NATURAL RESOURCES TECHNICAL REPORT

Widening of SR 1002 (Aviation Parkway) from NC 54 (Chapel Hill Road) to I-40 Morrisville and Cary, Wake County, North Carolina

TIP U-5811 WBS Element No. 44384.1.1



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 widen SR 1002 (Aviation Parkway) from NC 54 (Chapel Hill Road) to I-40 (TIP U-5811) in Morrisville and Cary, Wake County (Figure 1). The following Natural Resources Technical Report (NRTR) has been prepared to assist in the preparation of an Environmental Assessment (EA) 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 the week of August 1, 2016. Jurisdictional areas identified in the study area were verified by Eric Alsmeyer of the U.S. Army Corps of Engineers (USACE) on November 3, 2016. Documentation of this jurisdictional determination is pending. The principal personnel contributing to this document were:

Principal

Investigator: Beth Reed, PWS

Education: B.S. Marine Biology, 1989; M.S. Coastal Zone Management, 1991 Experience: Senior Environmental Scientist, Kimley-Horn and Associates, Inc.

1992-Present

Responsibilities: Wetland and stream delineations, stream assessment, document

preparation, quality assurance/quality control (QA/QC) for

project deliverables

Investigator: Jason Hartshorn

Education: B.S. Environmental Technology and Management, 2011

Experience: Environmental Analyst, Kimley-Horn and Associates, Inc. 2011-Present

Responsibilities: GPS/GIS, natural community assessment, T/E species

assessment/survey, document preparation

Additional personnel who contributed to portions of the fieldwork and/or documentation for this project were Ross Sullivan and William Sullivan. Appendix D lists the qualifications of these contributors.

3.0 PHYSICAL RESOURCES

The study area lies in the piedmont physiographic region of North Carolina (Figure 2). Topography in the project vicinity is comprised of gently rolling hills with level floodplains along the streams. Elevations in the study area range from 270 to 350 feet above sea level. Land use in the project vicinity consists primarily of developed commercial areas and medium to high-density residential housing interspersed with fragmented forestland around Lake Crabtree and its tributaries.

3.1 Soils

The Wake County Soil Survey identifies twenty-three soil types within the study area (Table 1).

Table 1. Soils in the study area

Soil Series	Soil Series Mapping Unit Drainage Class		Hydric Status
Altavista fine sandy loam	AfB	Moderately Well Drained	Hydric*
Augusta fine sandy loam	AuA	Somewhat Poorly Drained	Hydric*
Carbonton-Brickhaven complex, 2-6% slopes	CaB	Somewhat Poorly Drained	Nonhydric
Carbonton-Brickhaven complex, 6-10% slopes	CaC	Somewhat Poorly Drained	Nonhydric
Carbonton-Brickhaven complex, 10-15%	CaD	Somewhat Poorly Drained	Nonhydric
Chewacla sandy loam	CmA	Somewhat Poorly Drained	Hydric*
Congaree silt loam	СрА	Moderately Well Drained	Hydric*
Creedmoor sandy loam, 2-6% slopes	CrB2	Moderately Well Drained	Nonhydric
Creedmoor sandy loam, 6-10% slopes	CrC2	Moderately Well Drained	Nonhydric
Creedmoor sandy loam, 10-20% slopes	CrE	Moderately Well Drained	Nonhydric
Creedmoor silt loam, 2-6% slopes	CtB	Moderately Well Drained	Nonhydric
Creedmoor silt loam, 6-10% slopes	CtC	Moderately Well Drained	Nonhydric
Mayodan sandy loam	MfE	Well Drained	Nonhydric
Pacolet-Gullied land complex	PgF	Well Drained	Nonhydric
Pinkston sandy loam	PkF	Well Drained	Nonhydric
Warne fine sandy loam	WhA	Somewhat Poorly Drained	Hydric*
Wehadkee silt loam	WnA	Poorly Drained	Hydric
White Store sandy loam, 2-6% slopes	WsB	Moderately Well Drained	Nonhydric
White Store sandy loam, 2-6% slopes, moderately eroded	WsB2	Moderately Well Drained	Nonhydric
White Store sandy loam, 6-10% slopes	WsC	Moderately Well Drained	Nonhydric
White Store sandy loam, 6-10% slopes, moderately eroded	WsC2	Moderately Well Drained	Nonhydric
White Store sandy loam, 10-20% slopes	WsE	Moderately Well Drained	Nonhydric
Worsham sandy loam	WyA	Poorly Drained	Hydric

^{* -} Soils which are primarily nonhydric, but which may contain hydric inclusions

3.2 Water Resources

Water resources in the study area are part of the Neuse River basin [U.S. Geological Survey (USGS) Hydrologic Unit 03020201]. Fourteen streams were identified in the study area (Table 2). The locations of the water resources are shown in Figure 3. The physical characteristics of the streams are provided in Table 3.

Table 2. Water resources in the study area

Stream Name	Map ID	NCDWR Index Number	Best Usage Classification
Crabtree Creek	Crabtree Creek	27-33-(1)	C; NSW
UT to Crabtree Creek	SA	27-33-(1)	C; NSW
UT to Crabtree Creek	SB	27-33-(1)	C; NSW
UT to Crabtree Creek	SD	27-33-(1)	C; NSW
UT to Lake Crabtree	SE	27-33-(3.5)	B; NSW
UT to Lake Crabtree	SO	27-33-(3.5)	B; NSW
UT to Crabtree Creek	SP	27-33-(1)	C; NSW
UT to Crabtree Creek	SQ	27-33-(1)	C; NSW
UT to Lake Crabtree	SR	27-33-(3.5)	B; NSW
UT to Crabtree Creek	SS	27-33-(1)	C; NSW
UT to Crabtree Creek	ST	27-33-(1)	C; NSW
UT to Crabtree Creek	SU	27-33-(1)	C; NSW
UT to Crabtree Creek	SW	27-33-(1)	C; NSW
UT to Crabtree Creek	SY	27-33-(1)	C; NSW

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
Crabtree Creek	8	16	24	Silt, Sand, Gravel	Moderate	Clear
SA	5	12	24	Silt, Sand	Moderate	Clear
SB	4	8	24	Silt, Sand, Gravel	Moderate	Clear
SD	2	6	6	Silt, Sand, Gravel	Slow	Slightly Turbid
SE	1	2	4	Silt, Sand, Rock	N/A	Clear
SO	1	5	12	Sand, Gravel	Slow	Slightly Turbid
SP	6	10	36	Silt, Sand, Gravel	Fast	Clear
SQ	4	7	12	Silt, Sand	Slow	Turbid
SR	1	4	6	Silt, Sand, Gravel	Moderate	Turbid
SS	4	6	N/A	Silt, Sand	N/A	N/A
ST	2	5	N/A	Silt	N/A	N/A
SU	6	8	24	Silt, Sand	Slow	Clear
SW	4	5	N/A	Silt	N/A	N/A
SY	1	2	N/A	Silt, Sand	N/A	N/A

Two open water features occur in the study area. Lake Crabtree is located in the northern half of the study area and is a jurisdictional flood control reservoir created by an impoundment of Stirrup Iron Creek, Crabtree Creek, and Brier Creek. Pond PA is located in the northern quadrant of the NC-54 and Aviation Parkway intersection and is an artificially excavated pit sustained by rainfall and groundwater with no connection to jurisdictional waters. Approximately 17 acres of Lake Crabtree and 0.8 acre of PA occur in the study area.

There are no designated Primary Nursery Areas (PNA) or anadromous fish waters in or within 1.0-mile downstream of the study area. There are no designated High Quality Waters (HQW) or water supply watersheds (WS-I or WS-II) in or within 1.0-mile downstream of the study area. No streams within the project study area, or within 1.0 mile downstream of the study area, are identified on the North Carolina 2014 Final 303(d) lists of impaired waters for sedimentation or turbidity.

Benthic samples have been taken in Crabtree Creek at NC-54 within the study area, and given a rating of "Poor" on July 5, 2000. No fish monitoring data is available for any streams in the study area or within 1.0 mile of the study area.

4.0 BIOTIC RESOURCES

4.1 Terrestrial Communities

Four terrestrial communities were identified in the study area: piedmont bottomland forest, piedmont/mountain semipermanent impoundment, pine dominated forest, and maintained/disturbed. 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 Piedmont Bottomland Forest

The piedmont bottomland forest occurs in the study area along the floodplains of Crabtree Creek and its tributaries, as well as in portions of the forestland surrounding Lake Crabtree. Dominant overstory species in this community include willow oak, green ash, loblolly pine, northern red oak, American elm, red maple, sweetgum, and water oak. The understory and shrub layer consists of American elm, red maple, green ash, silky dogwood, tag alder, pignut hickory, and musclewood. Herbaceous plants in this community include Japanese stilt grass, river oats, false-nettle, and smartweed. Vines observed in this community include poison ivy and greenbrier. Included in this community are floodplain depressional wetlands, which are classified as bottomland hardwood forests using the NCWAM classification.

4.1.2 Piedmont/Mountain Semipermanent Impoundment

The piedmont/mountain semipermanent impoundment community occurs in the study area in the emergent wetlands surrounding Lake Crabtree. This community lacks a true overstory. The understory and shrub layer consists of winged elm, American elm, tag

alder, sweetgum, red maple, black willow, and green ash. Sedges and cattails comprise most of the herbaceous layer present in this community. Vines observed include poison ivy and greenbrier. Included in this community are floodplain wetlands surrounding Lake Crabtree, which are classified as bottomland hardwood forests using the NCWAM classification.

4.1.3 Pine Dominated Forest

Pine dominated forests are located throughout the study area in early successional forests. The overstory in this community consists primarily of loblolly pine. The understory and shrub layer in these communities is comprised of various hardwoods, including red maple, sweetgum, white oak, northern red oak, and American beech. Herbaceous vegetation in this community is sparse and consists mostly of smartweed and various grasses. Vines observed in these forests include wild grape, greenbrier, poison ivy, trumpet creeper, and Virginia creeper. Included in this community is a portion of a floodplain wetland surrounding Lake Crabtree, which is classified as bottomland hardwood forests using the NCWAM classification.

4.1.4 Maintained/Disturbed

Maintained/disturbed areas are located throughout the study area in places where the vegetation is periodically mowed or otherwise maintained, such as roadside shoulders, parking lots, agricultural fields, and residential or commercial sites, and where existing development has limited or removed natural vegetation communities. Within the study area this community has limited canopy cover. The sapling and shrub layer consists of sweetgum, princess tree, tree-of-heaven, Chinese privet, Chinese lespedeza, red maple, crepe myrtle, and various other ornamental shrubs. Herbaceous vegetation in this community is comprised of low growing grasses and herbs including wild onion, fescue, sedge, clover, smartweed, and sheep sorrel. Vines observed within this community include poison ivy, wild grape, Japanese honeysuckle, and greenbrier.

4.1.5 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 roadway improvements 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.)
Piedmont Bottomland Forest	64.9
Piedmont/Mountain Semipermanent Impoundment	12.1
Pine Dominated Forest	57.6
Maintained/Disturbed	280.5
Total	415.1

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 and stream corridors found within the study area include species such as common mouse, gray squirrel*, eastern cottontail, raccoon, North American beaver, Virginia opossum, and white-tailed deer*. Birds that commonly use forest and forest edge habitats include the red-shouldered hawk, American crow*, northern mockingbird, Carolina chickadee, turkey vulture*, and tufted titmouse. Birds that may use the open habitat or water bodies within the study area include wood duck, mallard, great blue heron, belted kingfisher, barn swallow*, and eastern kingbird*. Reptile and amphibian species that may use terrestrial communities located in the study area include the eastern ribbon snake, copperhead, green snake, black rat snake, black racer, eastern box turtle*, snapping turtle, spring peeper, bullfrog*, eastern fence lizard, and five-lined skink.

4.3 Aquatic Communities

Aquatic communities in the study area consist of perennial and intermittent piedmont streams, and a manmade reservoir. Perennial streams in the study area could support fantail darter, swallowtail shiner, bluegill, and redbreast sunfish. Intermittent streams in the study area are relatively small in size and would support aquatic communities of spring peeper, crayfish, and various macroinvertebrates. The open water communities in the study area could support largemouth bass, bluegill, redbreast sunfish, and channel catfish.

4.4 Invasive Species

Six species from the NCDOT Invasive Exotic Plant List for North Carolina were found to occur in the study area. The species identified were Chinese lespedeza (Threat), Chinese privet (Threat), Japanese stilt grass (Threat), princess tree (Threat), tree-of-heaven (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.

Fourteen jurisdictional streams were identified in the study area (Table 5). The locations of the streams are shown on Figure 3. The NCDWR stream identification forms are included in Appendix C. The physical characteristics and water quality designation of the jurisdictional streams are detailed in Section 3.2. The 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
Crabtree Creek	1,082	Perennial	Yes	Subject
SA	913	Perennial	Yes	Subject
SB	2,092	Perennial	Yes	Subject
SD	1,064	Perennial/Intermittent	Unresolved	Subject
SE	224	Intermittent	Unresolved	Subject
SO	95	Perennial	Yes	Subject
SP	1,242	Perennial	Yes	Subject
SQ	492	Intermittent	Unresolved	Not Subject
SR	136	Intermittent	Unresolved	Subject
SS	150	Intermittent	Unresolved	Not Subject
ST	376	Intermittent	Unresolved	Not Subject
SU	296	Perennial/Intermittent	Unresolved	Subject
SW	88	Intermittent	Unresolved	Not Subject
SY	421	Intermittent	Unresolved	Not Subject
Total	8,671			-

Nine jurisdictional wetlands were 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 Neuse River basin (USGS Hydrologic Unit 03020201). The USACE wetland delineation forms and NCDWR wetland rating forms for each site are included in Appendix C. Descriptions of the terrestrial communities at the wetland sites are presented in Section 4.1. Wetland sites WA, WN, WT, WU, WV, WW, WX, and WZ are included in the piedmont bottomland forest community. Wetland site WS is included in both the piedmont/mountain semipermanent impoundment and the pine dominated forest community types.

Table 6. Jurisdictional characteristics of wetlands in the study area

Map ID	NCWAM Classification	Hydrologic Classification	NCDWQ Wetland Rating	Area (ac.)
WA	Bottomland Hardwood Forest	Riparian	69	0.8
WN	Bottomland Hardwood Forest	Riparian	36	0.02
WS	Bottomland Hardwood Forest	Riparian	89	13.3
WT	Bottomland Hardwood Forest	Riparian	59	0.4
WU	Bottomland Hardwood Forest	Riparian	55	1.7
WV	Bottomland Hardwood Forest	Riparian	59	0.9
WW	Bottomland Hardwood Forest	Riparian	66	1.3
WX	Headwater Forest	Riparian	29	0.2
WZ	Bottomland Hardwood Forest	Riparian	68	0.5
			Total	19.21

5.2 Clean Water Act Permits

The proposed project has been designated as an Environmental Assessment (EA) for the purposes of National Environmental Policy Act (NEPA) documentation. As a result, a Nationwide Permit (NWP) 23 will likely be applicable. 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

Wake County is not under the jurisdiction of the Coastal Area Management Act (CAMA) and no Areas of Environmental Concern (AEC) occur in the study area.

5.4 Construction Moratoria

No construction moratoria apply to any waters within the study area.

5.5 N.C. River Basin Buffer Rules

Streamside riparian zones within the study area are protected under provisions of the Neuse River Basin Buffer Rules administered by NCDWR. Table 5 indicates which streams are subject to buffer rule protection. Potential impacts to protected stream buffers will be determined once a final alignment and design have been determined.

5.6 Rivers and Harbors Act Section 10 Navigable Waters

No waters in the study area have been designated by the USACE as Navigable Waters 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 wetlands and streams 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 wetland and stream 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 the North Carolina Department of Environmental Quality Division of Mitigation Services (DMS).

5.8 Endangered Species Act Protected Species

As of April 2, 2015, the United States Fish and Wildlife Service (USFWS) lists four federally protected species for Wake County (Table 7). A brief description of these species' habitat requirements follows, along with the Biological Conclusion rendered based on survey results in the study area. Habitat requirements for these species are based on the current best available information from referenced literature and/or USFWS.

Table 7. Federally protected species listed for Wake County

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
Myotis septentrionalis	Northern long-eared bat	T	Yes	MA-LAA
Picoides borealis	Red-cockaded woodpecker	Е	No	No Effect
Alasmidonta heterodon	Dwarf wedgemussel	Е	Yes	No Effect
Rhus michauxii	Michaux's sumac	Е	Yes	No Effect

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E – Endangered

MA-LAA - May Affect, Likely to Adversely Affect

T-Threatened

Northern Long-eared Bat

USFWS Recommended Survey Window: June 1 – August 15

Habitat Description: In North Carolina, the Northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the Piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern North Carolina. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically ≥3 inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

Biological Conclusion: May Affect, Likely to Adversely Affect

The USFWS has developed a programmatic biological opinion (PBO) in conjunction with the Federal Highway Administration (FHWA), the US Army Corps of Engineers (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 Wake County, where U-5811 is located. This level of incidental take is authorized from the effective date of a final listing determination through April 30, 2020.

Red-cockaded Woodpecker

USFWS Recommended 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, 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: No Effect

Suitable habitat for RCW does not exist in the study area. Forests in the study area are comprised mostly of hardwoods and immature pines with a closed canopy. Therefore, a half mile survey was not conducted. A review of NCNHP records,

updated June 2016, indicates no known occurrences of this species within 1.0 mile of the study area. Due to the lack of habitat and lack of known occurrences, the biological conclusion is that the proposed project will have no effect on this species.

Dwarf Wedgemussel

USFWS Recommended 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

A dwarf wedgemussel survey was conducted in the project vicinity on November 11, 2016 by RK & K. The streams potentially affected by the project are Crabtree Creek or tributaries to Crabtree Creek. All tributaries for the project flow into Crabtree Creek above Lake Crabtree or into Lake Crabtree itself. The mussel survey was conducted in Crabtree Creek from a point adjacent to Cedar Fork Park upstream to highway NC 54. At the time of the survey the stream had little flow and the substrate was dominated by unstable shifting sand. A total of 57 live Eastern Elliptios (*Elliptio complanata*) and a shell fragment of a Paper Pondshell (*Utterbackia imbecillis*) were found during the survey. The results of this survey and recent others above Lake Crabtree suggest rare freshwater mussels are not present upstream of the lake. Given the Lake Crabtree dam acting as a barrier to recolonization of rare mussels from downstream, the nearest dwarf wedgemussel record being over 20 miles away, the degraded instream habitat for Crabtree Creek in the project vicinity, and the survey results, completion of this project will have No Effect on the species.

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-ofway; 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 present in the study area along the maintained railroad, roadside, power line, and utility right-of-ways. However, many of the areas of suitable habitat within the project study area are heavily maintained by mowing or the application of herbicides and present marginally suitable habitat. Surveys were conducted by Kimley-Horn biologists throughout areas of suitable habitat on September 8, 2016 and no individuals of Michaux's sumac were observed. A review of the NCNHP records, updated June 2016, indicates no known occurrences within 1.0 mile of the study area. Due to a lack of recorded occurrences and a lack of observed individuals in the project study area, it has been determined that the proposed project will have no effect on this species.

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 in July 2016 using 2015 color aerials. One water body (Lake Crabtree) large enough or sufficiently open to be considered a potential feeding source was identified. A review of the NCNHP database, updated June 2016, revealed an active nest was observed within the study area in 2009; however, the nest was noted as inactive in 2011. No NCNHP data has been recorded since 2011. Since there is foraging habitat as well as a known occurrence within the review area, a survey of the project study area and the area within 660 feet of the project limits was conducted by Kimley-Horn biologists on September 8, 2016, and no nests or individuals were observed. Due to the lack of known occurrences in the last 5 years, and the lack of observed individuals or nests, it has been determined that the proposed project will not affect this species.

5.10 Endangered Species Act Candidate Species

As of April 2, 2015, no candidate species are listed for Wake County by the USFWS.

5.11 Essential Fish Habitat

No designated Essential Fish Habitat occurs in the study area.

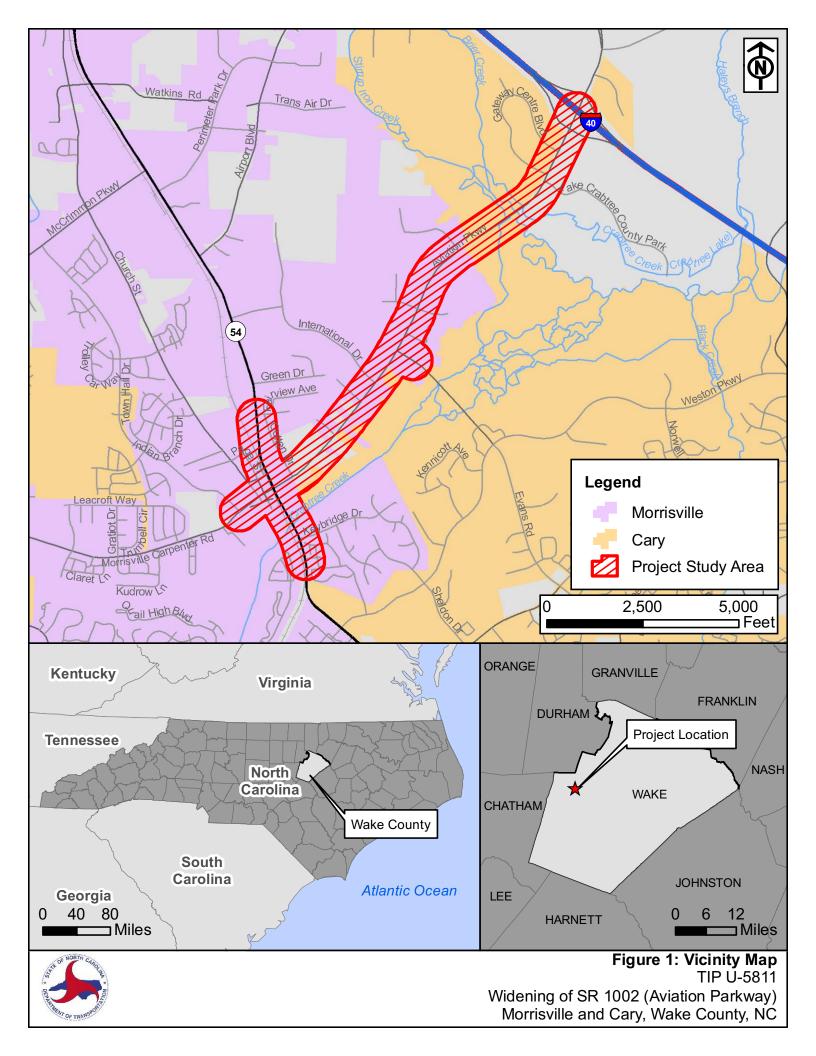
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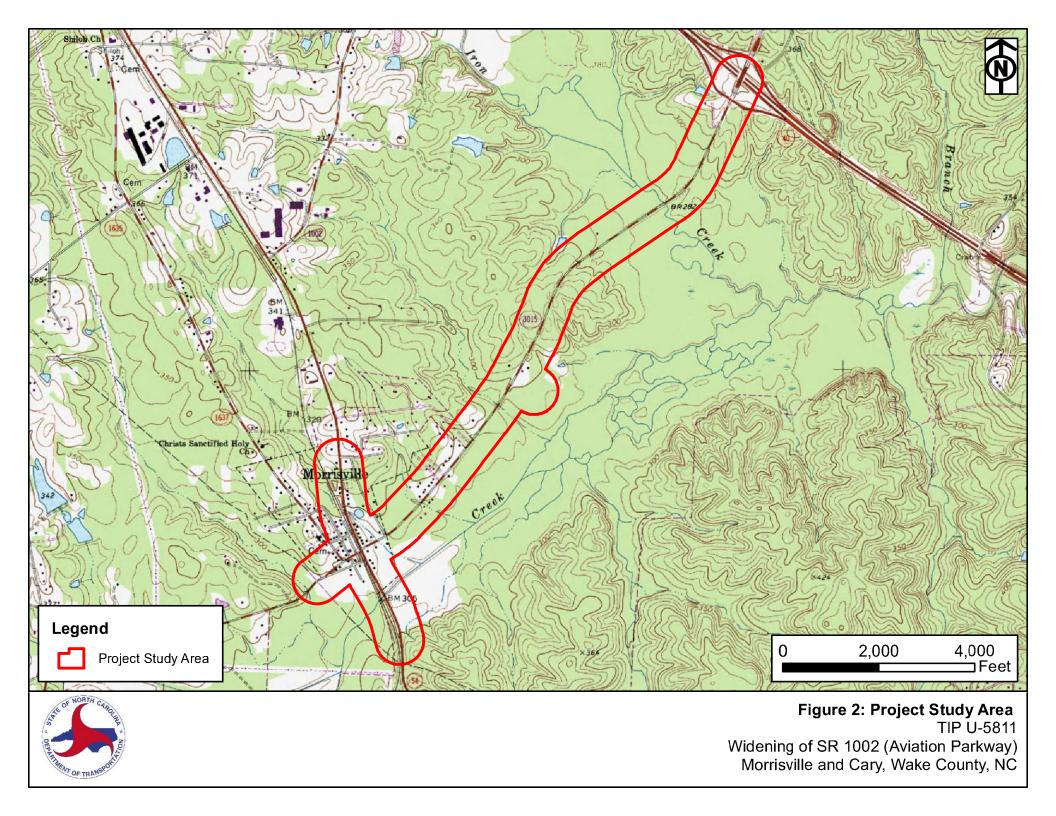
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Appendix A

Figures





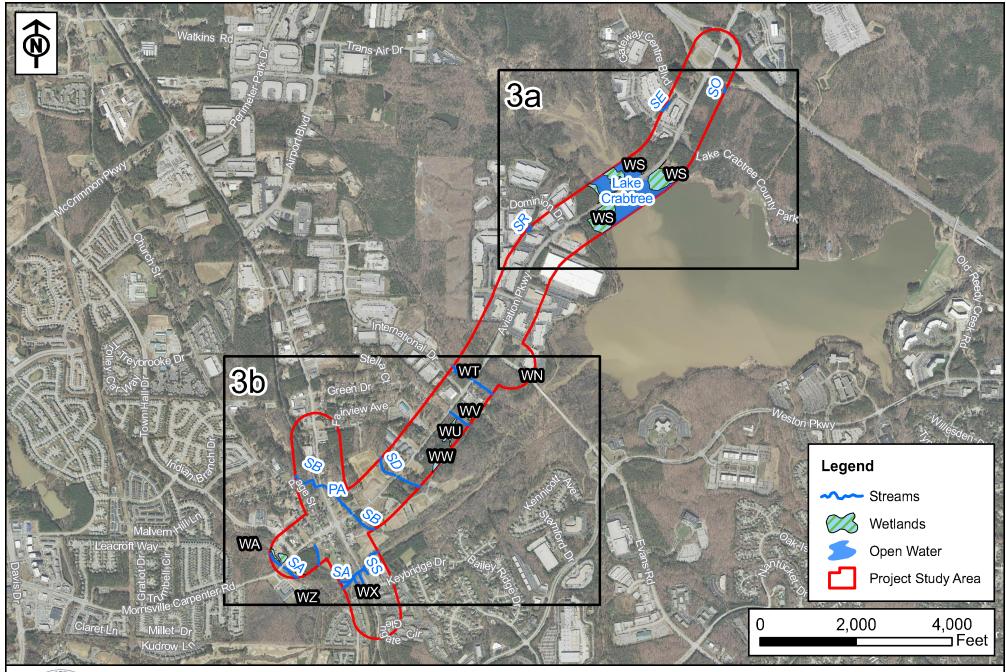




Figure 3: Jurisdictional Features Map TIP U-5811 Aviation Parkway Roadway Improvements Morrisville, Wake County, NC

