3.9 Natural Resources

3.9.1 CHANGES TO THIS CHAPTER SINCE THE DEIS

Since the Draft Environmental Impact Statement (DEIS), the chapter has been revised to update the acreage of the project study due to project design refinement, and the area of natural communities within the refined study area; and to incluce the impacts from the Refined Recommended Preferred Alternative.

3.9.2 WHAT ARE NATURAL RESOURCES?

The purpose of this chapter is to present the natural resources located within the project study area (PSA) and assess potential impacts to these resources resulting from the proposed project. Natural resources assessed in this document include landforms and soils, natural habitat communities and wildlife, and federal and/or state protected species. Natural resources are important in providing habitat for plant and animal species and contributing to the overall well-being of these species and humans. Specifically, soils provide storm water storage and a growing medium for plant life including important food crops. Natural communities not only provide habitat for wildlife, but through vegetated riparian buffers also contribute to the maintenance of good air and water quality. Riparian buffers are defined as "vegetated areas near streams, usually forested, which help shade and partially protect streams from the impact of adjacent land uses".[1] In an effort to avoid or minimize impacts to natural resources to the extent practicable, it is key that natural resources are documented and assessed during the project planning and design process.

Why are natural resources important?
Natural resources are important in providing habitat for plant and animal species and contributing to the overall well-being of these species and humans.

3.9.3 HOW WERE NATURAL RESOURCES WITHIN THE PROJECT STUDY AREA IDENTIFIED AND ASSESSED?

The PSA consists of a mainline corridor including I-20 from US 378 to the Broad River, I-26 from US 378 to north of Broad River Road, and I-126 from Stone Ridge Drive to I-26 extending out approximately 100-150 feet beyond the existing South Carolina Department of Transportation (SCDOT) right-of-way limits. Field reviews of the PSA were conducted between April 16, 2014 and November 18, 2015, between July 25, 2017 and September 20, 2017, and November 15 and 16, 2018 to document the natural resources, and specifically natural habitat communities, located within the PSA. Literature and reference material was also reviewed to obtain and document information related to soils, protected species, and natural habitat communities.[2]

[1] U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). 2006. "National Conservation Practice Standard: Riparian Forest Buffer."
[2] SCDOT. 2018. Carolina Crossroads I-20/I-26/I-126 Corridor Improvement Project Natural Resources Technical Report. Prepared by Mead & Hunt.

3.9.4 HOW ARE NATURAL RESOURCES PROTECTED?

There are no federal regulations protecting natural habitat communities or soils specifically; however, certain areas of habitat designated by the U.S. Fish and Wildlife Service (USFWS) as critical habitat for federally endangered or threatened species are protected through Section 7 of the Endangered Species Act as described below. Some areas of hydric soils are federally protected indirectly through Section 404 of the Clean Water Act (CWA) and the protection of jurisdictional wetland areas. More information on the protection of wetland habitat communities and associated hydric soils is included in Chapter 3.7 Water Resources. Natural habitats and associated water quality are also indirectly protected per Section 401 and 402 of the CWA. Section 401 requires a Water Quality Certification for any activities requiring a federal permit. Section 402 protects water quality through the National Pollutant Discharge Elimination System (NPDES) program which requires permits for land disturbance activities (projects), of a certain size, resulting in storm water runoff and discharges. As part of the NPDES permitting program, best management practices (i.e., sediment and erosion control measures) are required to be implemented as part of a project's storm water management plan. More information on the anticipated permits required for the proposed project is included in Section 3.18: Permits. Per the Heritage Trust Act 51-17 of 1976 (SC Code of Laws), the South Carolina Heritage Trust Program protects certain designated areas of natural habitat or communities determined to be outstanding representatives of the state's heritage. These natural areas or communities are provided protection through conservation easements and designated as Heritage Preserves or Sites to be managed by the South Carolina Department of Natural Resources.

3.9.4.1 Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, is the primary federal law that serves to protect federally protected (endangered and threatened) species. The ESA is administered and regulated by the U.S. Fish and Wildlife Service (USFWS) and/or National Oceanic and Atmospheric Administration-National Marine Fisheries Service (NOAA-NMFS). As part of that National Environmental Policy Act (NEPA) and Clean Water Act Section 404 permitting requirements, consultation with USFWS and/or NOAA-NMFS is required under Section 7 of the ESA, as amended (16 U.S.C. 1531-1534) for proposed federal projects that "may affect" federally-classified endangered and threatened species or their habitats.

