total wetland width $\geq$ 100 feet

Flooding and wetness

- ☐ semipermanently to permanently flooded or inundated
☒ seasonally flooded or inundated
☐ intermittently flooded or temporary surface water
☐ no evidence of flooding or surface water

Wetland type (select one)*

- ☒ Bottomland hardwood forest
☐ Headwater forest
☐ Swamp forest
☐ Wet flat
☐ Pocosin
☐ Bog forest

- ☐ Pine savanna
☐ Freshwater marsh
☐ Bog/fen
☐ Ephemeral wetland
☐ Carolina bay
☐ Other: _____

* The rating system cannot be applied to salt or brackish marshes or stream channels

R	Water storage	<u>4</u>	x 4.00 =	<u>16</u>
A	Bank/Shoreline stabilization	<u>4</u>	x 4.00 =	<u>16</u>
T	Pollutant removal	<u>3</u>	** x 5.00 =	<u>15</u>
I	Wildlife habitat	<u>3</u>	x 2.00 =	<u>6</u>
N	Aquatic life value	<u>3</u>	x 4.00 =	<u>12</u>
G	Recreation/Education	<u>3</u>	x 1.00 =	<u>3</u>

Wetland rating

68

** Add 1 point if in sensitive watershed and >10% nonpoint source disturbance within ½ mile upstream, upslope, or radius

Appendix D

Qualifications of Contributors

Investigator: Elisabeth Webster
Education: B.S. Environmental Technology and Management, 2015
Experience: Environmental Planner, SEPI, 2015-Present
Responsibilities: Document preparation, GIS, T&E surveys

Investigator: Susan Westberry, AICP, PWS, CPESC
Education: M.S. Botany, 2003
Experience: Senior Environmental Planner, SEPI Engineering, 2015-Present
Environmental Scientist, URS, 2005-2015
Environmental Scientist, Stantec, 2003-2005
Responsibilities: QA/QC

Investigator: Eric Black
Education: B.S. Biology, 1991
Experience: Environmental Scientist, SEPI Engineering, 2016-Present
Environmental Scientist, HSMM, 2002-2005
Environmental Specialist, NCDOT, 1999-2002
Environmental Technician, NCDWQ, 1997-1999
Responsibilities: T&E surveys