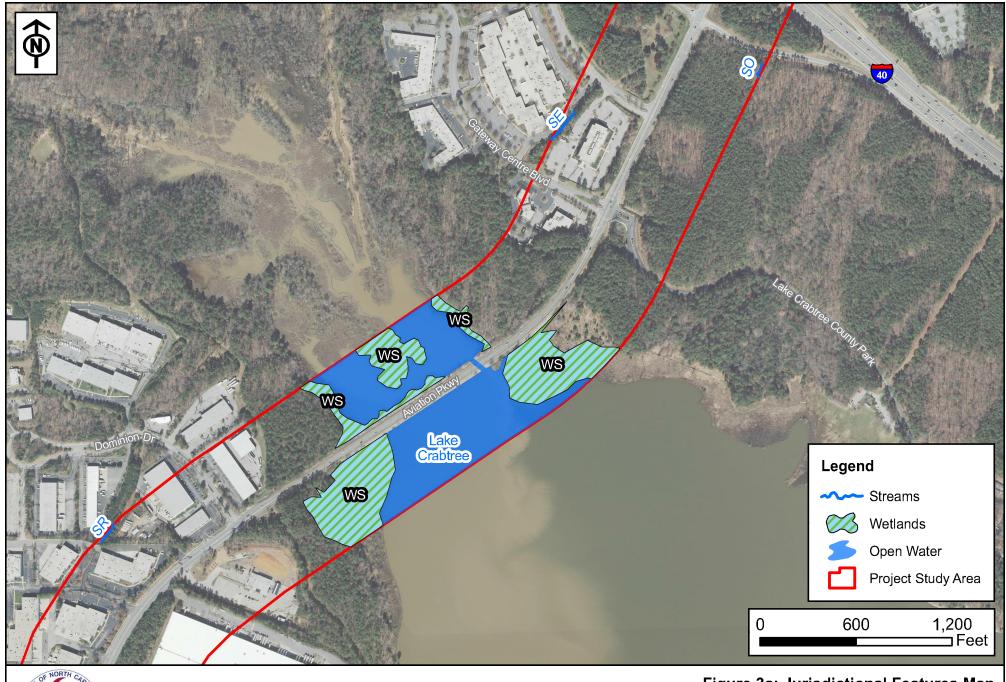


Figure 3a: Jurisdictional Features Map
TIP U-5811
Aviation Parkway Roadway Improvements
Morrisville, Wake County, NC

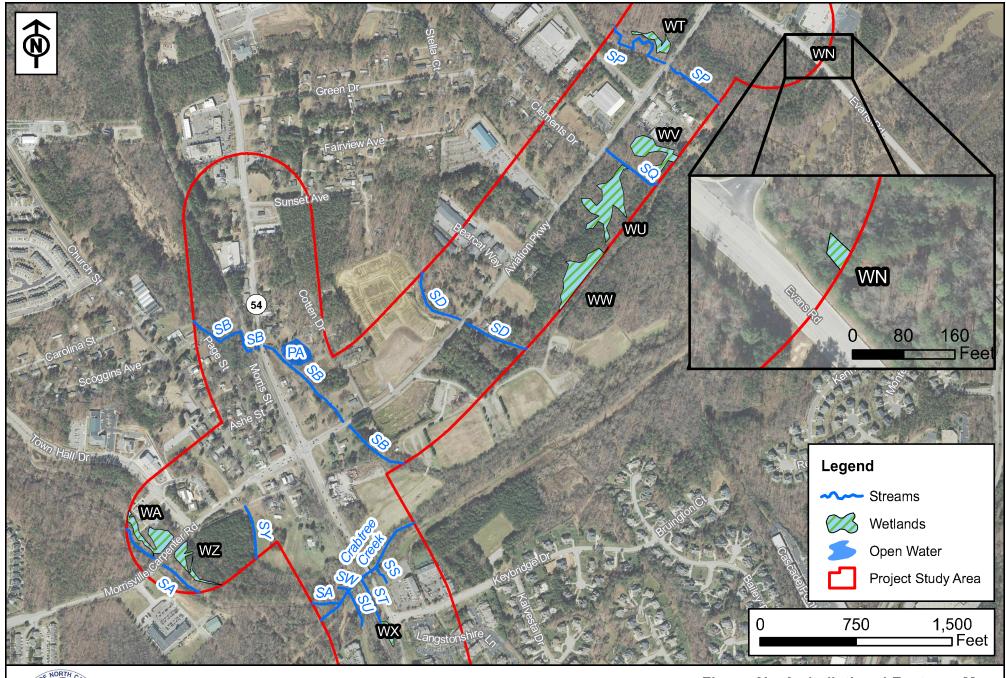




Figure 3b: Jurisdictional Features Map TIP U-5811 Aviation Parkway Roadway Improvements Morrisville, Wake County, NC

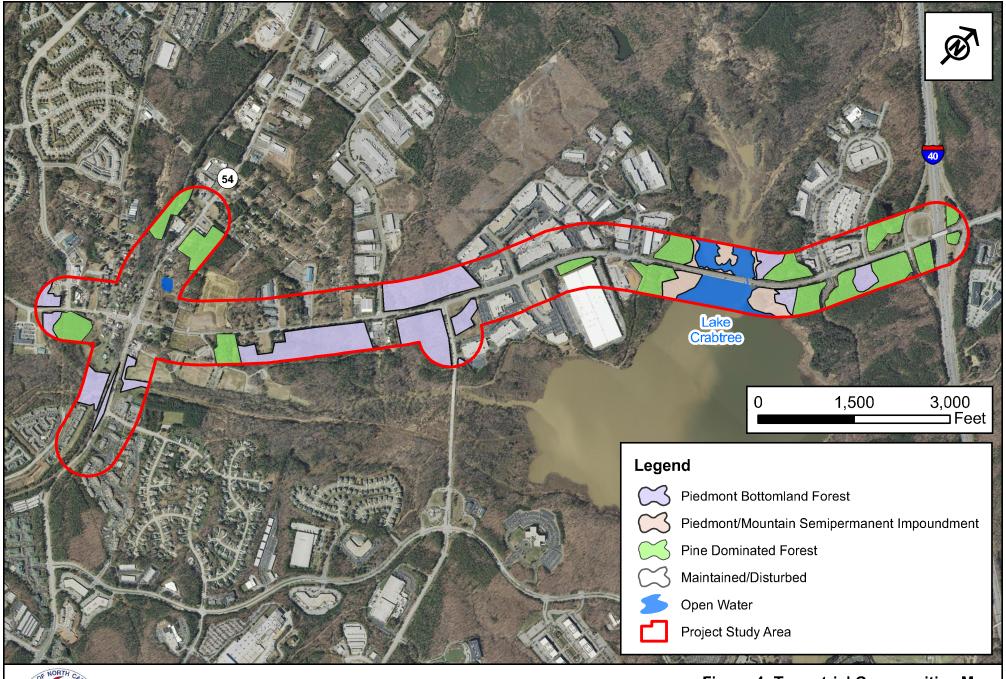




Figure 4: Terrestrial Communities Map
TIP U-5811
Widening of SR 1002 (Aviation Parkway)

Widening of SR 1002 (Aviation Parkway) Morrisville and Cary, Wake County, NC

Appendix B

Scientific Names of Species Identified in Report

Plants

Common NameScientific NameAmerican elmUlmus americanaAmerican beechFagus grandifoliaBlack willowSalix nigra

Black willow Salix nigra
Cattail Typha sp.

Chinese lespedeza Lespedeza cuneata
Chinese privet Ligustrum sinense
Clover Trifolium spp.

Crepe myrtle *Lagerstroemia* spp. False-nettle *Boehmeria cylindrica*

Fescue Festuca spp.

Greenbrier Smilax rotundifolia
Green ash Fraxinus pennsylvanica
Japanese honeysuckle Lonicera japonica
Japanese stilt grass Microstegium vimineum

Loblolly pine Pinus taeda
Longleaf pine Pinus palustris

Musclewood Carpinus caroliniana

Northern red oak Quercus rubra
Pignut hickory Carya glabra

Poison ivy Toxicodendron radicans
Princess tree Paulownia tomentosa

Red maple Acer rubrum

River oats Chasmanthium latifolium

Sedge *Carex* spp.

Sheep sorrel Rumex acetosella
Silky dogwood Cornus amomum
Smartweed Polygonum spp.

Sweetgum Liquidambar styraciflua

Tag alderAlnus serrulataTree-of-heavenAilanthus altissimaTrumpet creeperCampsis radicans

Virginia creeper Parthenocissus quinquefolia

Water oak Quercus nigra
White oak Quercus alba

Ulmus alata Winged elm Vitis rotundifolia Wild grape Wild onion Allium canadense Willow oak Quercus phellos

Animals

Common Name Scientific Name

American crow Corvus brachyrhynchos

Barn swallow Hirundo rustica Belted kingfisher Megaceryle alcyon

Black racer Coluber constrictor constrictor

Black rat snake Elaphe obsolete

Bluegill Lepomis macrochirus Lithobates catesbeianus Bullfrog Poecile carolinensis Carolina chickadee Channel catfish *Ictalurus punctatus* Common mouse Mus musculus

Copperhead Agkistrodon contortrix

Crayfish Cambarus sp.

Eastern box turtle Terrapene carolina carolina Eastern cottontail Sylvilagus floridanus mallurus

Eastern fence lizard Sceloporus undulatus Eastern kingbird Tyrannus tyrannus

Eastern ribbon snake Thamnophis sauritus sauritus

Fantail darter Etheostoma flabellare Five-lined skink Plestiodon fasciatus

Gray squirrel Sciurus carolinensis carolinensis

Great blue heron Ardea herodias Green snake Opheodrys vernalis Largemouth bass Micropterus salmoides Mallard Anas platyrhynchos North American beaver Castor canadensis Northern mockingbird Mimus polyglottos Raccoon Procyon lotor Redbreast sunfish Lepomis auritus Red-shouldered hawk Buteo lineatus

Snapping turtle Chelydra serpentina Spring peeper Pseudacris crucifer Swallowtail shiner Notropis procne

Tufted titmouse E
Turkey vulture C
Virginia opossum E
White-tailed deer C

Wood duck

Baeolophus bicolor Cathartes aura Didelphis virginianus

Odocoileus virginianus

Axis sponsa

Appendix C

Stream and Wetland Data Forms

Date:	8/2/2016	Project/Site:	Crabtree Creek TIP# U-5811	Latitude:	35.821122	Crabtree Creek U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.823145	
Total Poir Stream is at le if ≥ 19 or perei	ast intermittent	Stream Deter	mination (circle one) stermittent Perennial		Cary Quad	

A. Geomorphology Subtotal = 20.5	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	1
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	3
Depositional bars or benches	0	1	2	3	3
7. Recent alluvial deposits	0	1	2	3	2
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	0.5
10. Natural valley	0	0.5	1	1.5	1
11. Second or greater order channel	No =	0	Yes	= 3	3

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	10
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12. Presence of Baseflow	0	1	2	3	3
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1
15. Sediment on plants or debris	0	0.5	1	1.5	1.5
16. Organic debris lines or piles	0	0.5	1	1.5	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	= 3	3

C. Biology Subtotal = 13

18. Fibrous roots in streambed	3	2	1	0	3
19. Rooted upland plants in streambed	3	2	1	0	3
20. Macrobenthos (note diversity and abundance)	0	1	2	3	2
21. Aquatic Mollusks	0	1	2	3	2
22. Fish	0	0.5	1	1.5	1
23. Crayfish	0	0.5	1	1.5	1
24. Amphibians	0	0.5	1	1.5	1
25. Algae	0	0.5	1	1.5	0
26. Wetland plants in streambed FACW = 0.75; OBL = 1.5; Other = 0					0
perennial streams may also be identified using other methods. See p. 35 of manual.					

Notes:

Crabtree Creek is a deeply-incised, perennial stream within the study corridor. The bankful height is 8' and the width is 16'. The water is 6"-2' deep and clear. The stream substrate is composed of sand, silt, and gravel, and flow was moderate. Aquatic mollusks, crayfish, fish, and caddisfly casings were observed in Crabtree Creek.

Date:	8/2/2016	Project/Site:	Stream SA TIP# U-5811	Latitude:	35.819951	SA U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.824876	
Total Points: 37 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30		Stream Determination (circle one) Ephemeral Intermitten Perennial			Cary Quad	

A. Geomorphology Subtotal = 19.5	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	2
Particle size of stream substrate	0	1	2	3	3
5. Active/relic floodplain	0	1	2	3	3
Depositional bars or benches	0	1	2	3	3
7. Recent alluvial deposits	0	1	2	3	2
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	0
10. Natural valley	0	0.5	1	1.5	0.5
11. Second or greater order channel	No =	0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	10
, a. c. e.g, ca. e.a.	10

12. Presence of Baseflow	0	1	2	3	3
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1.5
15. Sediment on plants or debris	0	0.5	1	1.5	1.5
16. Organic debris lines or piles	0	0.5	1	1.5	1
17. Soil-based evidence of high water table?	No = 0		Yes = 3		3

C. Biology Subtotal = 7.5

••					
18. Fibrous roots in streambed	3	2	1	0	3
19. Rooted upland plants in streambed	3	2	1	0	3
20. Macrobenthos (note diversity and abundance)	0	1	2	3	1
21. Aquatic Mollusks	0	1	2	3	0
22. Fish	0	0.5	1	1.5	0.5
23. Crayfish	0	0.5	1	1.5	0
24. Amphibians	0	0.5	1	1.5	0
25. Algae	0	0.5	1	1.5	0
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0				0
*nerennial streams may also be identified using other methods. See p. 35 of manual					

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Stream SA is a deeply-incised, perennial tributary to Crabtree Creek. The floodplain of SA is indicative of frequent flooding. SA has a bankful height of 5' and width of 12'. The substrate is composed of silt and sand, and the flow is moderate. The water is clear and 2' deep. Mosquitofish were observed within SA.

Date:	8/2/2016	Project/Site:	Stream SB TIP# U-5811	Latitude:	35.824833	SB U-5811
Evaluator:	B. Reed (Kimley-Horn) R. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.82526	
Total Points: 42 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30		Stream Determination (circle one) Ephemeral Intermitten Perennial			Cary Quad	

A. Geomorphology Subtotal = 21	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	2
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	1
Depositional bars or benches	0	1	2	3	3
7. Recent alluvial deposits	0	1	2	3	3
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	1
10. Natural valley	0	0.5	1	1.5	1
11. Second or greater order channel	No =	0	Yes	= 3	3

artificial ditches are not rated; see discussions in manual

B.	Hydrology Subtotal =	11
О.	myuruluqy Sublular =	11

, 0,					
12. Presence of Baseflow	0	1	2	3	3
13. Iron oxidizing bacteria	0	1	2	3	1
14. Leaf litter	1.5	1	0.5	0	1.5
15. Sediment on plants or debris	0	0.5	1	1.5	1
16. Organic debris lines or piles	0	0.5	1	1.5	1.5
17. Soil-based evidence of high water table?	No =	= 0	Yes	= 3	3

C.	Biology Subtotal =	10
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••					
18. Fibrous roots in streambed	3	2	1	0	3
19. Rooted upland plants in streambed	3	2	1	0	3
20. Macrobenthos (note diversity and abundance)	0	1	2	3	1
21. Aquatic Mollusks	0	1	2	3	1
22. Fish	0	0.5	1	1.5	1.5
23. Crayfish	0	0.5	1	1.5	0
24. Amphibians	0	0.5	1	1.5	0.5
25. Algae	0	0.5	1	1.5	0
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0				0
*norannial straams may also be identified using other methods. See p. 35 of manual					

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Stream SB is a perennial tributary to Crabtree Creek. SB has a bankful height of 4' and width of 8'. The substrate is composed of silt, sand, and gravel, and the flow is moderate. The water is clear and 1-2' deep. Numerous minnows, juvenile fish, mollusk and mussel shells, and caddisfly casings were observed in SB.

Date:	8/3/2016	Project/Site:	Stream SD - (INT) TIP# U-5811	Latitude:	35.840102	SD-(INT) U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.81173	
Total Points: 23 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30		Stream Determination (circle one) Ephemera Intermittent Perennial			Cary Quad	

A. Geomorphology Subtotal = 10.5	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	1
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	2
Particle size of stream substrate	0	1	2	3	1
5. Active/relic floodplain	0	1	2	3	0
6. Depositional bars or benches	0	1	2	3	1
7. Recent alluvial deposits	0	1	2	3	0
8. Headcuts	0	1	2	3	1
9. Grade control	0	0.5	1	1.5	1
10. Natural valley	0	0.5	1	1.5	0.5
11. Second or greater order channel	No =	= 0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	9.5
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12. Presence of Baseflow	0	1	2	3	3
13. Iron oxidizing bacteria	0	1	2	3	1
14. Leaf litter	1.5	1	0.5	0	1
15. Sediment on plants or debris	0	0.5	1	1.5	0.5
16. Organic debris lines or piles	0	0.5	1	1.5	1
17. Soil-based evidence of high water table?	No = 0		Yes = 3		3

C. Biology Subtotal = 3

18. Fibrous roots in streambed	3	2	1	0	1	
19. Rooted upland plants in streambed	3	2	1	0	2	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0	
21. Aquatic Mollusks	0	1	2	3	0	
22. Fish	0	0.5	1	1.5	0	
23. Crayfish	0	0.5	1	1.5	0	
24. Amphibians	0	0.5	1	1.5	0	
25. Algae	0	0.5	1	1.5	0	
26. Wetland plants in streambed	FACW	0				
*perennial streams may also be identified using other methods. See p. 35 of manual.						

Notes:

Stream SD is an intermittent channel that has downcut and intercepted groundwater. SD is intermittent after the culvert outlet beneath Aviation Parkway. The bankful width is 6' and the bankful depth is 2'. SD was holding water during our site visit due to recent rainfall event. The water was slightly turbid and had a slow velocity. The stream substrate is composed of silt, sand, and gravel. No aquatic biology was observed in SD.

Date:	8/3/2016	Project/Site:	Stream SD-PER TIP# U-5811	Latitude:	35.825575	SD-PER U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.820054	
Total Points: 34 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30		Stream Determination (circle one) Ephemeral Intermittent Perennial			Cary Quad	

A. Geomorphology Subtotal = 14	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	1
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	2
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	2
6. Depositional bars or benches	0	1	2	3	1
7. Recent alluvial deposits	0	1	2	3	2
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	0.5
10. Natural valley	0	0.5	1	1.5	0.5
11. Second or greater order channel	No =	= 0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	9.5
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12. Presence of Baseflow	0	1	2	3	3
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1
15. Sediment on plants or debris	0	0.5	1	1.5	1.5
16. Organic debris lines or piles	0	0.5	1	1.5	1
17. Soil-based evidence of high water table?	No = 0		Yes	3	

C. Biology Subtotal = 10.5

18. Fibrous roots in streambed	3	2	1	0	3
19. Rooted upland plants in streambed	3	2	1	0	3
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0
21. Aquatic Mollusks	0	1	2	3	2
22. Fish	0	0.5	1	1.5	0.5
23. Crayfish	0	0.5	1	1.5	0
24. Amphibians	0	0.5	1	1.5	1.5
25. Algae	0	0.5	1	1.5	0.5
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 SD is a perennial tributary to Crabtree Creek within the study corridor. The bankful height is 2' and the width is 7'. The water is 6-12" deep and slightly turbid, likely due to recent rainfall. The substrate in SD is composed of sand and silt, and the water velocity is moderate. Aquatic snails and mosquitofish were observed near the culvtert inlet.

Date:	8/4/2016	Project/Site:	Stream SE TIP# U-5811	Latitude:	35.847099	SE U-5811
Evaluator:	B. Reed (Kimley-Horn) R. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.802108	
Total Points: 20.5 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30		Stream Determination (circle one)		Other e.g. Quad Name:	Cary Quad	

A. Geomorphology Subtotal = 9	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	2
Sinuosity of channel along thalweg	0	1	2	3	1
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	1
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	0
Depositional bars or benches	0	1	2	3	1
7. Recent alluvial deposits	0	1	2	3	0
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	1
10. Natural valley	0	0.5	1	1.5	1
11. Second or greater order channel	No =	= 0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology	Subtotal =	6.5

12. Presence of Baseflow	0	1	2	3	2
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1
15. Sediment on plants or debris	0	0.5	1	1.5	0
16. Organic debris lines or piles	0	0.5	1	1.5	0.5
17. Soil-based evidence of high water table?	No :	= 0	Yes	= 3	3

C. Biology Subtotal = 5

18. Fibrous roots in streambed	3	2	1	0	1
19. Rooted upland plants in streambed	3	2	1	0	1
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0
21. Aquatic Mollusks	0	1	2	3	1
22. Fish	0	0.5	1	1.5	0
23. Crayfish	0	0.5	1	1.5	0
24. Amphibians	0	0.5	1	1.5	0.5
25. Algae	0	0.5	1	1.5	0
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0				1.5
*perennial streams may also be identified using other methods. See p. 35 c	of manual.				

Notes:

Stream SE is an intermittent channel originating at a culvert outlet underneath an adjacent parking lot. The entire reach is heavily lined with riprap. No flow was observed in channel reach, but pools of water are located throughout. The bankful depth is 1' and the width is 2'. The water in the pools was roughly 4" deep and clear. Small frogs and aquatic snails were observed in SE.

Date:	8/4/2016	Project/Site:	Stream SO TIP# U-5811	Latitude:	35.848016	SO U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.797983	
Total Poir Stream is at le if ≥ 19 or perei	east intermittent	Stream Deter	mination (circle one) ntermitten Perennial		Cary Quad	

A. Geomorphology Subtotal = 17.5	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	2
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	1
6. Depositional bars or benches	0	1	2	3	2
7. Recent alluvial deposits	0	1	2	3	1
8. Headcuts	0	1	2	3	2
9. Grade control	0	0.5	1	1.5	1
10. Natural valley	0	0.5	1	1.5	1.5
11. Second or greater order channel	No =	= 0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	9
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12. Presence of Baseflow	0	1	2	3	3
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1.5
15. Sediment on plants or debris	0	0.5	1	1.5	0.5
16. Organic debris lines or piles	0	0.5	1	1.5	1
17. Soil-based evidence of high water table?	No = 0 Yes = 3		= 3	3	

C. Biology Subtotal = 8

18. Fibrous roots in streambed	3	2	1	0	3
19. Rooted upland plants in streambed	3	2	1	0	3
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0
21. Aquatic Mollusks	0	1	2	3	0
22. Fish	0	0.5	1	1.5	0
23. Crayfish	0	0.5	1	1.5	0.5
24. Amphibians	0	0.5	1	1.5	1.5
25. Algae	0	0.5	1	1.5	0
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0			0	
*perennial streams may also be identified using other methods. See p. 35 of	manual.			-	

Notes:

Stream SO is a meandering perennial feature beginning at a pipe outlet at the toe of the fillslope at the Aviation Pkwy ramp to I-40. There are multiple headcuts in the reach and evidence of flooding. The bankful height is 1' and the width is 5'. The water is slightly turbid and 6"-1' deep. The stream substrate is composed of sand and gravel, and the water velocity is slow. Many frogs and tadpoles were observed in stream SO.

Date:	8/2/2016	Project/Site:	Stream SP TIP# U-5811	Latitude:	35.831606	SP U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.815848	
Total Poil Stream is at le	east intermittent	Stream Determination (circle ene) Ephemeral Intermittent Perennial			Cary Quad	

A. Geomorphology Subtotal = 18	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	2
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	1
6. Depositional bars or benches	0	1	2	3	2
7. Recent alluvial deposits	0	1	2	3	1
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	0.5
10. Natural valley	0	0.5	1	1.5	1.5
11. Second or greater order channel	No =	= 0	Yes	= 3	3

artificial ditches are not rated; see discussions in manual

В. І	Hydrology Subtotal =	10.5

12. Presence of Baseflow	0	1	2	3	3
13. Iron oxidizing bacteria	0	1	2	3	1
14. Leaf litter	1.5	1	0.5	0	1.5
15. Sediment on plants or debris	0	0.5	1	1.5	0.5
16. Organic debris lines or piles	0	0.5	1	1.5	1.5
17. Soil-based evidence of high water table?	No =) = 0 Yes = 3		3	

C. Biology Subtotal = 10.5

18. Fibrous roots in streambed	3	2	1	0	3
19. Rooted upland plants in streambed	3	2	1	0	3
20. Macrobenthos (note diversity and abundance)	0	1	2	3	1
21. Aquatic Mollusks	0	1	2	3	2
22. Fish	0	0.5	1	1.5	0.5
23. Crayfish	0	0.5	1	1.5	1
24. Amphibians	0	0.5	1	1.5	0
25. Algae	0	0.5	1	1.5	0
26. Wetland plants in streambed	FACW	0			
*perennial streams may also be identified using other methods. See p. 35 of manual.					

Notes:

Stream SP is a large stream that is deeply incised. SP is culverted under Aviation Parkway through two large (~5') culverts. Strong flow observed with approximately 1-3' of water in stream. The bankful height is 6' and the width is 10'. Substrate in stream SP is composed of silt, sand, and gravel.

Date:	8/2/2016	Project/Site:	Stream SQ TIP# U-5811	Latitude:	35.829614	SQ U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.817219	
Total Poir Stream is at le if ≥ 19 or perer	ast intermittent	Stream Determination (circle one)		Other e.g. Quad Name:	Cary Quad	

A. Geomorphology Subtotal = 9.5	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	0
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	1
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	0
6. Depositional bars or benches	0	1	2	3	1
7. Recent alluvial deposits	0	1	2	3	1
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	1
10. Natural valley	0	0.5	1	1.5	0.5
11. Second or greater order channel	No =	0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

D. Hydrology Subtotal – 7.5	В.	Hydrology S	Subtotal =	7.5
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12. Presence of Baseflow	0	1	2	3	1
13. Iron oxidizing bacteria	0	1	2	3	1
14. Leaf litter	1.5	1	0.5	0	1
15. Sediment on plants or debris	0	0.5	1	1.5	0.5
16. Organic debris lines or piles	0	0.5	1	1.5	1
17. Soil-based evidence of high water table?	No = 0		Yes = 3		3

C. Biology Subtotal = 6.5

18. Fibrous roots in streambed	3	2	1	0	3	
19. Rooted upland plants in streambed	3	2	1	0	3	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0	
21. Aquatic Mollusks	0	1	2	3	0	
22. Fish	0	0.5	1	1.5	0	
23. Crayfish	0	0.5	1	1.5	0	
24. Amphibians	0	0.5	1	1.5	0	
25. Algae	0	0.5	1	1.5	0.5	
26. Wetland plants in streambed	FACW	0				
*norangial strange may also be identified using other methods. See p. 25 of manual						

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Stream SQ is an intermittent channel beginning at a culvert outlet under Aviation Parkway, on the southern portion of the study area. Stream SQ is a linear stream, incised to nearly 4' and may have been historically channelized.