3.9.4.2 Federal Protected Species

Species with the federal classification of Endangered (E) or Threatened (T), or Threatened due to Similarity of Appearance (T [S/A]) are protected under the ESA of 1973, as amended (16 U.S.C. 1531 et seq.). The term "endangered species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range", and the term "threatened species" is defined as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C. 1532).

The term "Proposed" (P) is defined as "any species proposed for official listing as endangered or threatened." "Candidate" (C) species are taxons under consideration for which there is sufficient information to support listing but development of a proposed listing regulation is precluded by other higher priority listing activities. "At-Risk Species" (ARS) is an informal term that refers to those species which may be in need of concentrated

conservation actions, and have been petitioned for listing as threatened or endangered. The USFWS designations P, C, and ARS do not provide federal protection and require no Section 7 consultation under the ESA. While there are no protections for these species, it is important to be aware of their presence or absence in the event they were to become listed during a later phase of the proposed project (e.g., during construction).

3.9.4.3 State Protected Species

Animal species that are on the South Carolina state protected species list receive protection under the South Carolina Nongame and Endangered Species Conservation Act (South Carolina Code, Title 50). State endangered species are defined as any species or subspecies of wildlife whose prospects of survival or recruitment within the state are in jeopardy or are likely within the foreseeable future to become so. It is unlawful for any person to take, possess, transport, export, process, sell or offer for sale or ship, and for any common or contract carrier knowingly to transport or receive for shipment any species or subspecies of wildlife appearing on the state list of protected species without appropriate authorization.

State Wildlife Action Plan (SWAP) species are those species of greatest conservation need in South Carolina not traditionally covered under any federal funded programs. Species listed in the SWAP are rare or designated as at-risk due to knowledge deficiencies; species common in South Carolina, but listed rare or declining elsewhere; or species that serve as indicators of detrimental environmental conditions. SCDNR recommends that appropriate measures be taken to minimize or avoid impacts to this species of concern.

3.9.4.4 Migratory Birds and Bald and Golden Eagle Protection Act

Migratory birds are also provided federal protection under the Migratory Bird Treaty Act (MBTA) of 1918, which requires protection of these birds and their habitats. The MBTA, 16 U.S.C. 703-711, states that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. The bald eagle is no longer protected under the ESA, but the species is afforded federal protection through the Migratory Bird Treaty Act as well as the Bald and Golden Eagle Protection Act (BGEPA) of 1940. The BGEPA, 16 U.S.C. 668-668c, prohibits the take of bald eagles including their parts, nests, or eggs by anyone, without a permit issued by the Secretary of the Interior.

3.9.5 WHAT NATURAL RESOURCES ARE IN THE PROJECT STUDY AREA?

The majority of the PSA is comprised by developed or disturbed land and maintained areas. The following describes the natural resources that are located in the undisturbed/natural areas in the PSA.

What ecoregion is the PSA in?

The majority of the PSA is contained within the Piedmont Ecoregion, a transitional area between the Appalachian and Blue Ridge Mountains. Landforms within the Piedmont are comprised generally of flat areas and hills.

3.9.5.1 Landforms and Soils

The origin and composition of soils is dependent upon the landform or ecoregion in which the soil is located. An ecoregion is defined as "an area in which the type, quality, and quantity of environmental resources are generally similar."[3] Ecosystem is defined as "a community of living organisms in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system."[4] The PSA is located within two Level III Ecoregions, the Piedmont (45) and Southeastern Plains (65), as defined and mapped by the U.S. Geological Survey (USGS).[5] The majority of the PSA is contained within the Piedmont (45) Ecoregion which is a transitional area between the Appalachian and Blue Ridge Mountains to the northwest and the Atlantic coastal plain to the southeast.[6] Landforms within the Piedmont are comprised generally of flat areas and hills. Once largely forested and then cultivated, much of the Piedmont has been converted to pine forest and managed for the production of timber or has reverted to successional hardwood-pine forest. Successional forest can be defined as the different stages of vegetative growth and species composition or makeup of an area over time. For more information on the Level III Ecoregions and associated further subdivided Level IV Ecoregions, as designated by the USGS, please refer to the Natural Resources Technical Report in Appendix L.