Date:	8/3/2016	Project/Site:	Stream SR TIP# U-5811	Latitude:	35.840125	SR U-5811
Evaluator:	B. Reed (Kimley-Horn) R. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.811714	
Total Points: 29 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30		Stream Determination (circle one) Ephemera Intermittent Perennial			Cary Quad	

A. Geomorphology Subtotal = 11	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	2
Sinuosity of channel along thalweg	0	1	2	3	1
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	2
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	3
6. Depositional bars or benches	0	1	2	3	0
7. Recent alluvial deposits	0	1	2	3	0
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	0.5
10. Natural valley	0	0.5	1	1.5	0.5
11. Second or greater order channel	No =	0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	10
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12. Presence of Baseflow	0	1	2	3	3
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1.5
15. Sediment on plants or debris	0	0.5	1	1.5	1
16. Organic debris lines or piles	0	0.5	1	1.5	1.5
17. Soil-based evidence of high water table?	No = 0		Yes	3	

C. Biology Subtotal =

18. Fibrous roots in streambed	3	2	1	0	2	
19. Rooted upland plants in streambed	3	2	1	0	3	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0	
21. Aquatic Mollusks	0	1	2	3	0	
22. Fish	0	0.5	1	1.5	0	
23. Crayfish	0	0.5	1	1.5	0.5	
24. Amphibians	0	0.5	1	1.5	1	
25. Algae	0	0.5	1	1.5	0	
6. 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 SR is a strong intermittent channel that has been ditched in numerous places. The bankful width is 4' and the bankful depth is 1'. SR had moderate flow during our site visit, likely due to recent rainfall event. The water is turbid and the stream substrate is composed of silt, sand, and gravel. Numerous frogs were observed in stream SR.

Date:	8/2/2016	Project/Site:	Stream SS TIP# U-5811	Latitude:	35.820534	SS U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.823187	
Total Points: 26.5 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30		Stream Determination (circle one)		Other e.g. Quad Name:	Cary Quad	

A. Geomorphology Subtotal = 12.5	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	2
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	0
Depositional bars or benches	0	1	2	3	1
7. Recent alluvial deposits	0	1	2	3	0
8. Headcuts	0	1	2	3	1
9. Grade control	0	0.5	1	1.5	1
10. Natural valley	0	0.5	1	1.5	0.5
11. Second or greater order channel	No =	= 0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	3
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12. Presence of Baseflow	0	1	2	3	1
13. Iron oxidizing bacteria	0	1	2	3	1
14. Leaf litter	1.5	1	0.5	0	1.5
15. Sediment on plants or debris	0	0.5	1	1.5	1
16. Organic debris lines or piles	0	0.5	1	1.5	0.5
17. Soil-based evidence of high water table?	No = 0		Yes	3	

C. Biology Subtotal = 6

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18. Fibrous roots in streambed	3	2	1	0	3	
19. Rooted upland plants in streambed	3	2	1	0	3	
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0	
21. Aquatic Mollusks	0	1	2	3	0	
22. Fish	0	0.5	1	1.5	0	
23. Crayfish	0	0.5	1	1.5	0	
24. Amphibians	0	0.5	1	1.5	0	
25. Algae	0	0.5	1	1.5	0	
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.						
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Notes:

Stream SS is a weak intermittent channel beginning at a headcut in an utility easement. No flow was observed, but there were a few pools with standing water present throughout the reach. The bankful height is 4' and the width is 6'. The substrate is composed of silt and sand. No aquatic biology was observed in stream SS.

Date:	8/2/2016	Project/Site:	Stream ST TIP# U-5811	Latitude:	35.820017	ST U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.823497	
Total Points: 19.5		Stream Determination (circle one)		Other	Cary Quad	
Stream is at least intermittent if ≥ 19 or perennial if ≥ 30		Ephemeral intermittent Perennial		e.g. Quad Name:	Cary Quad	

A. Geomorphology Subtotal = 10.5	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	1
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	1
Particle size of stream substrate	0	1	2	3	1
5. Active/relic floodplain	0	1	2	3	2
6. Depositional bars or benches	0	1	2	3	1
7. Recent alluvial deposits	0	1	2	3	0
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	0.5
10. Natural valley	0	0.5	1	1.5	1
11. Second or greater order channel	No =	- 0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	6
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12. Presence of Baseflow	0	1	2	3	0
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1
15. Sediment on plants or debris	0	0.5	1	1.5	1
16. Organic debris lines or piles	0	0.5	1	1.5	1
17. Soil-based evidence of high water table?	No = 0		Yes	3	

C. Biology Subtotal = 3

18. Fibrous roots in streambed	3	2	1	0	2
19. Rooted upland plants in streambed	3	2	1	0	1
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0
21. Aquatic Mollusks	0	1	2	3	0
22. Fish	0	0.5	1	1.5	0
23. Crayfish	0	0.5	1	1.5	0
24. Amphibians	0	0.5	1	1.5	0
25. Algae	0	0.5	1	1.5	0
26. Wetland plants in streambed FACW = 0.75; OBL = 1.5; Other = 0					0
perennial streams may also be identified using other methods. See p. 35 of manual.					

Notes:

Stream ST is a weak, intermittent channel draining wetland WX. ST likely flows during the wet season and in response to stormwater events. No flow was observed through the system, but soils were saturated in low areas. ST has a bankful height of 2' and width of 5'. The substrate is composed of silt. No flow or water was present.

Date:	8/2/2016	Project/Site:	Stream SU - (INT) TIP# U-5811	Latitude:	35.819705	SU-(INT) U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.823815	
Total Points: 21.5		Stream Determination (circle one)		Other		
Stream is at le	ast intermittent		ntermittent Perennial		Cary Quad	
if ≥ 19 or perer	nnial if ≥ 30	Epriomoralii	TROTTING TO COMMINICA	o.g. Quad Marrio.		

A. Geomorphology Subtotal = 10	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	2
Sinuosity of channel along thalweg	0	1	2	3	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	1
Particle size of stream substrate	0	1	2	3	1
5. Active/relic floodplain	0	1	2	3	1
Depositional bars or benches	0	1	2	3	1
7. Recent alluvial deposits	0	1	2	3	1
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	0.5
10. Natural valley	0	0.5	1	1.5	0.5
11. Second or greater order channel	No = 0		Yes = 3		0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	6
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12. Presence of Baseflow	0	1	2	3	0
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1.5
15. Sediment on plants or debris	0	0.5	1	1.5	1
16. Organic debris lines or piles	0	0.5	1	1.5	0.5
17. Soil-based evidence of high water table?	No = 0		Yes	3	

C. Biology Subtotal = 5.5

18. Fibrous roots in streambed	3	2	1	0	2
19. Rooted upland plants in streambed	3	2	1	0	2
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0
21. Aquatic Mollusks	0	1	2	3	0
22. Fish	0	0.5	1	1.5	0
23. Crayfish	0	0.5	1	1.5	0
24. Amphibians	0	0.5	1	1.5	0
25. Algae	0	0.5	1	1.5	0
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 SU is an intermittent reach that is supported primarily by stormwater from a nearby residential complex. SU transitions to a perennial stream as it approaches Crabtree Creek. SU has a bankful height of 2' and width of 6'. The substrate is composed of silt. Flow and water depth were not present. No aquatic biology was observed.

Date:	8/2/2016	Project/Site:	Stream SU - (PER) TIP# U-5811	Latitude:	35.820128	SU-(PER) U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.824052	
Total Points: 30.5 Stream is at least intermittent if ≥ 19 or perennial if ≥ 30		Stream Determination (circle one) Ephemeral Intermitten Perennial			Cary Quad	

A. Geomorphology Subtotal = 17	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	2
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	2
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	1
Depositional bars or benches	0	1	2	3	2
7. Recent alluvial deposits	0	1	2	3	2
8. Headcuts	0	1	2	3	1
9. Grade control	0	0.5	1	1.5	1
10. Natural valley	0	0.5	1	1.5	1
11. Second or greater order channel	No =	- 0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

В.	Hydrology Subtotal =	7.5

12. Presence of Baseflow	0	1	2	3	2
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1
15. Sediment on plants or debris	0	0.5	1	1.5	1
16. Organic debris lines or piles	0	0.5	1	1.5	0.5
17. Soil-based evidence of high water table?	No = 0		Yes	3	

C. Biology Subtotal = 6

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18. Fibrous roots in streambed	3	2	1	0	3
19. Rooted upland plants in streambed	3	2	1	0	3
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0
21. Aquatic Mollusks	0	1	2	3	0
22. Fish	0	0.5	1	1.5	0
23. Crayfish	0	0.5	1	1.5	0
24. Amphibians	0	0.5	1	1.5	0
25. Algae	0	0.5	1	1.5	0
26. Wetland plants in streambed FACW = 0.75; OBL = 1.5; Other = 0					0
*nerennial streams may also be identified using other methods. See p. 35 of manual					

Notes:

SU is a deeply-incised, perennial reach that receives back water from Crabtree Creek. SU transitions from an intermittent stream as it approaches Crabtree Creek. SU has a bankful height of 6' and width of 8'. The substrate is composed of silt and sand. The water is clear and has a slow velocity. No aquatic biology was observed, however there is evidence of wildlife use.

Date:	8/2/2016	Project/Site:	Stream SW TIP# U-5811	Latitude:	35.820283	SW U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.82424	
Total Poir Stream is at le if ≥ 19 or perei	ast intermittent	Stream Determination (circle one) Ephemera Intermittent Perennial			Cary Quad	

A. Geomorphology Subtotal = 10.5	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	1
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	0
Particle size of stream substrate	0	1	2	3	1
5. Active/relic floodplain	0	1	2	3	2
Depositional bars or benches	0	1	2	3	1
7. Recent alluvial deposits	0	1	2	3	1
8. Headcuts	0	1	2	3	1
9. Grade control	0	0.5	1	1.5	0
10. Natural valley	0	0.5	1	1.5	0.5
11. Second or greater order channel	No =	0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	5.5
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12. Presence of Baseflow	0	1	2	3	0
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1
15. Sediment on plants or debris	0	0.5	1	1.5	1
16. Organic debris lines or piles	0	0.5	1	1.5	0.5
17. Soil-based evidence of high water table?	No = 0		Yes	= 3	3

C. Biology Subtotal = 3

18. Fibrous roots in streambed	3	2	1	0	1
19. Rooted upland plants in streambed	3	2	1	0	2
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0
21. Aquatic Mollusks	0	1	2	3	0
22. Fish	0	0.5	1	1.5	0
23. Crayfish	0	0.5	1	1.5	0
24. Amphibians	0	0.5	1	1.5	0
25. Algae	0	0.5	1	1.5	0
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5; Other = 0 0				
*perennial streams may also be identified using other methods. See p. 35 of manual.					

Notes:

Stream SW is a small, intermittent channel in the floodplain of Crabtree Creek. SW begins at a headcut and only a few pools held water at the time of observation. The bankful height is 4' and the width is 5'. SW has a silt substrate.

Date:	8/2/2016	Project/Site:	Stream SY TIP# U-5811	Latitude:	35.821914	SY U-5811
Evaluator:	J. Hartshorn (Kimley-Horn) W. Sullivan (Kimley-Horn)	County:	Wake	Longitude:	-78.826754	
Total Poir Stream is at le if ≥ 19 or pere	ast intermittent	Stream Determination (circle one) Ephemeral Intermittent Perennial			Cary Quad	

A. Geomorphology Subtotal = 9.5	Absent	Weak	Moderate	Strong	Score
1 ^a . Continuity of channel bed and bank	0	1	2	3	3
Sinuosity of channel along thalweg	0	1	2	3	1
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	3	1
Particle size of stream substrate	0	1	2	3	2
5. Active/relic floodplain	0	1	2	3	1
Depositional bars or benches	0	1	2	3	1
7. Recent alluvial deposits	0	1	2	3	0
8. Headcuts	0	1	2	3	0
9. Grade control	0	0.5	1	1.5	0.5
10. Natural valley	0	0.5	1	1.5	0
11. Second or greater order channel	No =	= 0	Yes	= 3	0

artificial ditches are not rated; see discussions in manual

B. Hydrology Subtotal =	5.5
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12. Presence of Baseflow	0	1	2	3	1
13. Iron oxidizing bacteria	0	1	2	3	0
14. Leaf litter	1.5	1	0.5	0	1
15. Sediment on plants or debris	0	0.5	1	1.5	0
16. Organic debris lines or piles	0	0.5	1	1.5	0.5
17. Soil-based evidence of high water table?	No =	= 0	Yes	= 3	3

C. Biology Subtotal = 5

18. Fibrous roots in streambed	3	2	1	0	2
19. Rooted upland plants in streambed	3	2	1	0	3
20. Macrobenthos (note diversity and abundance)	0	1	2	3	0
21. Aquatic Mollusks	0	1	2	3	0
22. Fish	0	0.5	1	1.5	0
23. Crayfish	0	0.5	1	1.5	0
24. Amphibians	0	0.5	1	1.5	0
25. Algae	0 0.5 1 1.5 0				0
Wetland plants in streambed FACW = 0.75; OBL = 1.5; Other = 0					0
*perennial streams may also be identified using other methods. See p. 35 of manual.					

Notes:

Stream SY is a linear, weak intermittent channel carrying primarily stormwater and has downcut or been dugout. No water was present in SY and vegetation covered much of the channel. The bankful height is 1' and the width is 2'. The substrate is composed of silt and sand.

WETLAND RATING WORKSHEET Fourth version

Wetland WA

Project Name:	TIP# U-5811	Nearest road: Morrisville Carpenter
County: Wake Co	ounty Wetland area:	0.9 acres Wetland width: 200 feet
Name of Evaluator:	: R. Sullivan (Kimley-Horn)	Date: 1/14/2016
Wetland Location		Adjacent land use (within ½ mile
on pond	or lake	upstream,upslope, or radius)
X on peren	nnial stream	X forested/natural vegetation 30 %
on interm	nittent stream	X agriculture, urban/suburban 60 %
within int	terstream divide	X impervious service 10 %
other:		
		Dominant vegetation
Soil Series		1) <u>Acer rubrum</u>
predomir	nantly organic	2) Fraxinus pennsylvanica
(humus,	muck, or peat)	3) <u>Ulmus americana</u>
X predomir	nantly mineral	
(non-san	ndy)	Flooding and wetness
predomir	nantly sandy	semipermanently to permently flooded
		or inundated
Hydrolic factors		seasonally flooded or inundated
steep top	pography	X intermittently flooded or temporary
ditched o	or channelized	surface water
X total ripa	ırian wetland width ≥ 100 ft	no evidence of flooding or surface water
Wetland type (sele	ect one)	
X	Bottomland hardwood forest	Pine savanna
	Headwater forest	Freshwater marsh
	Swamp forest	Bog/fen
	_Wet flat	Ephemeral wetland
	_ Pocosin	Carolina Bay
	_Bog forest	Other
*The rating system	cannot be appllied to salt or brack	kish marshes or stream channels.
	_	weight
R	Water Storage 3 x	4.00 = 12
A Bank/S	Shoreline stabilization 3 x Pollutant removal 5 x	4.00 = 12
I I		5.00 = <u>25</u> 2.00 = 6
ı N	Wildlife habitat 3 x Aquatic life 3 x	2.00 = 6 $4.00 = 12$
	Recreation/Education 2 x	1.00 = 12
-		<u></u>
		Total Score ¹ 69

 $^{^{1}}$ Add 1 point if in sensitive watershed and >10% nonpoint disturbance within $\frac{1}{2}$ mile radius.

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 08/2/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WA-UP
Investigator(s): R. Sullivan & J. Hartshorn (Kimley-Horn)	
Landform (hillslope, terrace, etc.): <u>Levee/sewer easement</u> Lo	cal relief (concave, convex, none): Convex Slope (%): 0-1%
Subregion (LRR or MLRA): LRR P Lat: 35.821314	Long: -78.829335 Datum: NAD83
Soil Map Unit Name: Congaree silt loam	NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of ye	
Are Vegetation Soil or Hydrology significantly	disturbed? Are "Normal Circumstances" present? Yes No
Are Vegetation Soil or Hydrology naturally pro	oblematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing	sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes No ✓ No ✓ No ✓	Is the Sampled Area within a Wetland? Yes No
Remarks:	
	of and 1' higher in elevation than the wetland data
point. The upland data point was take on a se	wer/stormwater utility easement.
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) True Aquatic P	
High Water Table (A2) Hydrogen Sulfi	
	spheres on Living Roots (C3) Moss Trim Lines (B16)
	educed Iron (C4) Dry-Season Water Table (C2) Crayfish Burrows (C8)
Drift Deposits (B3) Thin Muck Surf	
Algal Mat or Crust (B4) Other (Explain	, ,
Iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	
Surface Water Present? Yes No V Depth (inches Water Table Present? Yes No V Depth (inches	,
(includes capillary fringe)	
Describe Recorded Data (stream gauge, monitoring well, aerial photo	os, previous inspections), if available:
Remarks:	
No indicators of wetland hydrology were obser	ved at the upland data point location.
	·

	EGETATION (Four Strata) – Use scientific names of plants.						
	Dominant		Dominance Test worksheet:				
<u> 6 Cover</u>	Species?	Status	Number of Dominant Species That Are OBL, FACW, or FAC: (A)				
			Total Number of Dominant Species Across All Strata: 3 (B)				
			Percent of Dominant Species That Are OBL FACW or FAC: 33.3%				
			That Are OBL, FACW, or FAC: (A/B)				
			Prevalence Index worksheet:				
			Total % Cover of: Multiply by:				
	T-1-1-0		OBL species x 1 =				
=	= Total Cov	er	FACW species x 2 =				
			FAC species 35 $\times 3 = 105$				
			FACU species $\frac{30}{70}$ $\times 4 = 280$				
		-	UPL species x 5 =				
			105 205				
			Column Totals: <u>105</u> (A) <u>385</u> (B)				
			Prevalence Index = $B/A = 3.67$				
			Hydrophytic Vegetation Indicators:				
			1 - Rapid Test for Hydrophytic Vegetation				
			2 - Dominance Test is >50%				
			3 - Prevalence Index is ≤3.0¹				
=	Total Cov	er	4 - Morphological Adaptations ¹ (Provide supporting				
2001		= 4 0 1 1	data in Remarks or on a separate sheet)				
			Problematic Hydrophytic Vegetation ¹ (Explain)				
	<u>N</u>		¹Indicators of hydric soil and wetland hydrology must				
5%	<u>N</u>	FAC	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				
750/	T-1-1-0		of size, and woody plants less than 3.28 ft tall.				
<u>/370</u> =	= Total Cov	er	Woody vine – All woody vines greater than 3.28 ft in				
30%	Υ	FAC	height.				
			Hydrophytic				
			Vegetation				
200/	Total Cov		Present? Yes No				
	30% 30% 10% 5%	= Total Cove = Total Cove 30% Y 10% N 5% N 75% = Total Cove 30% Y	= Total Cover = Total Cover = Total Cover 30% Y FACU 30% Y FACU 10% N FACU 5% N FAC				

Sampling Point: WA-UP

Profile Desc	cription: (Describe	to the dep	oth needed to docu			or confirm	the absence	of indicators.)
Depth (inches)	Matrix Color (moist)	%	Color (moist)	ox Features %	<u>Type¹</u>	Loc ²	Texture	Remarks
(inches) 0-12"	10YR 5/3	95%	7.5YR 4/6	5%	C	M	Loam	Remarks
12-24"		90%	-	10%	<u>c</u>	M		
12-24	10YR 4/2	90%	7.5YR 4/6	10%	<u> </u>	- <u>IVI</u>	Clay loam	
			-					
					1			
-						-		
		pletion, RM	=Reduced Matrix, M	S=Masked	Sand G	ains.	² Location: PL	L=Pore Lining, M=Matrix.
Hydric Soil			_					ators for Problematic Hydric Soils ³ :
Histosol			Dark Surface	` '				2 cm Muck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue Be				148) C	Coast Prairie Redox (A16)
	istic (A3) en Sulfide (A4)		Thin Dark Solution Loamy Gley			147, 146)	П	(MLRA 147, 148) Piedmont Floodplain Soils (F19)
	d Layers (A5)		Depleted Ma)		ш.	(MLRA 136, 147)
	uck (A10) (LRR N)		Redox Dark		6)		□ v	/ery Shallow Dark Surface (TF12)
	d Below Dark Surfac	ce (A11)	Depleted Da					Other (Explain in Remarks)
	ark Surface (A12)		Redox Depr					
	Mucky Mineral (S1) (A 147, 148)	LRR N,	☐ Iron-Mangar MLRA 13		es (F12) (LRR N,		
	Gleyed Matrix (S4)		Umbric Surfa	•	MIRA 1	36 122)	³ Inc	licators of hydrophytic vegetation and
	Redox (S5)		Piedmont Fl					etland hydrology must be present,
	Matrix (S6)		Red Parent					less disturbed or problematic.
Restrictive	Layer (if observed)):						
Type:								
Depth (in	ches):						Hydric Soil	Present? Yes No
Remarks:								
No bydri	ic soil indicate	orc were	observed at	the unl	and d	ata noir	nt The cu	bstrate became rocky
below 2		JIS WEIG	e observed at	tile upi	anu u	ata poli	it. The Su	ustrate became rocky
Delow 2	1 .							

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 08/2/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WA-WET
Investigator(s): R. Sullivan & J. Hartshorn	Section, Township, Range: Cedar Fork
	ocal relief (concave, convex, none): Concave Slope (%): 0-1%
Subregion (LRR or MLRA): LRR P Lat: 35.821377	Long: <u>-78.82929</u> Datum: NAD83
Soil Map Unit Name: Congaree silt loam	NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year	ear? Yes 🚺 No (If no, explain in Remarks.)
Are Vegetation Soil or Hydrology significantly	y disturbed? Are "Normal Circumstances" present? Yes No
Are Vegetation Soil or Hydrology naturally pr	roblematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes V No Yes No No Remarks:	Is the Sampled Area within a Wetland? Yes No
Remarks:	ad with a sower easement running through the
wetland.	nd with a sewer easement running through the
wettariu.	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	
Surface Water (A1) True Aquatic F	` '
High Water Table (A2) Hydrogen Sulf	
	ospheres on Living Roots (C3) Moss Trim Lines (B16)
11 I - · · · · · ·	educed Iron (C4) Dry-Season Water Table (C2)
	eduction in Tilled Soils (C6) face (C7) Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9)
Drift Deposits (B3) Algal Mat or Crust (B4) Thin Muck Sur Other (Explain	· ,
Iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes No Depth (inches	
Surface Water Present? Water Table Present? Yes No Depth (inches Depth	
Saturation Present? Yes V No Depth (inches	
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial phot	
Describe Recorded Data (Stream gauge, monitoring well, aerial prior	os, previous inspections), il available.
Remarks:	
The wetland receives hydrology from groundw	vater interface and flooding from stream SA.

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WA-WET
	Absolute	Dominant	Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size: <u>30'</u>)	% Cover	Species?		Number of Dominant Species
1. Acer rubrum	30%	<u>Y</u>	FAC	That Are OBL, FACW, or FAC: (A)
2. Fraxinus pennsylvanica	20%	Y	FACW	T
3. Ulmus americana	20%	<u> Y</u>	FACW	Total Number of Dominant Species Across All Strata: 8 (B)
4. Liquidambar styraciflua	20%	Y	FAC	Opedies Across Air Strata.
			17.0	Percent of Dominant Species 100%
5				That Are OBL, FACW, or FAC: (A/B)
6				Prevalence Index worksheet:
7				Total % Cover of: Multiply by:
8				OBL species x 1 =
0 15 (0) 1 0 ((D) (5) 20	90%	= Total Cov	er	
Sapling/Shrub Stratum (Plot size: 30')	100/	V	FAC	FACW species x 2 =
1. <u>Carpinus caroliniana</u>	10%	<u>Y</u>	<u>FAC</u>	FAC species x 3 =
2. Acer rubrum	10%	<u>Y</u>	FAC	FACU species x 4 =
3				UPL species x 5 =
4	_			Column Totals: (A) (B)
5				
6				Prevalence Index = B/A =
7				Hydrophytic Vegetation Indicators:
8				1 - Rapid Test for Hydrophytic Vegetation
9				2 - Dominance Test is >50%
	_			3 - Prevalence Index is ≤3.0 ¹
10	200/	T-1-1-0		4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 15')	20%	= Total Cov	er	data in Remarks or on a separate sheet)
. None				Problematic Hydrophytic Vegetation ¹ (Explain)
2				¹ Indicators of hydric soil and wetland hydrology must
3				be present, unless disturbed or problematic.
4				Definitions of Four Vegetation Strata:
5	_			
6	_			Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
7				more in diameter at breast height (DBH), regardless of height.
8				inoigh.ii
9				Sapling/Shrub – Woody plants, excluding vines, less
10.				than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
11				m) tan.
12.				Herb – All herbaceous (non-woody) plants, regardless
12.		= Total Cov		of size, and woody plants less than 3.28 ft tall.
Woody Vine Stratum (Plot size: 30')		- 10tai 00v	GI	Woody vine – All woody vines greater than 3.28 ft in
1.Smilax rotundifolia	5%	Υ	FAC	height.
2.Lonicera japonica	5%	Y	FAC	
			1710	
3				
4				Hydrophytic
5				Vegetation /
6	100/			Present? Yes No
	10%	= Total Cov	er	
Remarks: (Include photo numbers here or on a separate	sheet.)			

Sampling Point: WA-WET

Profile Desc	ription: (Describe	to the dep	th needed to docu	ment the i	ndicator	or confirm	n the absence of indicators.)
Depth	Matrix Color (moist)	%	Color (moist)	x Feature %	<u>s</u> _Type ¹ _	Loc ²	Texture Remarks
(inches) 0-2"	10YR 3/4	100%	Color (moist)		туре	LUC	Loam
2-4"	10YR 5/2	75%	7.5YR 4/6	25%	C	M	Clay loam
4-8"	10YR 5/1	90%	7.5YR 4/6	10%	<u>C</u>	<u></u> М	Loam
8-16"	10YR 6/2	90%	10YR 5/6	10%	<u>C</u>	M	Loam
16-24"		90%		10%	<u>C</u>	<u>М</u>	
24-30"	7.5YR 4/6		7.5YR 6/1		D		Loam Clay
24-30	5YR 5/6	95%	5YR 6/1	5%	<u>U</u>	PL	Clay
	-		<u> </u>				
							· —— ——
1		India DM	Ded and Market M	0. Marahar	1010-		21 and the Discounting M. March
Hydric Soil I	oncentration, D=Dep Indicators:	etion, RM	=Reduced Matrix, M	S=Masked	Sand Gr	ains.	² Location: PL=Pore Lining, M=Matrix. Indicators for Problematic Hydric Soils ³ :
Histosol			Dark Surface	e (S7)			2 cm Muck (A10) (MLRA 147)
Histic Ep	pipedon (A2)		Polyvalue Be	elow Surfa			
Black Hi			Thin Dark Su			147, 148)	(MLRA 147, 148)
	n Sulfide (A4) d Layers (A5)		Loamy Gleye Depleted Ma		(F2)		☐ Piedmont Floodplain Soils (F19) (MLRA 136, 147)
	ick (A10) (LRR N)		Redox Dark		- 6)		Very Shallow Dark Surface (TF12)
	Below Dark Surfac	e (A11)	Depleted Da				Other (Explain in Remarks)
	ark Surface (A12) Iucky Mineral (S1) (I	RR N	Redox Depre			I RR N	
-	A 147, 148)		MLRA 13		00 (i iz) (,	
	leyed Matrix (S4)		Umbric Surfa				³ Indicators of hydrophytic vegetation and
	ledox (S5) Matrix (S6)		Piedmont Flo				
	_ayer (if observed):		Red Faleliti	viateriai (i	ZI) (WILK	A 121, 141	in diffess disturbed of problematic.
Type:							
Depth (inc	ches):						Hydric Soil Present? Yes ✓ No ✓
Remarks:							
The soil	was depleted	. The w	ater table and	d soil s	aturati	on were	e both observed near the soil
surface.							

SOIL

WETLAND RATING WORKSHEET Fourth version

Wetland WN

Project Name:	TIP# U-5811		Nearest r	oad: Evans I	Rd.
County: Wake C	County Wetland area:	0.02 acres	Wetland w	ridth:	30 feet
Name of Evaluator	r: R. Sullivan (Kimley-Horn)		С	Date:	5/24/2014
		_			
Wetland Location	1	Adja	cent land use (w	ithin ½ mile	
on pond	l or lake	upst	ream,upslope, or	radius)	
X on perer	nnial stream	X	forested/natural	l vegetation	<u>65</u> %
on interr	mittent stream	X	agriculture, urba	an/suburban	<u> </u>
within in	terstream divide	X	impervious serv	vice	<u>30</u> %
other:					
		Dom	inant vegetation		
Soil Series		1)	Pinus taeda		
predomi	inantly organic	2)	Salix nigra		
(humus,	, muck, or peat)	3)	Acer rubrum		
X predomi	inantly mineral	·			
(non-sar	ndy)	Floo	ding and wetnes	s	
predomi	inantly sandy		semipermanent	ly to permen	tly flooded
· · · · · · · · · · · · · · · · · · ·			or inundated		
Hydrolic factors			seasonally flood	ded or inunda	ated
-	pography	X	intermittently flo		
	or channelized	-	surface water	'	,
	arian wetland width ≥ 100 ft		no evidence of	floodina or sı	urface water
Wetland type (sel	lect one)				
X	Bottomland hardwood forest		_ Pine savanna		
	Headwater forest		_Freshwater mai	rsh	
	Swamp forest		_Bog/fen		
	Wet flat		_Ephemeral wetl	and	
	Pocosin		_Carolina Bay Other		
***	Bog forest		_		
1 ne rating system	n cannot be appllied to salt or bra	ickish marshe	es or stream chan	neis.	
D	Water Ctara and C	weight	_	0	
R A Book	Water Storage 2 > /Shoreline stabilization 1 >		=	<u>8</u> 4	
A Bank	/Shoreline stabilization 1 > Pollutant removal 2 >		<u> </u>	10	
ĺ	Wildlife habitat 2		<u> </u>	4	
N	Aquatic life 2		=	8	
G	Recreation/Education 2 >		=	2	
		T	otal Score ¹	36	

 $^{^{1}}$ Add 1 point if in sensitive watershed and >10% nonpoint disturbance within $\frac{1}{2}$ mile radius.

Project/Site: TIP# U-5811	City/County: Wake County	_ Sampling Date: 05/24/2014
Applicant/Owner: NCDOT	• •	Sampling Point: WN-UP
Investigator(s): B. Reed & R. Sullivan (Kimley-Horn)		
Landform (hillslope, terrace, etc.): Slight hillslope Lo	cal relief (concave, convex, none): Convex	Slope (%): <1%
Subregion (LRR or MLRA): LRR P Lat: 35.831748	Long: -78.811565	Datum: NAD83
Soil Map Unit Name: Altavista fine sandy loam	NWI classit	fication: None
Are climatic / hydrologic conditions on the site typical for this time of year	ear? 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 pro	oblematic? (If needed, explain any answ	vers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, transect	ts, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Remarks: Yes ✓ No ✓ Yes No ✓ No ✓	Is the Sampled Area within a Wetland? Yes	No ✓
Upland data point WN-UP is located approxim project boundary.	ately 163' feet southeast from \	WN-WET near the
HYDROLOGY		
Wetland Hydrology Indicators:	Secondary India	cators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)		oil Cracks (B6)
Surface Water (A1) High Water Table (A2) True Aquatic P Hydrogen Sulfi		egetated Concave Surface (B8) Patterns (B10)
	· · ·	Lines (B16)
	· · · · · · · · · · · · · · · · · · ·	n Water Table (C2)
Sediment Deposits (B2)	eduction in Tilled Soils (C6) Crayfish Bu	urrows (C8)
Drift Deposits (B3) Thin Muck Sur	` '	Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Other (Explain Iron Deposits (B5)	_	Stressed Plants (D1)
Inundation Visible on Aerial Imagery (B7)	Shallow Aq	ic Position (D2) puttard (D3)
Water-Stained Leaves (B9)		graphic Relief (D4)
Aquatic Fauna (B13)		al Test (D5)
Field Observations:		
Surface Water Present? Yes No V Depth (inches		
Water Table Present? Yes No Depth (inches	'	- No Van
Saturation Present? Yes No V Depth (inches (includes capillary fringe)	,	ent? Yes No LV
Describe Recorded Data (stream gauge, monitoring well, aerial photo	os, previous inspections), if available:	
Remarks:		
No indicators of wetland hydrology were observed	rved at data point WN-UP during	g the site visit. Neither
the water table nor soil saturation was observe	ed in the first 20" of the soil pro	ofile.
	·	

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WN-UP
	Absolute	Dominant	Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size: <u>30'</u>)		Species?		Number of Dominant Species
1. Pinus taeda	20%	<u> </u>	FAC	That Are OBL, FACW, or FAC: 7 (A)
2. Liquidambar styraciflua	10%	<u>Y</u>	FAC	Total Number of Dominant
3. Acer rubrum	10%	Y	FAC	Species Across All Strata: (B)
4. Quercus falcata	5%	N	FACU	Daniel of Daniel and Onesian
5. Juniperus virginiana	2%	N	FACU	Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)
6				
7				Prevalence Index worksheet:
8				Total % Cover of: Multiply by:
	47%	= Total Cov	er	OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')				FACW species x 2 =
1 Liquidambar styraciflua	10%	Y	FAC	FAC species x 3 =
2. Ilex opaca	5%	Y	FACU	FACU species x 4 =
3. Morella cerifera	5%	Y	FAC	UPL species x 5 =
4. Nyssa sylvatica	5%	Y	FAC	Column Totals: (A) (B)
5				
6				Prevalence Index = B/A =
7				Hydrophytic Vegetation Indicators:
8				1 - Rapid Test for Hydrophytic Vegetation
9				X 2 - Dominance Test is >50%
				3 - Prevalence Index is ≤3.0 ¹
10	25%	= Total Cov		4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 30')	23 /0	= Total Cov	EI	data in Remarks or on a separate sheet)
1. None				Problematic Hydrophytic Vegetation ¹ (Explain)
2				
3		· •		¹ Indicators of hydric soil and wetland hydrology must
4				be present, unless disturbed or problematic.
				Definitions of Four Vegetation Strata:
5				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
6				more in diameter at breast height (DBH), regardless of
7				height.
8				Sapling/Shrub – Woody plants, excluding vines, less
9				than 3 in. DBH and greater than or equal to 3.28 ft (1
10				m) tall.
11				Herb – All herbaceous (non-woody) plants, regardless
12				of size, and woody plants less than 3.28 ft tall.
Woody Vine Stratum (Plot size: 30')		= Total Cov	er	Woody vine – All woody vines greater than 3.28 ft in
1 Vitis rotundifolia	2%	Υ	FAC	height.
·· <u> </u>		. <u></u> -	1710	
2		· 		
3				
4				Hydrophytic
5				Vegetation
6	20/			Present? Yes No
	2%	= Total Cov	er	
Remarks: (Include photo numbers here or on a separate	e sheet.)			•
Vegetation at WN-UP did not display morphol	ogical char	acteristics	s consist	ent with wetland hydrology.
5	J 5			· · · · · · · · · · · · · · · · · · ·

Sampling Point: WN-UP

SOIL

Profile Desc	cription: (Describe	to the dep	th needed to docu	ment the i	ndicator	or confirm	n the absence of indicators.)
Depth	Matrix			x Features	<u>s</u>	2	
(inches)	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²	Texture Remarks
0-2"	10YR 3/3	100%					Loam
2-8"	10YR 7/4	100%					Loam
8-14"	10YR 7/5	100%					Loam
14-20"+	10YR 6/6	80%	10YR 7/3	20%	C	M	Loam
	-						
							-
							·
		 					· ,———
							- <u> </u>
	oncentration, D=Dep	pletion, RM=	Reduced Matrix, M	S=Masked	Sand Gra	ains.	² Location: PL=Pore Lining, M=Matrix. Indicators for Problematic Hydric Soils ³ :
Hydric Soil			David Confee	- (07)			_
Histosol	oipedon (A2)		Dark Surface Polyvalue Be		ce (S8) (N	II R A 147	2 cm Muck (A10) (MLRA 147) , 148) Coast Prairie Redox (A16)
	istic (A3)		Thin Dark S				(MLRA 147, 148)
	en Sulfide (A4)		Loamy Gley				Piedmont Floodplain Soils (F19)
	d Layers (A5)		Depleted Ma				(MLRA 136, 147)
	uck (A10) (LRR N)		Redox Dark				Very Shallow Dark Surface (TF12)
	d Below Dark Surfac ark Surface (A12)	ce (A11)	Depleted Da				Other (Explain in Remarks)
. —	/Jucky Mineral (S1)	LRR N.	Iron-Mangar			LRR N.	
	A 147, 148)	,	MLRA 13		, ,	,	
	Gleyed Matrix (S4)		Umbric Surfa	ace (F13) (MLRA 13	6, 122)	³ Indicators of hydrophytic vegetation and
	Redox (S5)		Piedmont Fl				
	l Matrix (S6) Layer (if observed)		Red Parent	Material (F	21) (MLR	A 127, 147	7) unless disturbed or problematic.
Type:	Layer (ii observed)						
Depth (inc	ches).						Hydric Soil Present? Yes No
Remarks:							nyano den riesent. Tes in the
No indica	ators of hydri	c soils w	vere observed	l during	the si	te visit	- -•

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 05/24/2014
Applicant/Owner: NCDOT	State: NC Sampling Point: WN-WET
Investigator(s): B. Reed & R. Sullivan (Kimley-Horn)	Section, Township, Range: Cedar Fork
Landform (hillslope, terrace, etc.): Gentle hillslope Lo	ocal relief (concave, convex, none): Concave Slope (%): <1%
Subregion (LRR or MLRA): LRR P Lat: 35.831746	Long: -78.811558 Datum: NAD83
Soil Map Unit Name: Altavista fine sandy loam	NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of ye	ear? Yes 🚺 No (If no, explain in Remarks.)
Are Vegetation Soil or Hydrology significantly	v disturbed? Are "Normal Circumstances" present? Yes No
Are Vegetation Soil or Hydrology naturally pro	oblematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Remarks: Yes V No Yes No No	Is the Sampled Area within a Wetland? Yes No
Wetland WN receives stormwater flows from adia	acent commercial development. A portion of the wetland
_	ent. No precipitation was recorded within the 7 days prior
to the site visit (NC CRONOS).	
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) True Aquatic P	
High Water Table (A2) Saturation (A3) Hydrogen Sulfi Oxidized Rhize	ide Odor (C1) Drainage Patterns (B10) Spheres on Living Roots (C3) Moss Trim Lines (B16)
	educed Iron (C4) Dry-Season Water Table (C2)
Sediment Deposits (B2)	eduction in Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3) Thin Muck Sur	
Algal Mat or Crust (B4) Other (Explain Iron Deposits (B5)	in Remarks) Stunted or Stressed Plants (D1) ✓ Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	Δ.
Surface Water Present? Yes No V Depth (inches Water Table Present? Yes No V Depth (inches	
Saturation Present? Yes V No Depth (inches	
(includes capillary fringe)	, <u> </u>
Describe Recorded Data (stream gauge, monitoring well, aerial photo	os, previous inspections), il avaliable.
Remarks:	
	upper 18" of the soil profile. Soil saturation was
•	y commercial development, Evans Road, and a
	ely receives hydrology from stormwater runoff from
the surrounding impervious areas.	

VEGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WN-WET
201	Absolute	Dominant		Dominance Test worksheet:
Tree Stratum (Plot size: 30')		Species?		Number of Dominant Species That Are ORL FACW or FAC: 11
1. Pinus taeda	40%	<u> </u>	FAC	That Are OBL, FACW, or FAC: (A)
2. Salix nigra	20%	<u> </u>	OBL	Total Number of Dominant
3. Acer rubrum	15%	<u> Y</u>	FAC	Species Across All Strata: 11 (B)
4. <u> </u>				Percent of Deminent Species
5				Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)
6				
7				Prevalence Index worksheet:
8.		<u> </u>		Total % Cover of: Multiply by:
	75%	= Total Cov	er	OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')				FACW species x 2 =
1. Morella cerifera	10%	<u>Y</u>	FAC	FAC species x 3 =
2. Acer rubrum	10%	<u> </u>	FAC	FACU species x 4 =
3. Fraxinus pennsylvanica	5%	Y	FACW	UPL species x 5 =
4.				Column Totals: (A) (B)
5				
6	_			Prevalence Index = B/A =
7				Hydrophytic Vegetation Indicators:
7				1 - Rapid Test for Hydrophytic Vegetation
8				X 2 - Dominance Test is >50%
9				3 - Prevalence Index is ≤3.0 ¹
10				4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 30')	<u>25%</u>	= Total Cov	er	data in Remarks or on a separate sheet)
1. Boehmeria cylindrica	2%	Υ	FACW	Problematic Hydrophytic Vegetation ¹ (Explain)
			IACVV	Troblematic Trydrophytic Vegetation (Explain)
2				Indicators of hydric cail and watland hydrology must
3				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
4				Definitions of Four Vegetation Strata:
5				
6				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
7				more in diameter at breast height (DBH), regardless of height.
8				
9				Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1
10				m) tall.
11				
12				Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
	2%	= Total Cov	er	or olze, and woody plants loss than olze it tall.
Woody Vine Stratum (Plot size: 30')				Woody vine – All woody vines greater than 3.28 ft in
1. Campsis radicans	2%	<u> </u>	FAC	height.
2. <u>Smilax rotundifolia</u>	2%	<u> Y</u>	FAC	
3. Vitis rotundifolia	2%	<u> </u>	FAC	
4.Lonicera japonica	2%	<u> </u>	FAC	
5				Hydrophytic
6.		<u> </u>		Vegetation Present? Yes No No
	8%	= Total Cov	er	103 <u></u>
Description (Included to the American Included To Included Inc				
Remarks: (Include photo numbers here or on a separate	•			
The wetland is surrounded by commercial dev				
community appears to have been historically of	cleared du	e to the a	bundanc	ce of young loblolly pines and red maples.

SOIL Sampling Point: WN-WET

Profile Desc	ription: (Describe	to the dep	th needed to docu	ment the i	ndicator	or confirm	the absence	of indicators.)		
Depth				x Feature	<u>s</u> _ 1	. 2				
(inches) 0-4"	Color (moist)	95%	Color (moist)	<u>%</u> 5%	Type ¹	Loc ²	Texture	Remarks		
	10YR 4/2		10YR 5/6		<u>C</u>		Loamy clay			
3-10"	10YR 6/2	90%	10YR 5/6	10%	<u>C</u>	M	Loamy clay	'		
10-18"	10YR 6/1	50%	10YR 7/6	50%	C	M	Clay			
-										
					-					
					-					
1							2			
'Type: C=Ce Hydric Soil		pletion, RM	=Reduced Matrix, M	S=Masked	d Sand Gr	ains.		=Pore Lining, M=Matrix. ators for Problematic Hydric Soils ³ :		
Histosol			Dark Surface	(\$7)			_	cm Muck (A10) (MLRA 147)		
	oipedon (A2)		Polyvalue Be	. ,	ce (S8) (N	/ILRA 147.	_	oast Prairie Redox (A16)		
Black Hi			Thin Dark Su				,	(MLRA 147, 148)		
	en Sulfide (A4)		Loamy Gley	ed Matrix ((F2)		☐ Pi	iedmont Floodplain Soils (F19)		
	d Layers (A5)		✓ Depleted Ma					(MLRA 136, 147)		
	uck (A10) (LRR N)	oo (A11)	Redox Dark	•	,			ery Shallow Dark Surface (TF12)		
	d Below Dark Surfac ark Surface (A12)	Se (ATT)	Depleted Da				Цο	ther (Explain in Remarks)		
. —	lucky Mineral (S1) (LRR N,	Iron-Mangar			LRR N,				
	A 147, 148)		MLRA 13	86)						
	Bleyed Matrix (S4)		Umbric Surfa					icators of hydrophytic vegetation and		
	Redox (S5) I Matrix (S6)		Piedmont Flo					tland hydrology must be present, less disturbed or problematic.		
	Layer (if observed)	•	Red Parent I	viateriai (F	ZI) (IVILK	A 121, 141	r) uni	ess disturbed of problematic.		
Type:		-								
Depth (inc	ches):						Hydric Soil	Present? Yes V No		
Remarks:	<u> </u>						1 '	<u> </u>		
6 11 1										
Soil satu	ration was ob	servea	at 12".							

WETLAND RATING WORKSHEET Fourth version

Wetland WS

Project Name: TIP# U-5811	Nearest road: Aviation Parkway
County: Wake County Wetland area:	13.3 acres Wetland width: 400 feet
Name of Evaluator: J. Hartshorn (Kimley-Horn)	Date: 8/4/2016
Wetland Location	Adjacent land use (within $rac{1}{2}$ mile
X on pond or lake	upstream,upslope, or radius)
on perennial stream	X forested/natural vegetation 70 %
on intermittent stream	agriculture, urban/suburban
within interstream divide	X impervious service 30 %
other:	
	Dominant vegetation
Soil Series	1) Ulmus americana
predominantly organic	2) Microstegium vimineum
(humus, muck, or peat)	3) Acer rubrum
X predominantly mineral	- 100. Tale.a
(non-sandy)	Flooding and wetness
predominantly sandy	X semipermanently to permently flooded
prodominantly suridy	or inundated
Hydrolic factors	seasonally flooded or inundated
steep topography	intermittently flooded or temporary surface water
ditched or channelized X total riparian wetland width ≥ 100 ft	
X total riparian wetland width ≥ 100 ft	no evidence of flooding or surface water
Wetland type (select one)	
X Bottomland hardwood forest	Pine savanna
Headwater forest	Freshwater marsh
Swamp forest	Bog/fen
Wet flat	Ephemeral wetland
Pocosin	Carolina Bay
Bog forest	Other
*The rating system cannot be appllied to salt or brack	rish marshes or stream channels.
D. Water Otenson	weight
R Water Storage 5 x	4.00 = 20
A Bank/Shoreline stabilization 5 x T Pollutant removal 4 x	4.00 = 20 $5.00 = 20$
T Pollutant removal 4 x I Wildlife habitat 4 x	5.00 = <u>20</u> 2.00 = 8
N Aquatic life 4 x	4.00 = 16
G Recreation/Education 5 x	1.00 = 5
<u> </u>	<u>~</u>
	Total Score ¹ 89

 $^{^{1}}$ Add 1 point if in sensitive watershed and >10% nonpoint disturbance within $\frac{1}{2}$ mile radius.

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 8/4/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WS-UP
Investigator(s): J. Hartshorn & W. Sullivan	Section, Township, Range: Cedar Fork
Landform (hillslope, terrace, etc.): Slight hillslope	ocal relief (concave, convex, none): None Slope (%): 1-2%
Subregion (LRR or MLRA): LRR P Lat: 35.839954	Long: <u>-78.807077</u> Datum: NAD83
Soil Map Unit Name: WhA - Warne fine sandy loam, 0 to 2	percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of y	ear? Yes 🗸 No (If no, explain in Remarks.)
Are Vegetation Soil or Hydrology significantly	y disturbed? Are "Normal Circumstances" present? Yes
Are Vegetation Soil or Hydrology naturally pu	oblematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes No V No V	Is the Sampled Area within a Wetland? Yes No
Remarks:	
	vetland WS. Lake Crabtree may occasionally flood
WS-UP, but the hillslope prevents water from	ponding.
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	
Surface Water (A1) High Water Table (A2) True Aquatic F Hydrogen Sulf	
	ospheres on Living Roots (C3) Moss Trim Lines (B16)
	educed Iron (C4) Dry-Season Water Table (C2)
Sediment Deposits (B2)	eduction in Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3)	
Algal Mat or Crust (B4) Other (Explain	
Iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9)	Shallow Aquitard (D3) Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	
Surface Water Present? Yes No Depth (inches	
Water Table Present? Yes No Depth (inches	
Saturation Present? Yes No V Depth (inches (includes capillary fringe)	S): >24" Wetland Hydrology Present? Yes No
Describe Recorded Data (stream gauge, monitoring well, aerial phot	os, previous inspections), if available:
Remarks:	
No hydrology indicators were observed.	
The flydrology indicators were observed.	

	FAC FACU FACU	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A) Total Number of Dominant Species Across All Strata: 7 (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)
Y Y N N N N Total Co Y N N	FAC	That Are OBL, FACW, or FAC:
Y N N N Total Co Y N N	FAC	Total Number of Dominant Species Across All Strata: Percent of Dominant Species That Are OBL, FACW, or FAC: 100% Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species
N N N Total Co Y Y N	FAC FAC FAC FAC FAC FAC FAC FAC	Species Across All Strata: 7 (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)
N N Total Co Y Y N	FAC FAC FAC FAC FACU FAC	Species Across All Strata: 7 (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)
N Total Co Y Y N N	FAC FAC FACU FACU	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)
Total Co Y Y N N	ver FAC FAC FACU FACU	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)
Y Y N	FAC FACU FACU	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)
Y Y N	FAC FACU FACU	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)
Y Y N	FAC FACU FACU	OBL species x 1 = FACW species x 2 = FAC species x 3 = FACU species x 4 = UPL species x 5 = Column Totals: (A)
Y Y N	FAC FACU FACU	FACW species x 2 = FAC species x 3 = FACU species x 4 = UPL species x 5 = Column Totals: (A)
Y Y N	FAC FACU FACU	FAC species x 3 = FACU species x 4 = UPL species x 5 = Column Totals: (A) (B)
Y N N	FAC FACU FAC	FACU species x 4 = UPL species x 5 = Column Totals: (A) (B)
N N	FACU FAC	UPL species x 5 = Column Totals: (A) (B)
N	FAC	UPL species x 5 = Column Totals: (A) (B)
	FAC	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 ≤3.0 ¹
		4 - Morphological Adaptations ¹ (Provide supporting
Total Co	ver	data in Remarks or on a separate sheet)
		Problematic Hydrophytic Vegetation¹ (Explain)
		1 Toblematic Hydrophytic Vegetation (Explain)
		1. Proton of body of body and body body
		¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
		Definitions of Four Vegetation Strata:
		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.
		noight.
		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
Total Co	ver	of size, and woody plants less than 3.28 ft tall.
rotal oo	•••	Woody vine – All woody vines greater than 3.28 ft in
Υ	FAC	height.
Y	FAC	
Y		
		Hydrophytic
		Vegetation Val
Total Co		Present? Yes No
rotal Co	ver	
	Total Co	Total Cover

Sampling Point: WS-UP

SOIL

Profile Desc	ription: (Describe	to the dept	n needed to docu	ment the in	dicator o	r confirm	n the absence of indicators.)
Depth	Matrix	0/		ox Features	- 1	2	Turbus Burnels
(inches) 0-2"	Color (moist) 10YR 3/2	- <u>%</u> - 100%	Color (moist)	%	Type ¹	Loc ²	Texture Remarks Loam
-							·
2-10"	10YR 3/4	100%					Loam
10-16"	10YR 6/3	100%					Loam
16-24"	10YR 6/3	50%					Loam *Split matrix
	10YR 7/4	50%					
¹ Type: C=C	oncentration, D=De	oletion RM-	Reduced Matrix M	S-Masked S	Sand Gra	ins	² Location: PL=Pore Lining, M=Matrix.
Hydric Soil		Dietion, IXIVI	Teduced Matrix, M	0-IVIASKEU (Sand Gra		Indicators for Problematic Hydric Soils ³ :
Histosol	(A1)		Dark Surface	e (S7)			2 cm Muck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue Be				, 148) Coast Prairie Redox (A16)
	stic (A3)		Thin Dark S	. ,	•	47, 148)	(MLRA 147, 148)
	en Sulfide (A4) d Layers (A5)		Loamy Gley Depleted Ma		2)		Piedmont Floodplain Soils (F19) (MLRA 136, 147)
	uck (A10) (LRR N)		Redox Dark		6)		Very Shallow Dark Surface (TF12)
	d Below Dark Surfac	ce (A11)	Depleted Da				Other (Explain in Remarks)
_	ark Surface (A12)		Redox Depr				
	1ucky Mineral (S1) (A 147, 148)	LRR N,	☐ Iron-Mangar MLRA 13		s (F12) (L	.RR N,	
	Gleyed Matrix (S4)		Umbric Surfa	•	/ILRA 136	6. 122)	³ Indicators of hydrophytic vegetation and
	Redox (S5)		Piedmont Fl				
	Matrix (S6)		Red Parent	Material (F2	1) (MLR	A 127, 147	7) unless disturbed or problematic.
	Layer (if observed)	:					
Type:							
Depth (in	ches):						Hydric Soil Present? Yes No
Remarks:							
No hydri	c soil indicate	ors, wate	r table, or sa	aturation	were	observ	ved.
,		,	•				

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 8/4/2016							
Applicant/Owner: NCDOT	State: NC Sampling Point: WS-WET							
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn)	Section, Township, Range: Cedar Fork							
Landform (hillslope, terrace, etc.): Bottomland Lo	ocal relief (concave, convex, none): None Slope (%): <1%							
Subregion (LRR or MLRA): <u>LRR P</u> Lat: <u>35.840087</u> Long: <u>-78.806991</u> Datum: NAD83								
Soil Map Unit Name: WhA - Warne fine sandy loam, 0 to 2	Soil Map Unit Name: WhA - Warne fine sandy loam, 0 to 2 percent slopes NWI classification: PFO1C							
Are climatic / hydrologic conditions on the site typical for this time of ye	ear? Yes 🚺 No (If no, explain in Remarks.)							
Are Vegetation Soil or Hydrology significantly	y disturbed? Are "Normal Circumstances" present? Yes							
Are Vegetation Soil or Hydrology naturally pr	roblematic? (If needed, explain any answers in Remarks.)							
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, transects, important features, etc.							
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Remarks: Yes V No Yes No No Remarks:	Is the Sampled Area within a Wetland? Yes No							
	to Lake Crabtree. Drift deposits and alluvial sediment							
indicate frequent flooding of depths up to 3'.	to take crabines. Drint deposits and allavial scalinent							
indicate frequent hooding of depths up to 3.								
HYDROLOGY								
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)							
Primary Indicators (minimum of one is required: check all that apply)	Surface Soil Cracks (B6)							
Surface Water (A1)								
High Water Table (A2) Hydrogen Sulf								
	ospheres on Living Roots (C3) Moss Trim Lines (B16) educed Iron (C4) Dry-Season Water Table (C2)							
	eduction in Tilled Soils (C6) Crayfish Burrows (C8)							
Drift Deposits (B3)	· · · · · · · · · · · · · · · · · · ·							
Algal Mat or Crust (B4) Other (Explain	in Remarks) Stunted or Stressed Plants (D1)							
Iron Deposits (B5)	Geomorphic Position (D2)							
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)							
Water-Stained Leaves (B9)	Microtopographic Relief (D4) FAC-Neutral Test (D5)							
Aquatic Fauna (B13) Field Observations:	FAC-Neutral Test (D5)							
Surface Water Present? Yes No V Depth (inches	s):							
Water Table Present? Yes No V Depth (inches	, and the second							
Saturation Present? Yes No Depth (inches								
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial phot	os, previous inspections), if available:							
Remarks:								
· · · · · · · · · · · · · · · · · · ·	d forest. WS transitions to an emergent wetland with							
a stunted canopy and understory closer to Lak	ke Crabtree.							