[3] Omernik, J.M. 1987. Ecoregions of the conterminous United States. Annals of the Association of American Geographers 77(1): 118-125.
[4] Molles, Manuel C. 1999. Ecology: Concepts and Applications. Boston. WCB/McGraw-Hill.
[5] Griffith, G.E., et al., 2002. U.S. Geological Survey. Ecoregions of North Carolina and South Carolina, (color poster with map, descriptive text, summary tables, and photographs); Reston, Virginia.
[6] SCDOT. 2018. Carolina Crossroads I-20/I-26/I-126 Corridor Improvement Project Natural Resources Technical Report. Prepared by Mead & Hunt.

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic database identifies 50 soil map units from 30 different soil series within the PSA. Maps depicting the location and extent of the soil units within the PSA can be reviewed in the Natural Resources Technical Report.[7] The USDA-NRCS defines a soil series as a group of soils that have horizons (layers) that are similar in composition, thickness, and arrangement. The soil map units with a hydric component comprise approximately eight percent of the PSA. Hydric soil is defined as a soil that has formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic (no oxygen) conditions in the upper part. It is important to document the presence of hydric soils as these soils generally do not drain well which can have an adverse affect on the constructability of projects. Hydric soils are also one of the parameters used in the identification of jurisdictional wetland areas. For detailed information on each of the soil series and associated mapping units, refer to the aforementioned Natural Resources Technical Report.

What is a hydric soil?

Hydric soil is defined as a soil that has formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic (no oxygen) conditions in the upper part. Hydric soils are often indicative of wetlands.

[7] SCDOT. 2018. Carolina Crossroads I-20/I-26/I-126 Corridor Improvement Project Natural Resources Technical Report. Prepared by Mead & Hunt.

3.9.5.2 Natural Habitat Communities

Much of the PSA has been developed for residential and commercial land uses leading to the loss, alteration, and/or fragmentation of natural habitats including upland forests and wetlands and streams.

As noted, much of the PSA has been developed for residential and commercial land uses leading to the loss, alteration, and/or fragmentation of natural habitats including upland forests and wetlands and streams. Over time, much of the naturally occurring woodland habitats within the PSA have also been altered by silvicultural, or forestry, practices involving the conversion of hardwood and mixed pine/hardwood forests to homogenous (single species) forests typically managed for the production of timber. Forestry practices such as this have in turn formed monoculture stands of pine forest in certain areas and decreased the availability of hardwood forest and stream riparian buffer habitat for wildlife species dependent upon this habitat. Monoculture is defined as the practice of growing a single crop, plant, or livestock species, variety, or breed in a field or farming system at a time.[8] Forestry practices, as well as residential and commercial development, have also led to the introduction and spread of invasive plant species in natural forested areas. Based on the definition as written in Executive Order 13112, an invasive species is any species non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. These non-native species aggressively compete with and displace the associated flora community.[9]

Natural habitat communities within the PSA were identified and categorized by distinguishing characteristics including vegetation (dominant plant species), location within the landscape, past disturbance or alteration, and hydrologic characteristics. Based on these distinguishing characteristics, the following natural habitat communities were identified as being present within the project study area (PSA): mixed pine/hardwood forest, pine forest, bottomland hardwood forest, scrub-shrub, freshwater wetland, freshwater stream/tributary, and open water/pond; please see the following Figures 3.9-1A through 3.9-1P for maps depicting the location and extent of the natural habitat community types within the PSA. The areas/boundaries of the communities were approximated based on aerial photography interpretation and the field reviews conducted by the project team. A summary of each of the natural habitat communities follows.