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WS-WET
	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30')		Species?		Number of Dominant Species
1. Ulmus americana	40%	Y	FACW	That Are OBL, FACW, or FAC: (A)
2 <u>.</u> Acer rubrum	20%	<u>Y</u>	FAC	Total Number of Descinant
3. Pinus taeda	15%	N	FAC	Total Number of Dominant Species Across All Strata: 7 (B)
4. Betula nigra	10%	N	FACW	(2)
5	_			Percent of Dominant Species That Are OBL FACW or FAC: 85.7%
				That Are OBL, FACW, or FAC: 63.7 70 (A/B)
6				Prevalence Index worksheet:
7				Total % Cover of: Multiply by:
8	050/			OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')	85%	= Total Cov	er	FACW species x 2 =
1. Ulmus alata	10%	Υ	FACU	FAC species x 3 =
2. Liquidambar styraciflua	10%	<u> </u>	FAC	
			FAC	FACU species x 4 =
3				UPL species x 5 =
4				Column Totals: (A) (B)
5				Dravalance Index - P/A -
6				Prevalence Index = B/A =
7				Hydrophytic Vegetation Indicators:
8				1 - Rapid Test for Hydrophytic Vegetation
9		<u> </u>		X 2 - Dominance Test is >50%
10				3 - Prevalence Index is ≤3.0 ¹
	20%	= Total Cov		4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 30')	2070	= 10ta100V	Ci	data in Remarks or on a separate sheet)
1. Microstegium vimineum	25%	Υ	FAC	Problematic Hydrophytic Vegetation ¹ (Explain)
2. Juncus effusus	15%	<u> </u>	FACW	
3. Polygonum sp.	10%	N	FAC	¹ Indicators of hydric soil and wetland hydrology must
4. Boehmeria cylindrica	10%	N	FACW	be present, unless disturbed or problematic.
5. Carex sp.	<u>10 / 0</u> 5%	N	FAC	Definitions of Four Vegetation Strata:
6. Rubus argutus	<u>5%</u>	N N		Trans Manda plants analysis a single (7.0 cm)
	370		FACU	Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of
7				height.
8				Canling/Charle Was double at a control of a control of
9				Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1
10				m) tall.
11				Harb All borbossous (non woods) plants regardless
12				Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
	70%	= Total Cov	er	
Woody Vine Stratum (Plot size: 30')				Woody vine – All woody vines greater than 3.28 ft in
1. Toxicodendron radicans	5%	<u> </u>	FAC	height.
2				
3				
4				
5.				Hydrophytic
6.		<u> </u>		Vegetation Present? Yes No No
5	5%	= Total Cov	er	100 <u></u>
		_ 10tai 007		
Remarks: (Include photo numbers here or on a separate	e sneet.)			

Sampling Point: WS-WET

Sampling Point: WS-WET											
Profile Desc	ription: (Describe	to the dep	th need	ded to docu	ment the i	ndicator	or confirm	the absence			
Depth	Matrix				ox Features		2				
(inches)	Color (moist)	<u>%</u>	Col	or (moist)	%	Type ¹	Loc ²	<u>Texture</u>		Remarks	
0-4"	10YR 4/3	100%						Clay loam			
4-16"	10YR 5/2	60%	7.5Y	5/4	40%	<u>C</u>	<u>M</u>	Loamy clay	/		
16-24"	10YR 5/1	90%	7.5Y	5/6	10%	С	М	Loamy clay	/		
											_
											_
											_
					· ——						
	oncentration, D=Dep	letion, RM	=Reduc	ed Matrix, M	IS=Masked	Sand G	rains.	² Location: PL			3
Hydric Soil I										roblematic Hy	
Histosol	• •		H	Dark Surface		oo (CO) (I	MI DA 447			A10) (MLRA 1 4	47)
Black His	pipedon (A2)		H	Polyvalue Be Thin Dark St				148)	oast Prairie MLRA 14)	Redox (A16)	
	n Sulfide (A4)			Loamy Gley	, ,	•	,,	ПР		oodplain Soils (F19)
	Layers (A5)		$\overline{\mathbf{A}}$	Depleted Ma	` ,			_	(MLRA 13		
_	ick (A10) (LRR N)	(0.4.4)	H	Redox Dark	,	,				v Dark Surface	
	d Below Dark Surface ark Surface (A12)	e (A11)	Ħ	Depleted Da Redox Depr					πner (Expia	in in Remarks)	
	lucky Mineral (S1) (L	.RR N,		Iron-Mangar			(LRR N,				
MLRA	A 147, 148)			MLRA 13		, ,					
	leyed Matrix (S4)		닏	Umbric Surfa						ydrophytic veg	
	edox (S5) Matrix (S6)		H	Piedmont Flored Parent						logy must be pled or problema	
	_ayer (if observed):		Ш	Neu Faieiii	iviateriai (F	21) (IVILI	XA 127, 147	T un	iess distuit	ed of problems	alic.
Type:											
Depth (inc	ches):							Hydric Soil	Present?	Yes 🗸	No
Remarks:	<u> </u>							,			
NIk							+ \\(\)				
ivo watei	r table or satu	iration	was (observed	i at data	a poin	t WS-W	EI.			

WETLAND RATING WORKSHEET Fourth version

Wetland WT

Project Name: TIP# U-5811	Nearest road: Aviation Parkway
County: Wake County Wetland area:	0.4 acres Wetland width: 200 feet
Name of Evaluator: R. Sullivan (Kimley-Horn)	Date: 5/13/2014
	1
Wetland Location on pond or lake	Adjacent land use (within ½ mile upstream,upslope, or radius)
X on perennial stream	X forested/natural vegetation 65 %
on intermittent stream	X agriculture, urban/suburban 10 %
within interstream divide	X impervious service 25 %
other:	<u></u>
	Dominant vegetation
Soil Series	1) Microstegium vimineum
predominantly organic	2) Murdannia keisak
(humus, muck, or peat)	3) Salix nigra
X predominantly mineral	
(non-sandy)	Flooding and wetness
predominantly sandy	semipermanently to permently flooded
	or inundated
Hydrolic factors	X seasonally flooded or inundated
steep topography	intermittently flooded or temporary
ditched or channelized	surface water
Xtotal riparian wetland width ≥ 100 ft	no evidence of flooding or surface water
Wetland type (select one)	
X Bottomland hardwood forest	Pine savanna
Headwater forest	Freshwater marsh Bog/fen
Swamp forest Wet flat	Ephemeral wetland
Pocosin	Carolina Bay
Bog forest	Other
*The rating system cannot be appllied to salt or brace	ckish marshes or stream channels.
	weight
R Water Storage 3 x	
A Bank/Shoreline stabilization 3 x T Pollutant removal 3 x	
T Pollutant removal 3 x I Wildlife habitat 3 x	
N Aquatic life 3 x	
G Recreation/Education 2 x	
	Total Score ¹ 59

 $^{^{1}}$ Add 1 point if in sensitive watershed and >10% nonpoint disturbance within $\frac{1}{2}$ mile radius.

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 08/3/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WT-UP
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn)	
Landform (hillslope, terrace, etc.): Slight hillslope Lo	•
Subregion (LRR or MLRA): LRR P Lat: 35.832288	Long: -78.815572 Datum: NAD83
Soil Map Unit Name: Creedmoor silt loam	NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of ye	
Are Vegetation Soil or Hydrology significantly	
Are Vegetation Soil or Hydrology naturally pr	· —
· · · · · · · · · · · · · · · · · · ·	g sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes ✓ No ✓ Yes No ✓	Is the Sampled Area within a Wetland? Yes No
The data point WT-UP is located approximate point WT-WET.	ly 40' east from and 1' higher than the wetland data
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	· · ·
Surface Water (A1) High Water Table (A2) Hydrogen Sulfi	
High Water Table (A2) Saturation (A3) Hydrogen Sulfi	ide Odor (C1) Drainage Patterns (B10) ospheres on Living Roots (C3) Moss Trim Lines (B16)
	educed Iron (C4) Dry-Season Water Table (C2)
	eduction in Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3)	
Algal Mat or Crust (B4) Other (Explain	
Iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9)	Shallow Aquitard (D3) Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	
Surface Water Present? Yes No Depth (inches	
Water Table Present? Yes No V Depth (inches	
Saturation Present? Yes No Depth (inches (includes capillary fringe)	S): >16" Wetland Hydrology Present? Yes No No
Describe Recorded Data (stream gauge, monitoring well, aerial photo	os, previous inspections), if available:
Remarks:	
No indicators of wetland hydrology were obser	rved at WT-UP during the site visit. Neither the water
table nor soil saturation were observed within	
table flor soil saturation were observed within	the upper to or the son prome.

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WT-UP
	Absolute	Dominant	Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size: <u>30'</u>)			Status	Number of Dominant Species
1. Quercus alba	30%	<u>Y</u>	FACU	That Are OBL, FACW, or FAC: (A)
2. Pinus taeda	30%	<u> </u>	FAC	Total Number of Dominant
3. Acer rubrum	20%	<u>Y</u>	FAC	Species Across All Strata: 8 (B)
4. Quercus phellos	15%	N	FAC	Descent of Deminent Charles
5				Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)
6				
7				Prevalence Index worksheet:
8.				Total % Cover of: Multiply by:
	95%	= Total Cov	er	OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')				FACW species x 2 =
1. Fraxinus pennsylvanica	10%	<u>Y</u>	<u>FACW</u>	FAC species x 3 =
2. Nyssa sylvatica	5%	Υ	FAC	FACU species x 4 =
3. Cornus florida	5%	<u> </u>	FACU	UPL species x 5 =
4. Vaccinium fuscatum	5%	<u>Y</u>	FAC	Column Totals: (A) (B)
5				
6				Prevalence Index = B/A =
7				Hydrophytic Vegetation Indicators:
8				1 - Rapid Test for Hydrophytic Vegetation
9				X 2 - Dominance Test is >50%
10.				3 - Prevalence Index is ≤3.0 ¹
	25%	= Total Cov		4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 30')	2370	- 10tai 00V	O1	data in Remarks or on a separate sheet)
1. None				Problematic Hydrophytic Vegetation ¹ (Explain)
2				
3				¹ Indicators of hydric soil and wetland hydrology must
4				be present, unless disturbed or problematic.
5				Definitions of Four Vegetation Strata:
6				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
				more in diameter at breast height (DBH), regardless of
7	_			height.
9.	_			Sapling/Shrub – Woody plants, excluding vines, less
				than 3 in. DBH and greater than or equal to 3.28 ft (1
10				m) tall.
11				Herb – All herbaceous (non-woody) plants, regardless
12				of size, and woody plants less than 3.28 ft tall.
Woody Vine Stratum (Plot size: 30')		= Total Cov	er	Woody vine – All woody vines greater than 3.28 ft in
1. Vitis rotundifolia	5%	Υ	FAC	height.
•				
3				
4				Hydrophytic
5				Vegetation 🗸
6				Present? Yes No
	<u>5%</u>	= Total Cov	er	
Remarks: (Include photo numbers here or on a separate	sheet.)			
No morphological adaptations for wetland cor	nditions we	re observ	ed durin	g the site visit.
				-

Sampling Point: WT-UP

SOIL

Profile Desc	ription: (Describe t	o the dep	th needed to docum	ent the i	ndicator o	or confirm	n the absence of indicators.)
Depth	Matrix			K Features		2	
(inches)	Color (moist)	<u>%</u>	Color (moist)	%	Type ¹	Loc ²	Texture Remarks
0-6"	10YR 4/3	100%					Loam
6-10"	10YR 6/4	70%	10YR 5/8	30%	Mottle	<u>M</u>	Loam
10-16"	10YR 6/4	70%	10YR 5/6	30%			Loam
	-						
							· — — — — — — — — — — — — — — — — — — —
							-
							- ————————————————————————————————————
		etion, RM:	=Reduced Matrix, MS	S=Masked	Sand Gra	ains.	² Location: PL=Pore Lining, M=Matrix.
Hydric Soil I							Indicators for Problematic Hydric Soils ³ :
Histosol	` '		Dark Surface	` '	oo (CO) (M	II D A 147	2 cm Muck (A10) (MLRA 147) , 148) Coast Prairie Redox (A16)
Black His	pipedon (A2)		Polyvalue Be Thin Dark Su				(MLRA 147, 148)
	n Sulfide (A4)		Loamy Gleye			,,	Piedmont Floodplain Soils (F19)
	Layers (A5)		Depleted Mat		,		(MLRA 136, 147)
	ck (A10) (LRR N)		Redox Dark S	•			Very Shallow Dark Surface (TF12)
	Below Dark Surface	e (A11)	Depleted Dar				Other (Explain in Remarks)
	irk Surface (A12) lucky Mineral (S1) (L	RR N	Redox Depre			RRN	
	147, 148)	,	MLRA 136		C3 (1 12) (1	-1111 14,	
	leyed Matrix (S4)		Umbric Surfa	•	MLRA 13	6, 122)	³ Indicators of hydrophytic vegetation and
	edox (S5)		Piedmont Flo				
	Matrix (S6)		Red Parent M	laterial (F	21) (MLR	A 127, 147	7) unless disturbed or problematic.
	.ayer (if observed):						
Type:	.l \						Undria Sail Brasant2 Vas
Depth (inc	:nes):						Hydric Soil Present? Yes No
Remarks:							
No indica	ators of hydric	soils v	vere observed	at dat	a point	: WT-U	P during the site visit. Neither the
water tal	ble nor soil sa	turatio	n were observ	ed with	hin the	first 10	6" of the soil profile.
							•

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 08/3/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WT-WET
Investigator(s): B. Reed & R. Sullivan (Kimley-Horn)	
Landform (hillslope, terrace, etc.): Floodplain Lo	ocal relief (concave, convex, none): Concave Slope (%): 0-1%
Subregion (LRR or MLRA): LRR P Lat: 35.832081	Long: <u>-78.815701</u> Datum: NAD83
Soil Map Unit Name: Creedmoor silt loam	NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of ye	
Are Vegetation Soil or Hydrology significantly	y disturbed? Are "Normal Circumstances" present? Yes No
Are Vegetation Soil or Hydrology naturally pr	roblematic? (If needed, explain any answers in Remarks.)
	g sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes V No Yes No No	Is the Sampled Area within a Wetland? Yes No
Remarks: Wetland WT is a bottomland floodplain adjace	ent (north) to Stream SD
Wedand Willis a bottomiand hoodplain adjace	sit (north) to stream SF.
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	
Surface Water (A1)	Plants (B14) Sparsely Vegetated Concave Surface (B8)
High Water Table (A2) Hydrogen Sulf	
	ospheres on Living Roots (C3) Moss Trim Lines (B16)
	educed Iron (C4) Dry-Season Water Table (C2) eduction in Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3) Thin Muck Sur	
Algal Mat or Crust (B4) Other (Explain	n in Remarks) Stunted or Stressed Plants (D1)
Iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9) Aquatic Fauna (B13)	Microtopographic Relief (D4) FAC-Neutral Test (D5)
Field Observations:	FAC-Neutral Test (D5)
Surface Water Present? Yes No V Depth (inches	s)·
Water Table Present? Yes No V Depth (inches	, and the second
Saturation Present? Yes No V Depth (inches	
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial phot	
Describe Necorded Data (Stream gauge, monitoring well, aerial prior	os, previous inspections), il available.
Remarks:	
Soil was moist at 16" at data point WT-WET. I	However, no soil saturation or water table was
	as observed within the wetland at approximately 3"
deep. Hydrology mainly from groundwater and	
1	

/EGETATION (Four Strata) – Use scientific ı	Sampling Point: WT-WET				
	Absolute	Dominant		Dominance Test worksheet:	
<u>Tree Stratum</u> (Plot size: <u>30'</u>)		Species?		Number of Dominant Species	
1. Salix nigra	15%	<u>Y</u>	OBL	That Are OBL, FACW, or FAC: 9 (A)	
2. Quercus phellos	10%	Y	FAC	Total Number of Dominant	
3. Fraxinus pennsylvanica	10%	Υ	FACW	Species Across All Strata: 11 (B)	
4					
5				Percent of Dominant Species That Are OBL, FACW, or FAC: 81.8% (A/B)	
6.				mat Ale ODE, I AOW, OI I AO.	
7	1			Prevalence Index worksheet:	
8				Total % Cover of: Multiply by:	
<u> </u>	35%	= Total Cov		OBL species x 1 =	
Sapling/Shrub Stratum (Plot size: 15')	33 70	- 10tai 00v	GI	FACW species x 2 =	
1. Salix nigra	10%	<u>Y</u>	OBL	FAC species x 3 =	
2. Liquidambar styraciflua	5%	Y	FAC	FACU species x 4 =	
3. Quercus phellos	5%	Y	FAC	UPL species x 5 =	
4. Ulmus americana	5%		FACW	Column Totals: (A) (B)	
Rubus aroutus	5%	Y	FACU	(-)	
· · · · · · · · · · · · · · · · · · ·			*****	Prevalence Index = B/A =	
6	_			Hydrophytic Vegetation Indicators:	
7				1 - Rapid Test for Hydrophytic Vegetation	
8				X 2 - Dominance Test is >50%	
9				3 - Prevalence Index is ≤3.0 ¹	
10				4 - Morphological Adaptations ¹ (Provide supporting	
Herb Stratum (Plot size: 5')	30%	= Total Cov	er	data in Remarks or on a separate sheet)	
1. Microstegium vimineum	45%	Υ	FAC	Problematic Hydrophytic Vegetation ¹ (Explain)	
2. Murdannia keisak	35%	<u> </u>	OBL	residing riyalophytic vegetation (Explain)	
3. Juncus effusus	10%			¹ Indicators of hydric soil and wetland hydrology must	
			FACW	be present, unless disturbed or problematic.	
4. Typha latifolia	<u>5%</u>	<u>N</u>	OBL	Definitions of Four Vegetation Strata:	
5. Carex sp.			FAC		
6	_			Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or	
7	_			more in diameter at breast height (DBH), regardless of height.	
8					
9				Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1	
10				m) tall.	
11				Hart All back and a constant and a last a constant	
12				Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.	
	100%	= Total Cov	er		
Woody Vine Stratum (Plot size: 30')				Woody vine – All woody vines greater than 3.28 ft in	
1.Parthenocissus quinquefolia	5%	<u> </u>	FACU	height.	
2					
3					
4	_				
5				Hydrophytic Vegetation	
6				Present? Yes No No	
	5%	= Total Cov	er		
Remarks: (Include photo numbers here or on a separate	shoot)				
There is a distinct change in vegetation betwe			•		
groundcover of herbaceous plants adapted for	hydric en	vironmen	ts (Junci	us, Typha, Murdannia).	

Sampling Point: WT-WET

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth Matrix Redox Features								
(inches)	Color (moist)	<u>%</u>	Color (moist)	%	Type ¹	Loc ²	Texture	Remarks
0-4"	7.5YR 4/2	70%	10YR 4/4	30%	С	M	Clay loam	
4-10"	7.5YR 5/2	65%	7.5YR 4/6	35%			Loam clay	
10-16"+	7.5YR 4/1	60%	7.5YR 5/8	40%			Clay	
	,	-		-				
								_
1 _{Typo: C-C}	oncontration D_Don	olotion PM	=Reduced Matrix, M	S-Mackov	d Sand Gr	oine	² Location: PL=Pore	Lining M-Matrix
Hydric Soil		Dietion, Kivi	=Reduced Matrix, Mi	S=IVIASKE	J Sanu Gi	allis.	Indicators f	or Problematic Hydric Soils ³ :
Histosol			Dark Surface	(S7)			_	uck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue Be	` '	ice (S8) (N	ILRA 147,		Prairie Redox (A16)
	istic (A3)		Thin Dark Su					A 147, 148)
	en Sulfide (A4)		Loamy Gleye	ed Matrix	(F2)		Piedmo	nt Floodplain Soils (F19)
	d Layers (A5)		✓ Depleted Ma					RA 136, 147)
	uck (A10) (LRR N)	(8.4.4)	Redox Dark	•	,		_	nallow Dark Surface (TF12)
	d Below Dark Surfac ark Surface (A12)	e (A11)	Depleted Da				U Otner (Explain in Remarks)
	Aucky Mineral (S1) (I	I RR N	Iron-Mangan			I RR N		
	A 147, 148)	,	MLRA 13			,		
1 1	Gleyed Matrix (S4)		Umbric Surfa	•	(MLRA 13	6, 122)	³ Indicators	s of hydrophytic vegetation and
Sandy F	Redox (S5)		Piedmont Flo	odplain S	oils (F19)	(MLRA 14	18) wetland h	nydrology must be present,
	Matrix (S6)		Red Parent N	Material (F	21) (MLR	A 127, 147	7) unless di	sturbed or problematic.
	Layer (if observed):	:						
Type:								
Depth (in	ches):						Hydric Soil Prese	ent? Yes V No
Remarks:								
Neither t	the water tabl	le nor s	oil saturation	was of	serve	l at dat	a noint WT-W	ET during the site visit.
			observed pon				a point III II	ET daring the site visit.
HOWEVE	i, suitace wat	.ci was	observed pori	ucu III	wedai	iu vv i .		

WETLAND RATING WORKSHEET Fourth version

Wetland WU

Project Name:	TIP# U-5811		Nearest road: Aviation Parkway						
County: Wake	County Wetland area:	1.7 acres	s Wetland w	vidth: 35	50 feet				
Name of Evaluate	or: J. Hartshorn (Kimley-Horn)		[Date:	8/3/2016				
Wetland Locatio	on	Adja	cent land use (w	ithin ½ mile					
on pon	nd or lake	_	ream,upslope, o						
X on pere	ennial stream	X	X forested/natural vegetation 60						
on inte	rmittent stream	X	agriculture, urb	an/suburban	<u>20</u> %				
within i	interstream divide	X	impervious serv	vice	<u> </u>				
other:									
		Dom	inant vegetation						
Soil Series		1)	Quercus phello	s					
	ninantly organic	2)	Fraxinus penns	sylvanica					
(humus	s, muck, or peat)	3)	Pinus taeda						
	ninantly mineral								
(non-sa		Floo	Flooding and wetness						
predon	ninantly sandy		_semipermanen	tly to perment	tly flooded				
			or inundated						
Hydrolic factors	i		seasonally flooded or inundated						
	topography	X							
	d or channelized		surface water						
X total rip	parian wetland width ≥ 100 ft		_no evidence of	flooding or su	ırface water				
Wetland type (se	elect one)								
X	Bottomland hardwood forest		Pine savanna						
	Headwater forest		Freshwater marsh						
	Swamp forest		Bog/fen						
	Wet flat		Ephemeral wetland						
	Pocosin Bog forest		_ Carolina Bay Other						
*The notice of a content			_						
The rating system	m cannot be appllied to salt or bra		es or stream char	ineis.					
R	Water Storage 2	x weight 4.00		8					
		x 4.00		12					
T		x 5.00	= -	15					
I	Wildlife habitat 3	x 2.00	=	6					
N		x 4.00	=	12					
G	Recreation/Education 2	x 1.00	=	2					
		Т	otal Score ¹	55_					

 $^{^{1}}$ Add 1 point if in sensitive watershed and >10% nonpoint disturbance within $\frac{1}{2}$ mile radius.

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 8/3/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WU-UP
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn)	
Landform (hillslope, terrace, etc.): Hummock	ocal relief (concave, convex, none): None Slope (%): <1%
Subregion (LRR or MLRA): LRR P Lat: 35.827961	
Soil Map Unit Name: WhA - Warne fine sandy loam, 0 to 2	
Are climatic / hydrologic conditions on the site typical for this time of y	
	ly disturbed? Are "Normal Circumstances" present? Yes Vo
	roblematic? (If needed, explain any answers in Remarks.)
, , , , , , , , , , , , , , , , , , ,	g sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes No V No V	Is the Sampled Area within a Wetland? Yes No
Remarks:	
	sed of dry hummocks that extend into the wetland. No
water-stained leaves or debris piles are prese	ent on the hummocks.
HYDROLOGY	Occasional des des l'estant (minimum efferen no prince d'
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply Surface Water (A1) True Aquatic	· · · · · · · · · · · · · · · · · · ·
	fide Odor (C1) Spaisely Vegetated Concave Surface (B6)
	cospheres on Living Roots (C3) Moss Trim Lines (B16)
	Reduced Iron (C4) Dry-Season Water Table (C2)
Sediment Deposits (B2)	Reduction in Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3)	• • • • • • • • • • • • • • • • • • • •
	n in Remarks) Stunted or Stressed Plants (D1)
Iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7) Water-Stained Leaves (B9)	Shallow Aquitard (D3) Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	
Surface Water Present? Yes No Depth (inche	s):
Water Table Present? Yes No V Depth (inche	
Saturation Present? Yes No Depth (inche	
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial pho	tos, previous inspections), if available:
Remarks:	
No hydrology indicators were observed at WL	J-UP.

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WU-UP
	Absolute	Dominant	Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size: <u>30'</u>)		Species?	Status	Number of Dominant Species
_{1.} Pinus taeda	40%	Y	FAC	That Are OBL, FACW, or FAC: 8 (A)
2. Quercus rubra	10%	<u>Y</u>	FACU	Total Number of Deminent
3				Total Number of Dominant Species Across All Strata: 10 (B)
4				
5				Percent of Dominant Species That Are ORL FACILY or FAC: 80%
6				That Are OBL, FACW, or FAC: (A/B)
				Prevalence Index worksheet:
7		· 		Total % Cover of: Multiply by:
8. <u> </u>	F00/			OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30'	50%	= Total Cov	er	FACW species x 2 =
1. Ulmus americana	10%	Υ	FACW	FAC species x 3 =
2. Acer rubrum	5%	Y	FAC	FACU species x 4 =
3. Pinus taeda	5%	<u>'</u>	FAC	
				UPL species x 5 =
4. Liquidambar styraciflua	5%	<u>Y</u>	FAC	Column Totals: (A) (B)
5				Prevalence Index = B/A =
6	_			Hydrophytic Vegetation Indicators:
7				
8				1 - Rapid Test for Hydrophytic Vegetation
9				X 2 - Dominance Test is >50%
10				3 - Prevalence Index is ≤3.0 ¹
	25%	= Total Cov	er	4 - Morphological Adaptations (Provide supporting
Herb Stratum (Plot size: 30')				data in Remarks or on a separate sheet)
1. Rubus argutus	5%	<u> </u>	FACU	Problematic Hydrophytic Vegetation ¹ (Explain)
2. Microstegium vimineum	5%	Υ	FAC	
3				¹ Indicators of hydric soil and wetland hydrology must
4				be present, unless disturbed or problematic.
5				Definitions of Four Vegetation Strata:
				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
6				more in diameter at breast height (DBH), regardless of
7	_			height.
8				Sapling/Shrub – Woody plants, excluding vines, less
9	_			than 3 in. DBH and greater than or equal to 3.28 ft (1
10		· 		m) tall.
11				Herb – All herbaceous (non-woody) plants, regardless
12	_			of size, and woody plants less than 3.28 ft tall.
201	10%	= Total Cov	er	Was business Allowed by San
Woody Vine Stratum (Plot size: 30')	100/	V	EAC	Woody vine – All woody vines greater than 3.28 ft in height.
1. Campsis radicans	10%	<u>Y</u>	FAC	noight.
2. <u>Toxicodendron radicans</u>	10%	<u>Y</u>	<u>FAC</u>	
3	_			
4	_			
5	_			Hydrophytic Vegetation
6				Present? Yes No No
	20%	= Total Cov	er	
Remarks: (Include photo numbers here or on a separate	choot \			
Tremarks. (include prioto numbers here of on a separate	Silect.)			

Sampling Point: WU-UP

Profile Desc	ription: (Describe	to the dep	th needed to docu	ment the ir	ndicator	or confirm	the absence of indicators.)	
Depth	Matrix			ox Features		. 2		
(inches)	Color (moist)	<u>%</u>	Color (moist)	%	Type ¹	Loc ²	Texture Remarks	<u> </u>
0-4"	10YR 4/3	100%					Loam	
4-24"	10YR 6/3	80%	10YR 5/6	20%	<u>C</u>	M	Loam	
	-							
¹ Type: C=Co	oncentration, D=Dep	oletion, RM:	=Reduced Matrix, M	S=Masked	Sand Gr	ains.	² Location: PL=Pore Lining, M=Matrix.	
Hydric Soil I			, , , , , , , , , , , , , , , , , , , ,				Indicators for Problematic Hydr	ic Soils³:
Histosol	(A1)		Dark Surface	e (S7)			2 cm Muck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue B				148) Coast Prairie Redox (A16)	
Black Hi			Thin Dark S			147, 148)	(MLRA 147, 148)	
	n Sulfide (A4)		Loamy Gley		- 2)		Piedmont Floodplain Soils (F	19)
	d Layers (A5) ick (A10) (LRR N)		Depleted Ma		6)		(MLRA 136, 147) Very Shallow Dark Surface (7	ΓΕ12)
	d Below Dark Surfac	e (A11)	Depleted Da	,	,		Other (Explain in Remarks)	1 12)
	ark Surface (A12)	(****)	Redox Depr					
	lucky Mineral (S1) (LRR N,	Iron-Mangar			LRR N,		
	A 147, 148)		MLRA 13	•				
	Sleyed Matrix (S4)		Umbric Surfa				³ Indicators of hydrophytic vegeta	
	ledox (S5)		Piedmont Fl				· · · · · · · · · · · · · · · · · · ·	
	Matrix (S6) _ayer (if observed)	•	Red Parent	iviateriai (F2	21) (WILK	A 127, 147	unless disturbed or problemation	U.
Type:	Layer (ii observed)	•						
Depth (inc	chec):						Hydric Soil Present? Yes	No √
	51100).						Tryuno com resent.	
Remarks:								
Soils are dry and friable. No water table or saturation was observed.								

Project/Site: TIP# U-5811	City/County: Wake County	Sampling Date: 8/3/2016						
Applicant/Owner: NCDOT		: NC Sampling Point: WU-WET						
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn)	Section, Township, Range: Cedar Fo	ork						
Landform (hillslope, terrace, etc.): Bottomland L	ocal relief (concave, convex, none): Co							
Subregion (LRR or MLRA): <u>LRR P</u> Lat: <u>35.828618</u> Long: <u>-78.817180</u> Datum: NAD83								
Soil Map Unit Name: WhA - Warne fine sandy loam, 0 to 2	percent slopes NV	VI classification: PFO1C						
Are climatic / hydrologic conditions on the site typical for this time of y	ear? Yes 🚺 No (If no, ex	xplain in Remarks.)						
Are Vegetation Soil or Hydrology significant	y disturbed? Are "Normal Circum:	stances" present? Yes No						
Are Vegetation Soil or Hydrology naturally p	roblematic? (If needed, explain a	any answers in Remarks.)						
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, tra	ansects, important features, etc.						
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Remarks: Yes V No	Is the Sampled Area within a Wetland?	ves No No						
WU is a bottomland forest within the larger floor	Inlain of Crahtree Creek A s	anitary sewer utility easement						
near the study area boundary appears to have n	•	,						
fragmented by dry hummocks.	3							
HYDROLOGY								
Wetland Hydrology Indicators:	Second	dary Indicators (minimum of two required)						
Primary Indicators (minimum of one is required: check all that apply	Su	rface Soil Cracks (B6)						
Surface Water (A1) True Aquatic		arsely Vegetated Concave Surface (B8)						
		ainage Patterns (B10) oss Trim Lines (B16)						
		y-Season Water Table (C2)						
Sediment Deposits (B2)	eduction in Tilled Soils (C6)	ayfish Burrows (C8)						
Drift Deposits (B3) Algel Met ex Cruet (B4) Other (Exploit	` ′	turation Visible on Aerial Imagery (C9) unted or Stressed Plants (D1)						
Algal Mat or Crust (B4) Other (Explain Iron Deposits (B5)	′ == i	eomorphic Position (D2)						
Inundation Visible on Aerial Imagery (B7)		allow Aquitard (D3)						
✓ Water-Stained Leaves (B9)		crotopographic Relief (D4)						
Aquatic Fauna (B13)	FA	.C-Neutral Test (D5)						
Field Observations: Surface Water Present? Yes No Depth (incher	s)·							
Water Table Present? Yes No Depth (inche	· •							
Saturation Present? Yes No Depth (inche		gy Present? Yes No						
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial pho	tos, previous inspections), if available:							
Powerla								
Remarks:								
WU is a bottomland forest that appears to be	•							
and significant rain events. Debris piles and d	rift deposits were present a	at the base of many trees.						

/EGETATION (Four Strata) – Use scientific i	names of	plants.		Sampling Point: WU-WET
	Absolute	Dominant	Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size: <u>30'</u>)		Species?		Number of Dominant Species
1. Quercus phellos	30%	<u> </u>	FAC	That Are OBL, FACW, or FAC: 8 (A)
2. Fraxinus pennsylvanica	20%	<u>Y</u>	<u>FACW</u>	Total Number of Dominant
3. Pinus taeda	10%	<u>N</u>	FAC	Species Across All Strata: 9 (B)
4.				Barrella (Barriana (Orania)
5				Percent of Dominant Species That Are OBL, FACW, or FAC: 89% (A/B)
6				
7				Prevalence Index worksheet:
8				Total % Cover of: Multiply by:
	60%	= Total Cov	er	OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')				FACW species x 2 =
1. Acer rubrum	10%	Y	FAC	FAC species x 3 =
2. Ulmus americana	10%	<u>Y</u>	FACW	FACU species x 4 =
3. Liquidambar styraciflua	10%	<u>Y</u>	FAC	UPL species x 5 =
4				Column Totals: (A) (B)
5				
6				Prevalence Index = B/A =
7				Hydrophytic Vegetation Indicators:
8				1 - Rapid Test for Hydrophytic Vegetation
9				X 2 - Dominance Test is >50%
10				3 - Prevalence Index is ≤3.0¹
	30%	= Total Cov	er	4 - Morphological Adaptations (Provide supporting
Herb Stratum (Plot size: 30')	30 70	= 10ta1 00V	Ci	data in Remarks or on a separate sheet)
1. Carex sp.	10%	Y	FAC	Problematic Hydrophytic Vegetation ¹ (Explain)
2. Rubus argutus	5%	Υ	FACU	
3				¹ Indicators of hydric soil and wetland hydrology must
4				be present, unless disturbed or problematic.
5				Definitions of Four Vegetation Strata:
6				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
_				more in diameter at breast height (DBH), regardless of
7 8.				height.
9.				Sapling/Shrub – Woody plants, excluding vines, less
10.	_			than 3 in. DBH and greater than or equal to 3.28 ft (1
			-	m) tall.
11				Herb – All herbaceous (non-woody) plants, regardless
12	1 50/	T-1-1-0		of size, and woody plants less than 3.28 ft tall.
Woody Vine Stratum (Plot size: 30')	1370	= Total Cov	er	Woody vine – All woody vines greater than 3.28 ft in
1. Smilax rotundifolia	5%	Υ	FAC	height.
2.Toxicodendron radicans	5%	Y	FAC	
3				
4				
5.				Hydrophytic
6.	_			Vegetation Van Van Van
0	10%	= Total Cov		Present? Yes No
		= Total Cov	ei	
Remarks: (Include photo numbers here or on a separate	sheet.)			

SOIL Sampling Point: WU-WET

Profile Desc	ription: (Describe	to the dep	th needed to docu	ment the i	ndicator	or confirm	the absence	e of indicators.)
Depth	Matrix			x Feature	<u>s</u> _ 1	. 2		_
(inches)	Color (moist)	<u>%</u>	Color (moist)		Type ¹	Loc ²	<u>Texture</u>	Remarks
0-6"	2.5Y 6/2	90%	7.5YR 4/6	10%	<u>C</u>	PL	Clay loam	· · · · · · · · · · · · · · · · · · ·
6-20"	2.5Y 6/1	70%	10YR 6/8	30%	С	M	Clay loam	·
								· ·
					-		-	
								·
	-					. ———		
								·
	-							
	-							·
¹ Type: C=Ce	oncentration, D=Dep	oletion, RM	=Reduced Matrix, M	S=Masked	d Sand Gr	ains.	² Location: P	L=Pore Lining, M=Matrix.
Hydric Soil		•						ators for Problematic Hydric Soils ³ :
Histosol	(A1)		Dark Surface					2 cm Muck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue Be				148)	Coast Prairie Redox (A16)
Black Hi			Thin Dark Su	, ,	•	147, 148)		(MLRA 147, 148)
	en Sulfide (A4) d Layers (A5)		Loamy Gleye ✓ Depleted Ma		(F2)		Ш,	Piedmont Floodplain Soils (F19) (MLRA 136, 147)
	ick (A10) (LRR N)		Redox Dark		- 6)		Пν	Very Shallow Dark Surface (TF12)
	d Below Dark Surfac	e (A11)	Depleted Da	•	,			Other (Explain in Remarks)
. —	ark Surface (A12)		Redox Depre					
-	lucky Mineral (S1) (LRR N,	☐ Iron-Mangan		es (F12) (LRR N,		
	A 147, 148) Gleyed Matrix (S4)		MLRA 13	•	MIDA 4)C 422\	3 _{1m}	dicators of hydrophytic vegetation and
	Redox (S5)		Umbric Surfa					etland hydrology must be present,
	Matrix (S6)		Red Parent I					nless disturbed or problematic.
Restrictive I	Layer (if observed)	:						
Type:								
Depth (inc	ches):						Hydric Soi	I Present? Yes <u>▼</u> No
Remarks:								
No saturation or water table was observed at data point WILWET. Doro linings observed in upper								
No saturation or water table was observed at data point WU-WET. Pore linings observed in upper 6", below 6" is heavily depleted with significant concentrations.								
b, below	v o is neavily	, aepiei	.ea with Signii	icant co	oncent	rations		

WETLAND RATING WORKSHEET Fourth version

Wetland WV

Project Name: TIP# U-5811	Nearest road: Aviation Parkway
County: Wake County Wetland area:	0.9 acres Wetland width: 250 feet
Name of Evaluator: J. Hartshorn (Kimley-Horn)	Date: 8/24/2016
	1
Wetland Location on pond or lake	Adjacent land use (within ½ mile upstream,upslope, or radius)
X on perennial stream	X forested/natural vegetation 60 %
on intermittent stream	X agriculture, urban/suburban 20 %
within interstream divide	X impervious service 20 %
other:	<u> </u>
	Dominant vegetation
Soil Series	1) Fraxinus pennsylvanica
predominantly organic	2) Acer rubrum
(humus, muck, or peat)	3) Pinus taeda
X predominantly mineral	,
(non-sandy)	Flooding and wetness
predominantly sandy	semipermanently to permently flooded
	or inundated
Hydrolic factors	seasonally flooded or inundated
steep topography	X intermittently flooded or temporary
ditched or channelized	surface water
X total riparian wetland width ≥ 100 ft	no evidence of flooding or surface water
Wetland type (select one)	
X Bottomland hardwood forest	Pine savanna
Headwater forest	Freshwater marsh
Swamp forest	Bog/fen
Wet flat Pocosin	Ephemeral wetland Carolina Bay
Bog forest	Other
*The rating system cannot be appllied to salt or b	
-	weight
R Water Storage 3	$x \frac{4.00}{4.00} = 12$
A Bank/Shoreline stabilization 3	x = 4.00 = 12
T Pollutant removal 3	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Wildlife habitat 3	x 2.00 = 6
N Aquatic life 3 G Recreation/Education 2	$ \begin{array}{cccc} $
G Recreation/Education 2	x 1.00 = <u>2</u>
	Total Score ¹ 59

 $^{^{1}}$ Add 1 point if in sensitive watershed and >10% nonpoint disturbance within $\frac{1}{2}$ mile radius.

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 08/03/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WV-UP
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn)	Section, Township, Range: Cedar Fork
Landform (hillslope, terrace, etc.): Slight hillslope	ocal relief (concave, convex, none): None Slope (%): <1%
Subregion (LRR or MLRA): LRR P Lat: 35.829488	
Soil Map Unit Name: WhA - Warne fine sandy loam, 0 to 2	percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of y	ear? Yes 🚺 No (If no, explain in Remarks.)
Are Vegetation Soil or Hydrology significantl	y disturbed? Are "Normal Circumstances" present? Yes No
Are Vegetation Soil or Hydrology naturally p	roblematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes V No V No V	Is the Sampled Area within a Wetland? Yes No
Remarks:	
I .	ght hillslopes, levees, and hummocks. Uplands are
distinguishable by a 1' to 2' change in elevation a	and the absence of water-stained leaves and debris piles.
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	· /
Surface Water (A1) High Water Table (A2) True Aquatic F Hydrogen Sulf	
	ospheres on Living Roots (C3) Moss Trim Lines (B16)
	leduced Iron (C4) Dry-Season Water Table (C2)
Sediment Deposits (B2)	eduction in Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3) Thin Muck Su	` '
Algal Mat or Crust (B4) Uron Deposits (B5)	
Iron Deposits (B5) Inundation Visible on Aerial Imagery (B7)	Geomorphic Position (D2) Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	
Surface Water Present? Yes No V Depth (inches	
Water Table Present? Yes No Depth (inches	
Saturation Present? Yes No Depth (inchest (includes capillary fringe)	s): >24" Wetland Hydrology Present? Yes No No
Describe Recorded Data (stream gauge, monitoring well, aerial photos	os, previous inspections), if available:
Remarks:	
No hydrology indicators were observed.	
, ,,	

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WV-UP
	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30')		Species?		Number of Dominant Species
1. Pinus taeda	30%	<u>Y</u>	FAC	That Are OBL, FACW, or FAC: 7 (A)
2. Quercus rubra	10%	<u>Y</u>	FACU	Total Number of Dominant
_{3.} Carya glabra	10%	Y	FACU	Species Across All Strata: (B)
4				
5				Percent of Dominant Species That Are OBL, FACW, or FAC: 64% (A/B)
6				(775)
7				Prevalence Index worksheet:
8				Total % Cover of: Multiply by:
<u> </u>	50%	= Total Cov	er	OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')	3070	- 10tai 00V	OI.	FACW species x 2 =
1. Ulmus americana	10%	<u>Y</u>	FACW	FAC species x 3 =
2. Acer rubrum	5%	Υ	FAC	FACU species x 4 =
3. Pinus taeda	5%	Y	FAC	UPL species x 5 =
4. Carya glabra	5%	<u> Y</u>	FACU	Column Totals: (A) (B)
5				(-)
				Prevalence Index = B/A =
6				Hydrophytic Vegetation Indicators:
7				1 - Rapid Test for Hydrophytic Vegetation
8				X 2 - Dominance Test is >50%
9	-			3 - Prevalence Index is ≤3.0 ¹
10	250/			4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 30')	25%	= Total Cov	er	data in Remarks or on a separate sheet)
Herb Stratum (Plot size: 30°) 1. Rubus argutus	5%	Υ	FACU	Problematic Hydrophytic Vegetation ¹ (Explain)
2. Microstegium vimineum	5%	<u>'</u>	FAC	
\ <u></u>			TAC	¹ Indicators of hydric soil and wetland hydrology must
3				be present, unless disturbed or problematic.
4				Definitions of Four Vegetation Strata:
5				
6				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of
7				height.
8				Continue/Charle Was devaluate and discretions less
9				Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1
10				m) tall.
11				Herb – All herbaceous (non-woody) plants, regardless
12				of size, and woody plants less than 3.28 ft tall.
201	10%	= Total Cov	er	
Woody Vine Stratum (Plot size: 30')	100/		E46	Woody vine – All woody vines greater than 3.28 ft in height.
1.Campsis radicans	10%	<u>Y</u>	<u>FAC</u>	noight.
2. <u>Toxicodendron radicans</u>	10%	<u> </u>	<u>FAC</u>	
3				
4				
5				Hydrophytic Vegetation
6				Present? Yes V
	20%	= Total Cov	er	
Remarks: (Include photo numbers here or on a separate	sheet.)			
Tromano. (morado prioto namboro noto or on a doparato	011001)			

Sampling Point: WV-UP

Depth						
10YR 4/3						
4-24" 10YR 6/3 80% 10YR 5/6 20% C M Loam Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. Hydric Soil Indicators: Histosol (A1) Histic Epipedon (A2) Histic Epipedon (A2) Histic Epipedon (A2) Hydrogen Sulfide (A3) Hydrogen Sulfide (A4) Stratified Layers (A5) 2 cm Muck (A10) (LRR N) Redox Dark Surface (F6) Loam L						
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: Histosol (A1)						
Hydric Soil Indicators: Histosol (A1) Dark Surface (S7) Histic Epipedon (A2) Black Histic (A3) Hydrogen Sulfide (A4) Stratified Layers (A5) Zem Muck (A10) (MLRA 147) Depleted Matrix (F3) Redox Dark Surface (F6) Indicators for Problematic Hydric Soils ³ : 2 cm Muck (A10) (MLRA 147) Coast Prairie Redox (A16) (MLRA 147, 148) (MLRA 147, 148) Piedmont Floodplain Soils (F19) (MLRA 136, 147) Very Shallow Dark Surface (TF12)						
Hydric Soil Indicators: Histosol (A1) Dark Surface (S7) Histic Epipedon (A2) Black Histic (A3) Hydrogen Sulfide (A4) Stratified Layers (A5) Zem Muck (A10) (MLRA 147) Depleted Matrix (F3) Redox Dark Surface (F6) Indicators for Problematic Hydric Soils ³ : 2 cm Muck (A10) (MLRA 147) Coast Prairie Redox (A16) (MLRA 147, 148) (MLRA 147, 148) Piedmont Floodplain Soils (F19) (MLRA 136, 147) Very Shallow Dark Surface (TF12)						
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Hydric Soil Indicators: Histosol (A1) Dark Surface (S7) Histic Epipedon (A2) Black Histic (A3) Hydrogen Sulfide (A4) Stratified Layers (A5) Zem Muck (A10) (MLRA 147) Depleted Matrix (F3) Redox Dark Surface (F6) Indicators for Problematic Hydric Soils ³ : Dark Surface (S7) Coast Prairie Redox (A10) (MLRA 147) (MLRA 147, 148) (MLRA 147, 148) Piedmont Floodplain Soils (F19) (MLRA 136, 147) Very Shallow Dark Surface (TF12)						
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Hydric Soil Indicators: Histosol (A1) Dark Surface (S7) Histic Epipedon (A2) Black Histic (A3) Hydrogen Sulfide (A4) Stratified Layers (A5) Zem Muck (A10) (MLRA 147) Depleted Matrix (F3) Redox Dark Surface (F6) Indicators for Problematic Hydric Soils ³ : 2 cm Muck (A10) (MLRA 147) Coast Prairie Redox (A16) (MLRA 147, 148) (MLRA 147, 148) Piedmont Floodplain Soils (F19) (MLRA 136, 147) Very Shallow Dark Surface (TF12)						
Hydric Soil Indicators: Histosol (A1) Dark Surface (S7) Histic Epipedon (A2) Black Histic (A3) Hydrogen Sulfide (A4) Stratified Layers (A5) Zem Muck (A10) (MLRA 147) Depleted Matrix (F3) Redox Dark Surface (F6) Indicators for Problematic Hydric Soils ³ : 2 cm Muck (A10) (MLRA 147) Coast Prairie Redox (A16) (MLRA 147, 148) (MLRA 147, 148) Piedmont Floodplain Soils (F19) (MLRA 136, 147) Very Shallow Dark Surface (TF12)						
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Hydrogen Sulfide (A4) Stratified Layers (A5) 2 cm Muck (A10) (LRR N) Loamy Gleyed Matrix (F2) Depleted Matrix (F3) Redox Dark Surface (F6) Piedmont Floodplain Soils (F19) (MLRA 136, 147) Very Shallow Dark Surface (TF12)						
Stratified Layers (A5) Depleted Matrix (F3) Com Muck (A10) (LRR N) Depleted Matrix (F3) Redox Dark Surface (F6) Very Shallow Dark Surface (TF12)						
2 cm Muck (A10) (LRR N) Redox Dark Surface (F6) Very Shallow Dark Surface (TF12)						
Depleted Below Dark Surface (A11) Depleted Dark Surface (F7) Other (Explain in Remarks)						
Thick Dark Surface (A12) Redox Depressions (F8)						
Sandy Mucky Mineral (S1) (LRR N, Iron-Manganese Masses (F12) (LRR N,						
MLRA 147, 148) MLRA 136) Spendy Cloved Matrix (S4) MLRA 136 (S12) (MLRA 136 123) MLRA 147, 148)						
Sandy Gleyed Matrix (S4) Umbric Surface (F13) (MLRA 136, 122) Sandy Redox (S5) Umbric Surface (F13) (MLRA 148) Indicators of hydrophytic vegetation and wetland hydrology must be present,						
Stripped Matrix (S6) Red Parent Material (F21) (MLRA 127, 147) unless disturbed or problematic.						
Restrictive Layer (if observed):						
Type:						
Depth (inches): Hydric Soil Present? Yes No						
Remarks:						
Coils are dry and friable. No water table or esturation was observed						
Soils are dry and friable. No water table or saturation was observed.						

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 8/3/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WV-WET
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn)	Section, Township, Range: Cedar Fork
Landform (hillslope, terrace, etc.): Bottomland Lo	ocal relief (concave, convex, none): None Slope (%): <1%
Subregion (LRR or MLRA): LRR P Lat: 35.829695	Long: <u>-78.816126</u> Datum: NAD83
Soil Map Unit Name: WhA - Warne fine sandy loam, 0 to 2	percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of ye	ear? Yes 🚺 No (If no, explain in Remarks.)
Are Vegetation Soil or Hydrology significantly	y disturbed? Are "Normal Circumstances" present? Yes No
Are Vegetation Soil or Hydrology naturally pr	roblematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Remarks: Yes V No Yes No No No	Is the Sampled Area within a Wetland? Yes No
WV is a bottomland forest associated with the	e Crabtree Creek floodplain. WV is bounded by a
commercial building to the north and a levee	,
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1) True Aquatic F	
High Water Table (A2) Saturation (A3) Hydrogen Sulf ✓ Oxidized Rhize	ide Odor (C1) Drainage Patterns (B10) ospheres on Living Roots (C3) Moss Trim Lines (B16)
	educed Iron (C4) Dry-Season Water Table (C2)
	eduction in Tilled Soils (C6) Crayfish Burrows (C8)
☐ Drift Deposits (B3) ☐ Thin Muck Sur	· /
Algal Mat or Crust (B4) Uther (Explain Iron Deposits (B5)	Stunted or Stressed Plants (D1) Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	Δ.
Surface Water Present? Water Table Present? Yes No V Depth (inches	
Saturation Present? Yes No Depth (inches	1 1 1 1 1
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial phot	
Describe Necorded Data (Stream gauge, monitoring well, aerial prior	os, previous inspections), il available.
Remarks:	
WV is a floodplain forest that receives hydrolo	gy from Crabtree Creek overflow and stormwater
runoff from the adjacent commercial facility. [Orift deposits are present throughout the wetland.

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WV-WET
	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30')		Species?	Status	Number of Dominant Species
1. Fraxinus pennsylvanica	20%	Y	FACW	That Are OBL, FACW, or FAC: 8 (A)
2 <u>.</u> Acer rubrum	20%	<u>Y</u>	FAC	Total Number of Deminent
3. Pinus taeda	15%	Y	FAC	Total Number of Dominant Species Across All Strata: 9 (B)
4. Carya glabra	5%	N	FACU	
5	_			Percent of Dominant Species That Are OBL FACW or FAC: 89%
6				That Are OBL, FACW, or FAC: (A/B)
				Prevalence Index worksheet:
7				Total % Cover of: Multiply by:
8. <u> </u>	600/	T / 10		OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')	0070	= Total Cov	er	FACW species x 2 =
1. Acer rubrum	10%	Υ	FAC	FAC species x 3 =
2. Liquidambar styraciflua	10%	Y	FAC	FACU species x 4 =
	_		1710	UPL species x 5 =
3				
4				Column Totals: (A) (B)
5		· 		Prevalence Index = B/A =
6				Hydrophytic Vegetation Indicators:
7				1 - Rapid Test for Hydrophytic Vegetation
8				X 2 - Dominance Test is >50%
9				3 - Prevalence Index is ≤3.0¹
10				4 - Morphological Adaptations ¹ (Provide supporting
201	25%	= Total Cov	er	
Herb Stratum (Plot size: 30')	400/		E40	data in Remarks or on a separate sheet)
1. Carex sp.	<u>10%</u>	<u> Y</u>	FAC	Problematic Hydrophytic Vegetation ¹ (Explain)
2. Boehmeria cylindrica	5%	<u>Y</u>	FACW	
3				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
4				
5				Definitions of Four Vegetation Strata:
6				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
7				more in diameter at breast height (DBH), regardless of height.
8				neight.
9.				Sapling/Shrub – Woody plants, excluding vines, less
10.	<u> </u>			than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
11				m) tan.
12.		· -		Herb – All herbaceous (non-woody) plants, regardless
	15%	= Total Cov		of size, and woody plants less than 3.28 ft tall.
Woody Vine Stratum (Plot size: 30')		- 10tai 00v	OI .	Woody vine - All woody vines greater than 3.28 ft in
_{1.} Smilax rotundifolia	5%	Υ	FAC	height.
2.Parthenocissus quinquefolia	5%	Υ	FACU	
3				
4.				
5.				Hydrophytic
6.				Vegetation
0	10%	= Total Cov	or	riesent? Tes No
		= Total Cov	ei ————————————————————————————————————	
Remarks: (Include photo numbers here or on a separate				

Sampling Point: WV-WET

SOIL

	ription: (Describe	to the dep	oth needed to docur	nent the i	ndicator	or confirm	the absence	of indicators.)
Depth	Matrix			x Feature		2		
(inches)	Color (moist)	<u>%</u>	Color (moist)	<u>%</u>	Type ¹	Loc ²	<u>Texture</u>	Remarks
0-6"	2.5Y 6/2	95%	7.5YR 4/6	5%	<u>C</u>	PL	Clay loam	
6-20"	2.5Y 6/1	70%	10YR 6/8	30%	С	M	Clay loam	
				-		. ——		
¹ Type: C=C	oncentration, D=Dep	oletion, RM	=Reduced Matrix, M	S=Masked	Sand Gr	ains.	² Location: PL	=Pore Lining, M=Matrix.
Hydric Soil		•	<u> </u>				Indica	ators for Problematic Hydric Soils ³ :
Histosol	(A1)		Dark Surface	e (S7)			_ 2	cm Muck (A10) (MLRA 147)
	oipedon (A2)		Polyvalue Be				148) C	oast Prairie Redox (A16)
	istic (A3)		Thin Dark Su			47, 148)		(MLRA 147, 148)
	en Sulfide (A4) d Layers (A5)		Loamy Gleye ✓ Depleted Ma		F2)		⊔Р	iedmont Floodplain Soils (F19) (MLRA 136, 147)
	uck (A10) (LRR N)		Redox Dark		·6)		Пν	ery Shallow Dark Surface (TF12)
	d Below Dark Surfac	e (A11)	Depleted Da	•	•			ther (Explain in Remarks)
	ark Surface (A12)		Redox Depre				_	
	lucky Mineral (S1) (LRR N,	☐ Iron-Mangan		es (F12) (LRR N,		
	A 147, 148)		MLRA 13 Umbric Surfa	,	MIDA 12	6 122\	³ Ind	icators of hydrophytic vegetation and
	Gleyed Matrix (S4) Redox (S5)		Piedmont Flo					tland hydrology must be present,
	Matrix (S6)		Red Parent N					less disturbed or problematic.
Restrictive	Layer (if observed)	:						
Type:								
Depth (in	ches):						Hydric Soil	Present? Yes V No
							•	
Remarks:								
Remarks:		r tahlo	was observed	at dat	a noint	- \^/\/_\^/	/ET	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ΈΤ.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	
Remarks:		r table	was observed	at dat	a point	: WV-W	ET.	

WETLAND RATING WORKSHEET Fourth version

Wetland WW

Project Name: IP# U-5811	Nearest road: Aviation Parkway
County: Wake County Wetland area:	1.3 acres Wetland width: 450 feet
Name of Evaluator: <u>J. Hartshorn (Kimley-Horn)</u>	Date: 8/3/2016
	_
Wetland Location on pond or lake X on perennial stream on intermittent stream within interstream divide other: Soil Series predominantly organic (humus, muck, or peat) X predominantly mineral (non-sandy)	Adjacent land use (within ½ mile upstream,upslope, or radius) X forested/natural vegetation 60 % X agriculture, urban/suburban 20 % X impervious service 20 % Dominant vegetation 1) Quercus phellos 2) Fraxinus pennsylvanica 3) Quercus rubra Flooding and wetness
math predominantly sandy Hydrolic factors steep topography ditched or channelized X total riparian wetland width ≥ 100 ft	semipermanently to permently flooded or inundated seasonally flooded or inundated intermittently flooded or temporary surface water no evidence of flooding or surface water
Wetland type (select one) X Bottomland hardwood forest Headwater forest Swamp forest Wet flat Pocosin Bog forest *The rating system cannot be appllied to salt or bra	Pine savanna Freshwater marsh Bog/fen Ephemeral wetland Carolina Bay Other ackish marshes or stream channels.
A Bank/Shoreline stabilization 3 T Pollutant removal 4 I Wildlife habitat 4 N Aquatic life 3	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

 $^{^{1}}$ Add 1 point if in sensitive watershed and >10% nonpoint disturbance within $\frac{1}{2}$ mile radius.

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 8/3/2016						
Applicant/Owner: NCDOT	State: NC Sampling Point: WW-UP						
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn) Section, Township, Range: Cedar Fork							
Landform (hillslope, terrace, etc.): Slight hillslope L	ocal relief (concave, convex, none): None Slope (%): 1-2%						
Subregion (LRR or MLRA): LRR P Lat: 35.827334							
Soil Map Unit Name: WhA - Warne fine sandy loam, 0 to 2	percent slopes NWI classification: None						
Are climatic / hydrologic conditions on the site typical for this time of y	ear? Yes 🗸 No (If no, explain in Remarks.)						
Are Vegetation Soil or Hydrology significant	y disturbed? Are "Normal Circumstances" present? Yes No						
Are Vegetation Soil or Hydrology naturally p	roblematic? (If needed, explain any answers in Remarks.)						
SUMMARY OF FINDINGS – Attach site map showin	g sampling point locations, transects, important features, etc.						
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes V No V No V	Is the Sampled Area within a Wetland? Yes No						
Remarks:							
· · ·	ope over wetland WW. WW-UP was higher in elevation						
than the drift deposits present in wetland WW	and there were no water-stained leaves at WW-UP.						
HYDROLOGY							
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)						
Primary Indicators (minimum of one is required: check all that apply Surface Water (A1) True Aquatic	· /						
┌	fide Odor (C1) Drainage Patterns (B10)						
	ospheres on Living Roots (C3) Moss Trim Lines (B16)						
Water Marks (B1)	Reduced Iron (C4) Dry-Season Water Table (C2)						
	eduction in Tilled Soils (C6) Crayfish Burrows (C8)						
Drift Deposits (B3) Thin Muck Su	• , ,						
Algal Mat or Crust (B4) Other (Explain Iron Deposits (B5)	Stunted or Stressed Plants (D1) Geomorphic Position (D2)						
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)						
Water-Stained Leaves (B9)	Microtopographic Relief (D4)						
Aquatic Fauna (B13)	FAC-Neutral Test (D5)						
Field Observations:							
Surface Water Present? Yes No Depth (inche							
Water Table Present? Yes No Depth (inche							
Saturation Present? Yes No Depth (inche (includes capillary fringe)	, , , , , , , , , , , , , , , , , , , ,						
Describe Recorded Data (stream gauge, monitoring well, aerial pho	tos, previous inspections), if available:						
Remarks:							
No hydrology indicators were observed.							
, 3,							

201	Absolute	Dominant		Dominance Test worksheet:
Tree Stratum (Plot size: 30')		Species?		Number of Dominant Species
1. Pinus taeda	40%	<u>Y</u>	FAC	That Are OBL, FACW, or FAC: 7 (A)
2. Ulmus americana	20%	<u> </u>	<u>FACW</u>	Total Number of Dominant
3. Quercus rubra	10%	N	FACU	Species Across All Strata: 9 (B)
4				
5	- '			Percent of Dominant Species That Are OBL, FACW, or FAC: 77.8% (A/B)
6.		<u> </u>		mat Ale ODE, I AOW, OI I AO.
7				Prevalence Index worksheet:
8				Total % Cover of: Multiply by:
0	70%	= Total Cov		OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')	7070	= Total Cov	er	FACW species x 2 =
1. Ulmus americana	10%	Υ	FACW	FAC species x 3 =
2. Prunus serotina	10%	Y	FACU	FACU species x 4 =
3. Acer rubrum	5%	N	FAC	UPL species x 5 =
4. Pinus taeda	5%	N	FAC	· ———
	5% 5%			Column Totals: (A) (B)
5. Juniperus virginiana	3%	<u>N</u>	FACU	Prevalence Index = B/A =
6				Hydrophytic Vegetation Indicators:
7				
8				1 - Rapid Test for Hydrophytic Vegetation
9				X 2 - Dominance Test is >50%
10				3 - Prevalence Index is ≤3.0 ¹
	35%	= Total Cov	er	4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 30')				data in Remarks or on a separate sheet)
1. Microstegium vimineum	20%	<u> </u>	FAC	Problematic Hydrophytic Vegetation ¹ (Explain)
2. Rubus argutus	5%	Υ	FACU	
3		<u> </u>		¹ Indicators of hydric soil and wetland hydrology must
4	- 1			be present, unless disturbed or problematic.
5				Definitions of Four Vegetation Strata:
5				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
6				more in diameter at breast height (DBH), regardless of
7				height.
8				Sanling/Shrub Woody plants evaluding vines loss
9				Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1
10				m) tall.
11				Hart Allhada a a a chair a a a a a lla a
12				Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
	25%	= Total Cov	er	or orzo, and woody planto loop than orzo it tall.
Woody Vine Stratum (Plot size: 30')				Woody vine – All woody vines greater than 3.28 ft in
1. Campsis radicans	10%	<u> </u>	FAC	height.
2. Toxicodendron radicans	10%	<u> </u>	FAC	
3.Smilax rotundifolia	5%	Υ	FAC	
4		<u> </u>		
5				Hydrophytic
				Vegetation Vegetation
6	25%	= Total Cov		Present? Yes No
	23 /0	= Total Cov	er	
Remarks: (Include photo numbers here or on a separate	sheet.)			
Loblolly pine is much more prevalent in the up	lands bord	dering we	tland WV	N.
, , ,				

Sampling Point: WW-UP

SOIL Sampling Point: WW-UP

Profile Desc	ription: (Describe	to the dep	th needed to docu	ment the i	ndicator	or confirm	n the absence	e of indicators.)
Depth	Matrix			ox Features		. 2		
(inches)	Color (moist)	1000/	Color (moist)	%	Type ¹	Loc ²	Texture	Remarks
0-4"	10YR 4/3	100%				· 	Loam	
4-24"	10YR 6/3	80%	10YR 5/6	20%	C	M	Loam	*Diffuse boundaries
							1	
								·
					-			
¹ Type: C=Co	oncentration, D=Dep	oletion, RM:	=Reduced Matrix, M	S=Masked	Sand Gr	ains.	² Location: P	PL=Pore Lining, M=Matrix.
Hydric Soil I	Indicators:							cators for Problematic Hydric Soils ³ :
Histosol	(A1)		Dark Surface					2 cm Muck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue Be				, 148) 📙 (Coast Prairie Redox (A16)
Black Hi			Thin Dark S			147, 148)	П.	(MLRA 147, 148)
	n Sulfide (A4) d Layers (A5)		Loamy Gley Depleted Ma		F2)		Ш,	Piedmont Floodplain Soils (F19) (MLRA 136, 147)
	ick (A10) (LRR N)		Redox Dark		6)			Very Shallow Dark Surface (TF12)
	d Below Dark Surfac	e (A11)	Depleted Da	•	,			Other (Explain in Remarks)
	ark Surface (A12)		Redox Depr					
_	lucky Mineral (S1) (LRR N,	☐ Iron-Mangar		es (F12) (LRR N,		
	147, 148)		MLRA 13	•	MI DA 43	e 422\	3 _{1m}	disators of budrophytic venetation and
	Bleyed Matrix (S4) Redox (S5)		Umbric Surfa					dicators of hydrophytic vegetation and etland hydrology must be present,
	Matrix (S6)		Red Parent					nless disturbed or problematic.
	_ayer (if observed)	:		`	, ,	-		·
Type:								
Depth (inc	ches):						Hydric Soi	il Present? Yes No
Remarks:								
Coile are	not donloted	halaw	4" but the ob	200,00	conce	ntratio	na ara fai	nt/diffuse Coils are dry and
						illi alio	iis are iai	int/diffuse. Soils are dry and
rriable, r	no water table	e or sati	iration was o	bserved	1.			

Project/Site: TIP# U-5811	City/County: Wake County Sampling Da	ate: 8/3/2016					
Applicant/Owner: NCDOT	State: NC Sampling						
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn)	Section, Township, Range: Cedar Fork						
	cal relief (concave, convex, none): Concave	Slope (%): <1%					
Subregion (LRR or MLRA): <u>LRR P</u> Lat: <u>35.826962</u> Long: <u>-78.818056</u> Datum: NAD83							
Soil Map Unit Name: WhA - Warne fine sandy loam, 0 to 2 percent slopes NWI classification: PFO1C							
Are climatic / hydrologic conditions on the site typical for this time of year	ear? Yes No (If no, explain in Remarks.)						
Are Vegetation Soil or Hydrology significantly	disturbed? Are "Normal Circumstances" present? Yes	s 🚺 No 🔃					
Are Vegetation Soil or Hydrology naturally pr	oblematic? (If needed, explain any answers in Remarks	s.)					
SUMMARY OF FINDINGS – Attach site map showing	រូ sampling point locations, transects, importan	nt features, etc.					
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes V No Yes No No	Is the Sampled Area within a Wetland? Yes No						
Remarks:	leadulain of Cualitimas Cualit MM is become	امط					
WW is a bottomland forest within the larger f	•	lea					
topographically between an upland slope and	utility easement.						
HYDROLOGY							
Wetland Hydrology Indicators:	Secondary Indicators (minimur	m of two required)					
Primary Indicators (minimum of one is required; check all that apply)	Surface Soil Cracks (B6)						
Surface Water (A1)		ave Surface (B8)					
High Water Table (A2) Hydrogen Sulf	ide Odor (C1) Drainage Patterns (B10)						
	ospheres on Living Roots (C3) Moss Trim Lines (B16)						
11 I - · · · · · ·	educed Iron (C4) Dry-Season Water Table (duction in Tilled Soils (C6) Crayfish Burrows (C8)	(C2)					
Drift Deposits (B3) Thin Muck Sur		al Imagery (C9)					
Algal Mat or Crust (B4) Other (Explain	` '	3 , (,					
Iron Deposits (B5)	Geomorphic Position (D2)	•					
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)	2.0					
✓ Water-Stained Leaves (B9) Aquatic Fauna (B13)	Microtopographic Relief (DFAC-Neutral Test (D5)	04)					
Field Observations:	TAC-Neutral Test (Do)						
Surface Water Present? Yes No V Depth (inches	s):						
Water Table Present? Yes No Depth (inches	_{i):} >20"	7					
Saturation Present? Yes No V Depth (inches	s): >20" Wetland Hydrology Present? Yes 1	No					
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial phot	os, previous inspections), if available:						
Remarks:							
WW is a floodplain forest that appears to be p	eriodically inundated Water-stained leave	ac are					
present throughout the wetland and drift depo	•						
present unoughout the wedaha and and dept	is indicate 1-2 of water nowing through	i tile iolest.					

30% 20% 10% 80% 10% 10%	= Total Cov	FACU FACU FACU FACU FACU FACU FACU FACU	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A) Total Number of Dominant Species Across All Strata: 9 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: 55.6% (A/B) Prevalence Index worksheet:
30% 20% 10% 80% 10% 10%	Y Y N = Total Cov Y Y Total Cov	FAC FACW FACU FAC FAC FACW	That Are OBL, FACW, or FAC:
20% 10% 80% 10% 10% 20%	Y Y N = Total Cov Y Y Total Cov	FACU FACU FAC FAC FACW	Total Number of Dominant Species Across All Strata: Percent of Dominant Species That Are OBL, FACW, or FAC: Total % Cover of: Total % Cover of: Multiply by: OBL species FACW species FACW species FACU species FACU species VA = UPL species VA = UPL species Column Totals: (A) Prevalence Index = B/A = Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
20% 10% 80% 10% 20% 10%	Y N = Total Cov Y Y Total Cov	FACU FAC FAC FACW	Species Across All Strata: 9 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: 55.6% (A/B) Prevalence Index worksheet: Multiply by: 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%
10% 80% 10% 10%	N = Total Cov Y Y = Total Cov	FAC FACW	Species Across All Strata: 9 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: 55.6% (A/B) Prevalence Index worksheet:
80% 10% 10%	= Total Cov	FAC FACW	Percent of Dominant Species That Are OBL, FACW, or FAC: Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species FACW species FAC species FAC species FACU species Water Water of the control of
80% 10% 10%	= Total Cov	FAC FACW	That Are OBL, FACW, or FAC: 55.0% (A/B) Prevalence Index worksheet:
80% = 10% =	= Total Cov	FAC FACW	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%
80% 10% 10% 10% 10% 10% 10% 10% 10% 10%	= Total Cov	FAC FACW	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) Prevalence Index = B/A = Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
80% 10% 10% 10% 10% 10% 10% 10% 10% 10% 1	= Total Cov	FAC FACW	OBL species x 1 = FACW species x 2 = FAC species x 3 = FACU species x 4 = UPL species x 5 = Column Totals: (A) Mean total prevalence Index = B/A = Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
10% 10%	Y Y	FAC FACW	OBL species x 1 = FACW species x 2 = FAC species x 3 = FACU species x 4 = UPL species x 5 = Column Totals: (A) Mean total prevalence Index = B/A = Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
10% 10%	Y Y	FAC FACW	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%
10% 	Y = Total Cov	FACW	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%
10% 	Y = Total Cov	FACW	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%
20% = 10%	= Total Cov		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%
20% = 10%	= Total Cov		Column Totals: (A) (B) Prevalence Index = B/A = Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
20%	= Total Cov		Prevalence Index = B/A = Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
20%	= Total Cov		Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
20% = 10%	= Total Cov		Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
20% : 10%	= Total Cov		1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
20% : 10%	= Total Cov		X 2 - Dominance Test is >50%
20% : 10%	= Total Cov		
20% : 10%	= Total Cov		
10%			
10%			4 - Morphological Adaptations ¹ (Provide supporting
	٧	/ei	data in Remarks or on a separate sheet)
	Y	FACIL	. ,
		FACU	Problematic Hydrophytic Vegetation ¹ (Explain)
5%	<u>Y</u>	FACU	
			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.
15%	= Total Cov	er er	
			Woody vine – All woody vines greater than 3.28 ft in
5%	<u>Y</u>	<u>FAC</u>	height.
5%	<u>Y</u>	<u>FACU</u>	
2%	N	FAC	
		·	
			Hydrophytic
			Vegetation Value V
120/	T-1-1-0		Present? Yes No
1270 :	= Total Cov	er er	
eet.)			
d most t	trees have	e drift de	posits piled against trunks.
	LI CCS Hav	c arne ac	posits prica against traints.
JOJC (
osc (
) (neet.)	12% = Total Cov	12% = Total Cover

SOIL Sampling Point: WW-WET

Profile Desc	ription: (Describe	to the dep	th needed to docu	ment the i	ndicator	or confirm	the absence	e of indicators.)
Depth	Matrix			x Features	<u>s</u> _ 1	. 2		
(inches) 0-6"	Color (moist)	<u>%</u>	Color (moist)	100/	Type ¹	Loc ²	<u>Texture</u>	Remarks
	2.5Y 6/2	90%	7.5YR 4/6	10%	<u>C</u>	PL	Clay loam	· · · · · · · · · · · · · · · · · · ·
6-20"	2.5Y 6/1	70%	10YR 6/8	30%	С	M	Clay loam	·
							. <u></u>	
	-							· ———
							·	
¹ Type: C=Ce	oncentration, D=Dep	oletion, RM	=Reduced Matrix, M	S=Masked	Sand Gr	ains.	² Location: Pl	L=Pore Lining, M=Matrix.
Hydric Soil		•						ators for Problematic Hydric Soils ³ :
Histosol	(A1)		Dark Surface					2 cm Muck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue Be				148)	Coast Prairie Redox (A16)
Black Hi			Thin Dark Su	, ,	•	147, 148)		(MLRA 147, 148)
. —	en Sulfide (A4)		Loamy Gleye	,	F2)		□	Piedmont Floodplain Soils (F19)
	d Layers (A5) uck (A10) (LRR N)		Depleted Ma		·6)		Пν	(MLRA 136, 147) √ery Shallow Dark Surface (TF12)
	d Below Dark Surfac	e (A11)	Depleted Da	,	,			Other (Explain in Remarks)
	ark Surface (A12)	, ,	Redox Depre				_	
-	lucky Mineral (S1) (LRR N,	Iron-Mangan		es (F12) (LRR N,		
	A 147, 148)		MLRA 13	•			3,	
	Bleyed Matrix (S4) Redox (S5)		Umbric Surfa					dicators of hydrophytic vegetation and etland hydrology must be present,
	Matrix (S6)		Red Parent I					nless disturbed or problematic.
	Layer (if observed)	:			, (1	
Type:	,							
Depth (inc	ches):						Hydric Soi	I Present? Yes ✓ No
Remarks:	<u> </u>						1 -	
					-			linings observed in upper
6", belov	v 6" is heavily	/ deplet	ed with signif	icant co	oncent	rations		

WETLAND RATING WORKSHEET Fourth version

Wetland WX

Project Name: TIP# U-5811	Nearest road: NC-54				
County: Wake County Wetland area:	0.2 acres Wetland width:90 feet				
Name of Evaluator: J. Hartshorn (Kimley-Horn	Date: 8/2/2016				
Wetland Location	Adjacent land use (within ½ mile				
on pond or lake	upstream,upslope, or radius)				
on perennial stream	X forested/natural vegetation 30 %				
X on intermittent stream	X agriculture, urban/suburban 65 %				
within interstream divide	X impervious service 5 %				
other:	5				
0.110	Dominant vegetation				
Soil Series	1) Microstegium vimineum				
predominantly organic	2) Fraxinus pennsylvanica				
(humus, muck, or peat)	3) Alnus serrulata				
X predominantly mineral					
(non-sandy)	Flooding and wetness				
predominantly sandy	semipermanently to permently flooded				
	or inundated				
Hydrolic factors	X seasonally flooded or inundated				
steep topography	intermittently flooded or temporary				
ditched or channelized	surface water				
total riparian wetland width ≥ 100 ft	no evidence of flooding or surface water				
Wetland type (select one)	•				
Bottomland hardwood fore					
X Headwater forest	Freshwater marsh				
Swamp forest	Bog/fen				
Wet flat	Ephemeral wetland				
Pocosin Bog forest	Carolina Bay Other				
*The rating system cannot be appllied to salt or	r brackish marshes or stream channels.				
R Water Storage	$ \frac{\text{weight}}{4.00} = 4 $				
A Bank/Shoreline stabilization	$\frac{1}{1} \times 4.00 = \frac{4}{4}$				
	$\frac{1}{2}$ x 5.00 = $\frac{1}{10}$				
	$\frac{1}{2}$ x 2.00 = $\frac{2}{8}$				
	$2 \times 4.00 = 8$				
G Recreation/Education	$\frac{1}{1}$ x 1.00 = $\frac{1}{1}$				
	Total Score ¹ 29				

 $^{^{1}}$ Add 1 point if in sensitive watershed and >10% nonpoint disturbance within $\frac{1}{2}$ mile radius.

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 8/2/2016						
Applicant/Owner: NCDOT	State: NC Sampling Point: WX-UP						
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn) Section, Township, Range: Cedar Fork							
Landform (hillslope, terrace, etc.): Roadside hillslope Lo	ocal relief (concave, convex, none): None Slope (%): 2-4%						
Subregion (LRR or MLRA): LRR P Lat: 35.819174	Long: <u>-78.822879</u> Datum: NAD83						
Soil Map Unit Name: WnA - Wehadkee silt loam, 0 to 2 per	cent slopes NWI classification: None						
Are climatic / hydrologic conditions on the site typical for this time of y	ear? Yes 🚺 No (If no, explain in Remarks.)						
Are Vegetation Soil or Hydrology significantly	y disturbed? Are "Normal Circumstances" present? Yes No						
Are Vegetation Soil or Hydrology naturally pr	roblematic? (If needed, explain any answers in Remarks.)						
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, transects, important features, etc.						
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes V No V No V	Is the Sampled Area within a Wetland? Yes No						
Remarks:							
Data point WX-UP was taken on a roadside fi	llslope next to NC-54, 10 feet from wetland WX.						
HYDROLOGY							
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)						
Primary Indicators (minimum of one is required: check all that apply)							
Surface Water (A1) True Aquatic F							
High Water Table (A2) Saturation (A3) Hydrogen Sulf Oxidized Rhiz	ide Odor (C1) Drainage Patterns (B10) ospheres on Living Roots (C3) Moss Trim Lines (B16)						
	educed Iron (C4) Dry-Season Water Table (C2)						
	eduction in Tilled Soils (C6) Crayfish Burrows (C8)						
Drift Deposits (B3)	face (C7) Saturation Visible on Aerial Imagery (C9)						
Algal Mat or Crust (B4) Other (Explain							
Iron Deposits (B5)	Geomorphic Position (D2)						
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)						
Water-Stained Leaves (B9) Aquatic Fauna (B13)	Microtopographic Relief (D4) FAC-Neutral Test (D5)						
Field Observations:	TAO Neutral rest (66)						
Surface Water Present? Yes No Depth (inches	s):						
Water Table Present? Yes No Depth (inches	s): >24"						
Saturation Present? Yes No V Depth (inches	s): >24" Wetland Hydrology Present? Yes No No						
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial photon	os, previous inspections), if available:						
Remarks:							
No indicators observed.							

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WX-UP
201	Absolute	Dominant		Dominance Test worksheet:
Tree Stratum (Plot size: 30'		Species?		Number of Dominant Species
1. Fraxinus pennsylvanica	40%	<u> </u>	FACW	That Are OBL, FACW, or FAC: 4 (A)
2				Total Number of Dominant
3				Species Across All Strata: 5 (B)
4				Percent of Dominant Species
5				That Are OBL, FACW, or FAC: 80% (A/B)
6				Prevalence Index worksheet:
7				
8	_			Total % Cover of: Multiply by:
0.11.61.10.1.10.1.10.1.10.1.10.1.10.1.1	40%	= Total Cov	er	OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')	1 = 0/.	V	EACW	FACW species x 2 =
1. Cornus amomum			FACVV	FAC species x 3 =
2				FACU species x 4 =
3				UPL species x 5 =
4				Column Totals: (A) (B)
5				Prevalence Index = B/A =
6				Hydrophytic Vegetation Indicators:
7				1 - Rapid Test for Hydrophytic Vegetation
8				$\frac{X}{2}$ 2 - Dominance Test is >50%
9				3 - Prevalence Index is ≤3.0 ¹
10				4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 30')	<u>15%</u>	= Total Cov	er	data in Remarks or on a separate sheet)
1. Microstegium vimineum	60%	Υ	FAC	Problematic Hydrophytic Vegetation¹ (Explain)
- Fastuag sp	200/			· · · · · · · · · · · · · · · · ·
			TAC	¹ Indicators of hydric soil and wetland hydrology must
3				be present, unless disturbed or problematic.
4				Definitions of Four Vegetation Strata:
5				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
6				more in diameter at breast height (DBH), regardless of
7				height.
8				Sapling/Shrub – Woody plants, excluding vines, less
9				than 3 in. DBH and greater than or equal to 3.28 ft (1
10				m) tall.
11				Herb – All herbaceous (non-woody) plants, regardless
12	900/-	= Total Cov		of size, and woody plants less than 3.28 ft tall.
Woody Vine Stratum (Plot size: 30')	0070	= Total Cov	er	Woody vine – All woody vines greater than 3.28 ft in
1.Lonicera japonica	5%	Υ	FACU	height.
2				
3				
4				
5				Hydrophytic
6.				Vegetation Present? Yes No
-	5%	= Total Cov		100 100
Demander (Include abote growth are bose as an account				
Remarks: (Include photo numbers here or on a separate	e sneet.)			

Sampling Point: WX-UP

SOIL

Profile Desc	ription: (Describe	to the dep	th needed to docu	ment the i	ndicator	or confirm	n the absence of indicators.)
Depth	Matrix			x Feature	<u>s</u> _ 1	. 2	
(inches) 0-2"	Color (moist)	100%	Color (moist)	%	Type ¹	Loc ²	Texture Remarks
-	10YR 2/2						Sandy loam
2-10"	10YR 3/2	100%					Sandy loam
10-14"	10YR 4/3	100%					Sandy loam
14-24"	10YR 5/3	95%	10YR 3/6	5%	<u>C</u>	M	Sandy clay loam
					-		·
1 _{Type:} C-C	ancontration D_Dor	olotion DM	- Poducod Motrix M	S_Maakaa	d Cond Cr		² Location: PL=Pore Lining, M=Matrix.
Hydric Soil	oncentration, D=Dep	Dietion, Rivis	=Reduced Matrix, M	S=IVIASKEC	a Sand Gra	airis.	Indicators for Problematic Hydric Soils ³ :
Histosol			Dark Surface	e (S7)			2 cm Muck (A10) (MLRA 147)
	oipedon (A2)		Polyvalue Be	, ,	ce (S8) (N	ILRA 147,	
Black Hi			Thin Dark S			47, 148)	(MLRA 147, 148)
. —	en Sulfide (A4)		Loamy Gley		(F2)		Piedmont Floodplain Soils (F19)
	d Layers (A5) uck (A10) (LRR N)		Depleted Ma		- 6)		(MLRA 136, 147) Very Shallow Dark Surface (TF12)
	d Below Dark Surfac	e (A11)	Depleted Da	•			Other (Explain in Remarks)
. —	ark Surface (A12)		Redox Depr				_
-	fucky Mineral (S1) (LRR N,	☐ Iron-Mangar		es (F12) (I	LRR N,	
	A 147, 148) Gleyed Matrix (S4)		MLRA 13 Umbric Surfa	•	(MI RΔ 13	6 122)	³ Indicators of hydrophytic vegetation and
	Redox (S5)		Piedmont Fl				
	Matrix (S6)		Red Parent				
Restrictive I	Layer (if observed)	:					
Type:							
Depth (inc	ches):						Hydric Soil Present? Yes No
Remarks:							
No hvdri	c soil indicate	rs prese	ent.				
		, p. 55					

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 8/2/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WX-WET
Investigator(s): J. Hartshorn & W. Sullivan (Kimley-Horn)	Section, Township, Range: Cedar Fork
Landform (hillslope, terrace, etc.): Depression	ocal relief (concave, convex, none): Concave Slope (%): <1%
Subregion (LRR or MLRA): LRR P Lat: 35.819163	Long: <u>-78.822918</u> Datum: NAD83
Soil Map Unit Name: WnA - Wehadkee silt loam, 0 to 2 pero	cent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year	ear? Yes 🚺 No (If no, explain in Remarks.)
Are Vegetation Soil or Hydrology significantly	v disturbed? Are "Normal Circumstances" present? Yes ✓ No
Are Vegetation Soil or Hydrology naturally pr	oblematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing	g sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes V No Yes No Remarks:	Is the Sampled Area within a Wetland? Yes No
	by NC-54 and railroad tracks. WX drains to an
intermittent stream that flows to Crabtree Cre	•
intermittent stream that nows to crabitee ere	.CK.
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1)	
High Water Table (A2) Hydrogen Sulf	
	ospheres on Living Roots (C3) Moss Trim Lines (B16)
	educed Iron (C4) Dry-Season Water Table (C2) eduction in Tilled Soils (C6) Crayfish Burrows (C8)
Drift Deposits (B3) Thin Muck Sur	
Algal Mat or Crust (B4) Other (Explain	, ,
Iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Fauna (B13) Field Observations:	FAC-Neutral Test (D5)
Surface Water Present? Yes No Depth (inches	5):
Water Table Present? Yes No V Depth (inches	
Saturation Present? Yes Ve Depth (inches	
(includes capillary fringe) Describe Recorded Data (stream gauge, monitoring well, aerial phot	os. previous inspections), if available:
Remarks:	
, , , ,	oundwater seepage. Standing water was not present
at data point WX-WET, but was observed in o	ther areas of WX.

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WX-WET
	Absolute	Dominant	Indicator	Dominance Test worksheet:
<u>Tree Stratum</u> (Plot size: <u>30'</u>)		Species?		Number of Dominant Species
1. Fraxinus pennsylvanica	30%	<u> </u>	FACW	That Are OBL, FACW, or FAC: 9 (A)
2. Liquidambar styraciflua	15%	<u> </u>	FAC	Total Number of Dominant
3. Acer rubrum	10%	N	FAC	Species Across All Strata:
4.	_			Barrett (Barriera) Carrier
5				Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)
6				(170)
7				Prevalence Index worksheet:
8				Total % Cover of: Multiply by:
	55%	= Total Cov	er	OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')		_ 10tai 00V	O1	FACW species x 2 =
1. Alnus serrulata	25%	<u> </u>	OBL	FAC species x 3 =
2. Cornus amomum	20%	Y	FACW	FACU species x 4 =
3. Ulmus americana	10%	N	FACW	UPL species x 5 =
4. Fraxinus pennsylvanica	5%	N	FACW	Column Totals: (A) (B)
5	_			、, 、,
				Prevalence Index = B/A =
6				Hydrophytic Vegetation Indicators:
7				1 - Rapid Test for Hydrophytic Vegetation
8				X 2 - Dominance Test is >50%
9	_			3 - Prevalence Index is ≤3.0 ¹
10				4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 30')	00%	= Total Cov	er	data in Remarks or on a separate sheet)
1. Microstegium vimineum	35%	Υ	FAC	Problematic Hydrophytic Vegetation ¹ (Explain)
2. Boehmeria cylindrica	20%	<u> </u>	FACW	
3. Polygonum sp.	15%	<u>'</u>	FAC	¹ Indicators of hydric soil and wetland hydrology must
		· <u>'</u>	<u>TAC</u>	be present, unless disturbed or problematic.
4				Definitions of Four Vegetation Strata:
5				Trans. We also be also to social discussions (7.0 cm) or
6				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of
7				height.
8				Sapling/Shrub – Woody plants, excluding vines, less
9	_			than 3 in. DBH and greater than or equal to 3.28 ft (1
10	_			m) tall.
11				Herb – All herbaceous (non-woody) plants, regardless
12				of size, and woody plants less than 3.28 ft tall.
March March 19 (District 20)	<u>70%</u>	= Total Cov	er	We advising All woods since greater than 2.20 ft in
Woody Vine Stratum (Plot size: 30') 1. Toxicodendron radicans	250/	V	EAC	Woody vine – All woody vines greater than 3.28 ft in height.
	25%	<u> </u>	<u>FAC</u>	The same of the sa
2. <u>Smilax rotundifolia</u>	25%	<u> </u>	<u>FAC</u>	
3				
4				Hydronbytia
5				Hydrophytic Vegetation
6				Present? Yes No
	50%	= Total Cov	er	
Remarks: (Include photo numbers here or on a separate	sheet.)			
Buttressed trees were observed in wetland W.				
battlessed trees were observed in wedaria w.	Λ.			

Sampling Point: WX-WET

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth	Matrix			x Feature		2		
(inches)	Color (moist)	<u>%</u>	Color (moist)	<u>%</u>	Type ¹	Loc ²	<u>Texture</u>	Remarks
0-14"	10YR 4/1	85%	7.5YR 4/6	15%	<u>C</u>	<u>M</u>	Loamy clay	
14-20"	N 4/	60%	7.5YR 5/8	40%	С	<u>M</u>	Loamy clay	
			_					
¹ Type: C=Co	oncentration, D=Dep	letion, RM	=Reduced Matrix, MS	S=Masked	d Sand Gr	ains.	² Location: PL	=Pore Lining, M=Matrix.
Hydric Soil							Indica	tors for Problematic Hydric Soils ³ :
Histosol	` '		Dark Surface					cm Muck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue Be					oast Prairie Redox (A16)
Black Hi			Thin Dark Su			147, 148)		(MLRA 147, 148)
	n Sulfide (A4) d Layers (A5)		Loamy Gleye Depleted Ma		(FZ)			edmont Floodplain Soils (F19) (MLRA 136, 147)
	ick (A10) (LRR N)		Redox Dark		- 6)			ery Shallow Dark Surface (TF12)
	d Below Dark Surfac	e (A11)	Depleted Dar		•			ther (Explain in Remarks)
	ark Surface (A12)		Redox Depre					
	lucky Mineral (S1) (I	_RR N,	☐ Iron-Mangan		es (F12) (LRR N,		
	A 147, 148) Bleyed Matrix (S4)		MLRA 13	•	MIRA 13	16 122)	³ Indi	cators of hydrophytic vegetation and
	tedox (S5)		Piedmont Flo					tland hydrology must be present,
	Matrix (S6)		Red Parent N					ess disturbed or problematic.
Restrictive I	_ayer (if observed):							
Type:								
Depth (inc	ches):						Hydric Soil	Present? Yes <u>▼</u> No .
Remarks:								
No wate	r tahle was oh	servec	l at WX-WFT	hut su	rface s	aturatio	n was nre	esent
No water table was observed at WX-WET, but surface saturation was present.								

WETLAND RATING WORKSHEET Fourth version

Wetland WZ

on intermittent stream within interstream divide X agriculture, urban/suburban X impervious service							
Wetland Location Adjacent land use (within ½ mile upstream, upslope, or radius) X on perennial stream X forested/natural vegetation yon intermittent stream X agriculture, urban/suburban within interstream divide X impervious service							
on pond or lake X on perennial stream on intermittent stream within interstream divide upstream,upslope, or radius) X forested/natural vegetation X agriculture, urban/suburban X impervious service	16						
on pond or lake X on perennial stream on intermittent stream within interstream divide upstream,upslope, or radius) X forested/natural vegetation X agriculture, urban/suburban X impervious service							
X on perennial stream X forested/natural vegetation on intermittent stream X agriculture, urban/suburban within interstream divide X impervious service							
on intermittent stream within interstream divide X agriculture, urban/suburban X impervious service	25 %						
within interstream divide X impervious service	65 %						
	10 %						
other:	10 /0						
Dominant vegetation							
Soil Series 1) Microstegium vimineum							
predominantly organic 2) Acer rubrum	—						
(humus, muck, or peat) 3) Pinus taeda	—						
X predominantly mineral	—						
(non-sandy) Flooding and wetness							
` ''	semipermanently to permently flooded						
or inundated							
Hydrolic factors X seasonally flooded or inundated							
steep topography intermittently flooded or temporary	intermittently flooded or temporary						
ditched or channelized surface water							
X total riparian wetland width ≥ 100 ft no evidence of flooding or surface water	r						
Wetland type (select one)							
X Bottomland hardwood forest Pine savanna Headwater forest Freshwater marsh							
Swamp forest Bog/fen							
Wet flat Ephemeral wetland							
Pocosin Carolina Bay							
Bog forest Other							
*The rating system cannot be appllied to salt or brackish marshes or stream channels.							
weight							
R Water Storage $3 \times 4.00 = 12$							
A Bank/Shoreline stabilization 3 x 4.00 = 12							
T Pollutant removal $5 \times 5.00 = 25$							
Wildlife habitat $3 \times 2.00 = 6$							
N Aquatic life 3 x 4.00 = 12 G Recreation/Education 1 x 1.00 = 1							
G Recreation/Education 1 x 1.00 = 1							
Total Score ¹ 68							

 $^{^1\}text{Add 1}$ point if in sensitive watershed and >10% nonpoint disturbance within ½ mile radius.

City/County: Wake County Sampling Date: 08/3/2016 Applicant/Owner: NCDOT State: NC Sampling Date: NC Sampling Date: 08/3/2016 Applicant/Owner: NCOT State: NC Sampling Date: N
Investigator(s): R. Sullivan & J. Hartshorn (Kimley-Horn) Section, Township, Range: Cedar Fork Landform (hillslope, terrace, etc.): Levee Local relief (concave, convex, none): None Subregion (LRR or MLRA): LRR P Lat: 35.820818 Long: -78.828679 Datum: NAD83 Soli Map Unit Name: Congaree silt loam NWI classification: None Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.) Are Vegetation Soli or Hydrology Indicators: Sill or Hydrology Indicators (Hydrology Indicators: Pyes No No V Indicators (Hydrology Indicators: None Are Vegetation Soli or Hydrology Indicators: None Are Vegetation Present? Yes No No V Indicators (Hydrology Present? Yes No No No V Indicators (Hydrology Present? Yes No No No V Indicators (Hydrology Present? Yes No No No No Y Indicators (Hydrology Present? Yes No No No No Y Indicators (Hydrology Present? Yes No No No Y Indicators (Hydrology Present? Yes No No No No Y Indicators (Hydrology Present? Yes No No No No Y Indicators (Hydrology Present? Yes No No No Y Indicators (Hydrology Present? Yes No No No No Y Indicators
Subregion (LRR or MLRA): LRR P Lat: 35.820818 Long: -78.828679 Datum: NAD83 Soil Map Unit Name: Congaree silt loam NWI classification: None 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 Nore 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 No Within a Wetland? Yes No Within a Wetland? Wetland Hydrology Present? Yes No No Within a Wetland? The upland data point was taken ~60' south of and 0.5' to 1' higher in elevation than the wetland data point. The upland data point was taken on a sanitary sewer utility easement. HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one is required: check all that apply) Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Surface Soil Cracks (B6) Sparsely Vegetated Concave Surface (B8) Drainage Patterns (B10) Drainage Patterns (B10) Moss Trim Lines (B16) Dry-Season Water Table (C2) Crayfish Burrows (C8) Saturation (Visible on Aerial Imagery (C9) Algal Mat or Crust (B4) Iron Deposits (B5)
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Are Vegetation Soil or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
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HYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one is required: check all that apply) Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) 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)
Wetland Hydrology Indicators:Secondary Indicators (minimum of two required)Primary Indicators (minimum of one is required: check all that apply)Surface Soil Cracks (B6)Surface Water (A1)True Aquatic Plants (B14)Sparsely Vegetated Concave Surface (B8)High Water Table (A2)Hydrogen Sulfide Odor (C1)Drainage Patterns (B10)Saturation (A3)Oxidized Rhizospheres on Living Roots (C3)Moss Trim Lines (B16)Water Marks (B1)Presence of Reduced Iron (C4)Dry-Season Water Table (C2)Sediment Deposits (B2)Recent Iron Reduction in Tilled Soils (C6)Crayfish Burrows (C8)Drift Deposits (B3)Thin Muck Surface (C7)Saturation Visible on Aerial Imagery (C9)Algal Mat or Crust (B4)Other (Explain in Remarks)Stunted or Stressed Plants (D1)Iron Deposits (B5)Geomorphic Position (D2)
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Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) True Aquatic Plants (B14) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres on Living Roots (C3) Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Thin Muck Surface (C7) Other (Explain in Remarks) 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)
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Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Oxidized Rhizospheres on Living Roots (C3) Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Thin Muck Surface (C7) Other (Explain in Remarks) Oxidized Rhizospheres on Living Roots (C3) Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Saturation Visible on Aerial Imagery (C9) Stunted or Stressed Plants (D1) Geomorphic Position (D2)
Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Thin Muck Surface (C7) Other (Explain in Remarks) Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Thin Muck Surface (C7) Stunted or Stressed Plants (D1) Geomorphic Position (D2)
Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Recent Iron Reduction in Tilled Soils (C6) Thin Muck Surface (C7) Other (Explain in Remarks) Crayfish Burrows (C8) Saturation Visible on Aerial Imagery (C9) Stunted or Stressed Plants (D1) Geomorphic Position (D2)
Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Thin Muck Surface (C7) Other (Explain in Remarks) Saturation Visible on Aerial Imagery (C9) Stunted or Stressed Plants (D1) Geomorphic Position (D2)
Algal Mat or Crust (B4) Other (Explain in Remarks) Stunted or Stressed Plants (D1) Geomorphic Position (D2)
Iron Deposits (B5)
Individual of Visible of North Integery (51)
Water-Stained Leaves (B9) Microtopographic Relief (D4)
Aquatic Fauna (B13) FAC-Neutral Test (D5)
Field Observations:
Surface Water Present? Yes No V Depth (inches): Water Table Present? Yes Depth (inches): 24"
Saturation Present? Yes Depth (inches): 24" Wetland Hydrology Present? Yes No V Depth (inches): 24"
(includes capillary fringe)
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Remarks:
No indicators of wetland hydrology were observed at the upland data point location.

/EGETATION (Four Strata) – Use scientific	names of	plants.		Sampling Point: WZ-UP
201	Absolute	Dominant		Dominance Test worksheet:
Tree Stratum (Plot size: 30')				Number of Dominant Species That Are OBL FACW or FAC: 6
1. Platanus occidentalis	35%	<u>Y</u>	FACW	That Are OBL, FACW, or FAC: (A)
2. Pinus taeda	25%	<u> Y</u>	FAC	Total Number of Dominant
3. Betula nigra	15%	<u>Y</u>	FACW	Species Across All Strata: 8 (B)
4				Percent of Dominant Species 750/
5				That Are OBL, FACW, or FAC: (A/B)
6				
7				Prevalence Index worksheet:
8				Total % Cover of: Multiply by:
	75%	= Total Cov	er	OBL species x 1 =
Sapling/Shrub Stratum (Plot size: 30')	400/	.,	EAGU	FACW species x 2 =
1. Ligustrum sinense	10%	<u> </u>	FACU	FAC species x 3 =
2				FACU species x 4 =
3				UPL species x 5 =
4				Column Totals: (A) (B)
5				Drovolongo Indov. – P/A –
6				Prevalence Index = B/A = Hydrophytic Vegetation Indicators:
7				
8				1 - Rapid Test for Hydrophytic Vegetation X 2 - Dominance Test is >50%
9				_
10		· <u> </u>		3 - Prevalence Index is ≤3.0 ¹
	10%	= Total Cov	er	4 - Morphological Adaptations ¹ (Provide supporting
Herb Stratum (Plot size: 15')				data in Remarks or on a separate sheet)
1. Sorghum halepense	20%	<u> </u>	FACU	Problematic Hydrophytic Vegetation ¹ (Explain)
2. Microstegium vimineum	20%	<u>Y</u>	FAC	
3				¹ Indicators of hydric soil and wetland hydrology must
4				be present, unless disturbed or problematic.
5		<u></u>		Definitions of Four Vegetation Strata:
6				Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or
7				more in diameter at breast height (DBH), regardless of
8				height.
9				Sapling/Shrub – Woody plants, excluding vines, less
10.				than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
11				
12.		· · ·		Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
	40%	= Total Cov	er	of size, and woody plants less than 3.26 it tall.
Woody Vine Stratum (Plot size: 30')				Woody vine – All woody vines greater than 3.28 ft in
1. Vitis rotundifolia	10%	<u>Y</u>	FAC	height.
2. <u>Smilax rotundifolia</u>	10%	<u>Y</u>	FAC	
3				
4				
5				Hydrophytic
6				Vegetation
	20%	= Total Cov	er	
Remarks: (Include photo numbers here or on a separate				
Remarks. (include prioto numbers here of our a separate	: SHEEL.)			

Sampling Point: WZ-UP

SOIL

Profile Desc	ription: (Describe	to the dep	th needed to docur	nent the i	indicator	or confirm	the absence	of indicators.)
Depth	Matrix			x Feature	<u>s</u>	2		
(inches)	Color (moist)		Color (moist)	%	Type'	Loc ²	<u>Texture</u>	Remarks
0-2"	5YR 4/4	100%					Sand	
2-14"	5YR 4/4	100%					Clay loam	
14-24"	5YR 4/3	95%	7.5YR 5/6	5%	<u>C</u>	M	Clay loam	
24-30"	7.5YR 6/3	95%	7.5YR 4/6	5%	С	M	Clay loam	
							· ——	
¹ Type: C=Co	oncentration, D=Dep	oletion, RM=	Reduced Matrix, M	S=Masked	d Sand Gra	ains.	² Location: Pl	L=Pore Lining, M=Matrix.
Hydric Soil							Indic	ators for Problematic Hydric Soils ³ :
Histosol	, ,		Dark Surface				_	cm Muck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue Be				148) (Coast Prairie Redox (A16)
Black Hi			Thin Dark Su			147, 148)		(MLRA 147, 148)
	en Sulfide (A4) d Layers (A5)		Loamy Gleye Depleted Ma		(F2)		□,	Piedmont Floodplain Soils (F19) (MLRA 136, 147)
	ick (A10) (LRR N)		Redox Dark		- 6)			/ery Shallow Dark Surface (TF12)
	d Below Dark Surfac	ce (A11)	Depleted Da					Other (Explain in Remarks)
	ark Surface (A12)		Redox Depre	essions (F	8)			
	lucky Mineral (S1) (LRR N,	☐ Iron-Mangan		es (F12) (LRR N,		
	A 147, 148)		MLRA 13		/MI D A 42	e 422\	3100	licators of hydrophytic vegetation and
	Bleyed Matrix (S4) Redox (S5)		Umbric Surfa					dicators of hydrophytic vegetation and etland hydrology must be present,
	Matrix (S6)							less disturbed or problematic.
Stripped Matrix (S6) Red Parent Material (F21) (MLRA 127, 147) unless disturbed or problematic. Restrictive Layer (if observed):								
Type:								
Depth (inc	ches):						Hydric Soil	Present? Yes No
Remarks:								
No hydric soil indicators were observed at the upland data form location.								

Project/Site: TIP# U-5811	City/County: Wake County Sampling Date: 08/3/2016
Applicant/Owner: NCDOT	State: NC Sampling Point: WZ-WET
Investigator(s): R. Sullivan & J. Hartshorn (Kimley-Horn)	
Landform (hillslope, terrace, etc.): Bottomland floodplain Lo	cal relief (concave, convex, none): Concave Slope (%): 0-1%
Subregion (LRR or MLRA): LRR P Lat: 35.820998	Long: -78.828638 Datum: NAD83
Soil Map Unit Name: Congaree silt loam	NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of ye	
Are Vegetation Soil or Hydrology significantly	disturbed? Are "Normal Circumstances" present? Yes No
Are Vegetation Soil or Hydrology naturally pro	oblematic? (If needed, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site map showing	sampling point locations, transects, important features, etc.
Hydrophytic Vegetation Present? Hydric Soil Present? Wetland Hydrology Present? Yes V No Wetland Hydrology Present?	Is the Sampled Area within a Wetland? Yes No
Remarks:	
	nd that likely receives periodic flooding from stream
SA (UT to Crabtree Creek). A sanitary sewer u	itility easement runs along SA.
HYDROLOGY	
Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required: check all that apply)	Surface Soil Cracks (B6)
Surface Water (A1)	
High Water Table (A2) Hydrogen Sulfi	
	ospheres on Living Roots (C3) Moss Trim Lines (B16)
	educed Iron (C4) Dry-Season Water Table (C2) Crystian in Tilled Soile (C6)
Sediment Deposits (B2) Drift Deposits (B3) Recent Iron Re Thin Muck Sur	eduction in Tilled Soils (C6) Crayfish Burrows (C8) face (C7) Saturation Visible on Aerial Imagery (C9)
Algal Mat or Crust (B4) Other (Explain	
Iron Deposits (B5)	Geomorphic Position (D2)
Inundation Visible on Aerial Imagery (B7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Microtopographic Relief (D4)
Aquatic Fauna (B13)	FAC-Neutral Test (D5)
Field Observations:	411.011
Surface Water Present? Yes V No Depth (inches	
Water Table Present? Yes Veg No Depth (inches	
Saturation Present? Yes No Depth (inches (includes capillary fringe)): Surface Wetland Hydrology Present? Yes No
Describe Recorded Data (stream gauge, monitoring well, aerial photo	os, previous inspections), if available:
Remarks:	
Pockets of standing water were observed thro	ughout the wetland. The water table and soil
saturation was observed at the soil surface.	agriout the wettand. The water table and son
Saturation was observed at the son surface.	

	plants.		Sampling Point: WZ-WET
bsolute	Dominant	Indicator	Dominance Test worksheet:
	Species?		Number of Dominant Species
30%	<u>Y</u>	FAC	That Are OBL, FACW, or FAC: 9 (A)
25%	<u>Y</u>	FAC	Total Number of Dominant
20%	Υ	OBL	Species Across All Strata: 9 (B)
20%	Υ	FAC	,
			Percent of Dominant Species That Are OBL, FACW, or FAC:
			(775)
			Prevalence Index worksheet:
			Total % Cover of: Multiply by:
95% -	- Total Cov		OBL species x 1 =
5576 -	- 10101 001	J 1	FACW species x 2 =
10%	Υ	FAC	FAC species x 3 =
10%	Υ	FAC	FACU species x 4 =
5%	N	FAC	UPL species x 5 =
5%	N	FAC	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 ≤3.0 ¹
			4 - Morphological Adaptations ¹ (Provide supporting
<u>30%</u> =	= Total Cove	er	data in Remarks or on a separate sheet)
500%	V	EΛC	Problematic Hydrophytic Vegetation¹ (Explain)
		TAC	1 Toblematic Hydrophytic Vegetation (Explain)
			Indicators of hydric acil and watland hydrology must
			¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
			Definitions of Four Vegetation Strata:
			John Monte of Four Togotation Official
			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.
50% =	= Total Cove	er	or size, and woody plants less than 5.20 it tall.
			Woody vine – All woody vines greater than 3.28 ft in
5%	<u> </u>	<u>FAC</u>	height.
5%	Y	FAC	
			Hydrophytic
			Armeteria.
			Vegetation Present? Yes No
10% =	= Total Cove	er er	Vegetation Present? Yes ✓ No No
	95% = 10% 10% 5% 5% = 50% = 5% = 5%	95% = Total Cove 10% Y 10% Y 5% N 5% N 30% = Total Cove 50% Y 50% = Total Cove 50% Y	95% = Total Cover 10% Y FAC 10% Y FAC 5% N FAC 5% N FAC 30% = Total Cover 50% Y FAC 50% = Total Cover 50% = Total Cover

Sampling Point: WZ-WET

SOIL

Profile Desc	ription: (Describe	to the dep	oth needed to docun	nent the i	ndicator	or confirm	the absence	of indicators.)
Depth	Matrix			x Feature	<u>s</u> _ 1	. 2		_
(inches)	Color (moist)	<u>%</u>	Color (moist)	<u>%</u>	Type ¹	Loc ²	<u>Texture</u>	Remarks
0-12"	7.5YR 4/2	90%	7.5YR 4/6	10%	<u>C</u>	<u>M</u>	Clay loam	
12-24"	7.5YR 6/2	80%	7.5YR 5/8	20%	<u>C</u>	<u>M</u>	Sandy clay	loam
	-							
	-							
	-							
					-			
		oletion, RM	=Reduced Matrix, MS	S=Masked	d Sand Gr	ains.	² Location: PL	_=Pore Lining, M=Matrix.
Hydric Soil I	ndicators:						Indica	ators for Problematic Hydric Soils ³ :
Histosol	• •		Dark Surface	. ,			_	cm Muck (A10) (MLRA 147)
	pipedon (A2)		Polyvalue Be				148) C	Coast Prairie Redox (A16)
Black His	stic (A3) n Sulfide (A4)		Thin Dark Su Loamy Gleye			147, 148)	Пь	(MLRA 147, 148) riedmont Floodplain Soils (F19)
	I Layers (A5)		Depleted Mat		(1-2)		Шг	(MLRA 136, 147)
	ick (A10) (LRR N)		Redox Dark S		- 6)		□v	/ery Shallow Dark Surface (TF12)
	d Below Dark Surfac	e (A11)	Depleted Dar					other (Explain in Remarks)
	ark Surface (A12)		Redox Depre					
	lucky Mineral (S1) (I \ 147, 148)	LRR N,	Iron-Mangan		es (F12) (LRR N,		
1 1	leyed Matrix (S4)		Umbric Surfa	•	MIRA 13	86. 122)	³ Ind	icators of hydrophytic vegetation and
	edox (S5)		Piedmont Flo					etland hydrology must be present,
	Matrix (S6)		Red Parent N					less disturbed or problematic.
Restrictive L	ayer (if observed):							
Type:								
Depth (inc	ches):						Hydric Soil	Present? Yes V No No
Remarks:								
The soil	was too satur	ated to	auger below	24" B	oth the	water	table and	soil saturation were
The soil was too saturated to auger below 24". Both the water table and soil saturation were observed at the surface.								
ODSCI VCC	a at the surface	JC.						

Appendix D

Qualifications of Contributors

Investigator: Ross Sullivan

Education: B.S. Social Psychology, 2008, Masters of Natural Resources (MNR),

Assessment and Analysis Technical Option, 2014, Graduate Certificate

in Geographic Information Systems, 2014

Experience: Environmental Analyst, Kimley-Horn and Associates, Inc. 2014-Present

Responsibilities: Wetland and stream delineations, GPS/GIS, stream assessment,

natural community assessment, T/E species assessment, document

preparation

Investigator: William Sullivan

Education: B.S. Natural Resources – Ecosystem Assessment, 2016, Minor in Forest

Management, 2016

Experience: Environmental Intern, Kimley-Horn and Associates, Inc. 2016-Present

Responsibilities: Wetland and stream delineations, GPS/GIS, T/E species

assessment/survey, document preparation