Mixed Pine/Hardwood Forest

Mixed pine/hardwood forest is the dominant habitat community type comprising approximately 274.39 acres, or 18.5 percent, of the PSA. Within the PSA, this habitat generally occurs on flats and slopes adjacent to streams and rivers and within wooded corridors buffering residential development. Dominant vegetation consists of pine and hardwood tree species, at varying levels of growth or successional stages from young and intermediate forest (five to 30 years old) to mature forest (30+ years old). Dominant tree species observed within the PSA varied depending on degree of wetness and location within the landscape but generally included sweetgum, red maple, loblolly pine, Virginia pine, water oak, northern red oak, American elm, winged elm, white oak, willow

[8] Connor, D.J., et al. 2011. Crop Ecology: productivity and management in agricultural systems. Cambridge University Press. 2nd edition.
[9] Federal Register of Documents. 1999. Executive Order 13112. Volume 64, No. 25. Pages 6183-6186.

oak, tulip poplar, white ash, mockernut hickory, blackgum, eastern red cedar, American holly, and persimmon. Dominant herbaceous plant species observed within the PSA included slender woodoats, Christmas fern, ebony spleenwort, broomsedge, and blackberry. Dominant vining plant species observed included Virginia creeper, common greenbrier, cat brier, trumpet vine, muscadine, and poison ivy. Invasive plant species, including Chinese privet, tree-of-heaven, Japanese honeysuckle, and autumn olive, were also observed in the PSA.

Pine Forest

Pine forest comprises approximately 33.75 acres, or 2.3 percent, of the PSA and primarily includes tracts of land planted with pine trees for the production of timber or other purposes. Within the PSA, this habitat generally occurs in association with large residential properties and within existing roadway interchanges along I-20 and I-26. Naturally occurring areas of pine-dominated forest are also present within limited portions of the PSA intermingled with areas of mixed pine/hardwood forest. The dominant vegetation within the pine forest community is primarily loblolly pine. Opportunistic tree species such as red maple, sweetgum, and elm were also observed in the understory. Groundcover vegetation was generally sparse due to the density of the overhead tree canopy. Dominant vining species observed within the community included Virginia creeper, poison ivy, and common greenbrier. Invasive species including Chinese privet, autumn olive, tree-of-heaven, and Japanese honeysuckle were also observed.

Bottomland Hardwood Forest

Bottomland hardwood forest comprises approximately 32.38 acres, or 2.2 percent, of the PSA and includes primarily the floodplains of large streams, creeks, and rivers and other low-lying areas. Specifically, this habitat can be found immediately adjacent to the Saluda and Broad Rivers. Dominant tree species observed within the bottomland hardwood forest community included red maple, water oak, laurel oak, willow oak, tulip poplar, American sycamore, sweetgum, red bay, and ironwood. Groundcover vegetation was sparse to moderately dense and included pepper bush, giant cane, cinnamon fern, and netted chain fern. Dominant vining species observed within the community included poison ivy, muscadine, laurel-leaf greenbrier, and common greenbrier. Invasive species including Chinese privet and Japanese honeysuckle were also observed.

Scrub-Shrub

Scrub-Shrub comprises approximately 20.65 acres, or 1.4 percent, of the PSA. The scrub-shrub community includes irregularly maintained or otherwise disturbed areas dominated by herbaceous and shrubby plant species and tree seedlings. Within the PSA, this habitat is found within roadway and/or utility rights-of-way and other overgrown areas associated with development. Dominant vegetation observed within the scrub-shrub community included blackberry, goldenrod, common greenbrier, eastern false willow, winged sumac, broomsedge, vasey grass, and seedlings of various tree species including sweetgum, red maple, loblolly pine, eastern red cedar, and winged elm. Invasive species including Chinese privet, tree-of-heaven, and Japanese honeysuckle were also observed.

Freshwater Wetland

Freshwater wetland comprises approximately 12.22 acres, or 0.8 percent, of the PSA and includes palustrine forested (PFO1A), emergent herbaceous (PEM1 and PEM2), and scrub-shrub (PSS1) wetland types as designated

by the project team per the Cowardin Classification wetland classification system.[10] As defined by the Cowardin classification system, palustrine refers to any inland non-tidal wetland lacking flowing water and containing concentrations of ocean-derived salts of less than 0.5 parts per thousand. A total of 60 wetland areas were identified and delineated within the PSA. Within the PSA, freshwater wetlands are generally found in low-lying areas abutting or adjacent to streams and rivers. More information on the wetlands, including approximate size, dominant vegetation, hydrology, hydric soil indicators, and jurisdictional status, is included in Chapter 3.7 Water Resources.

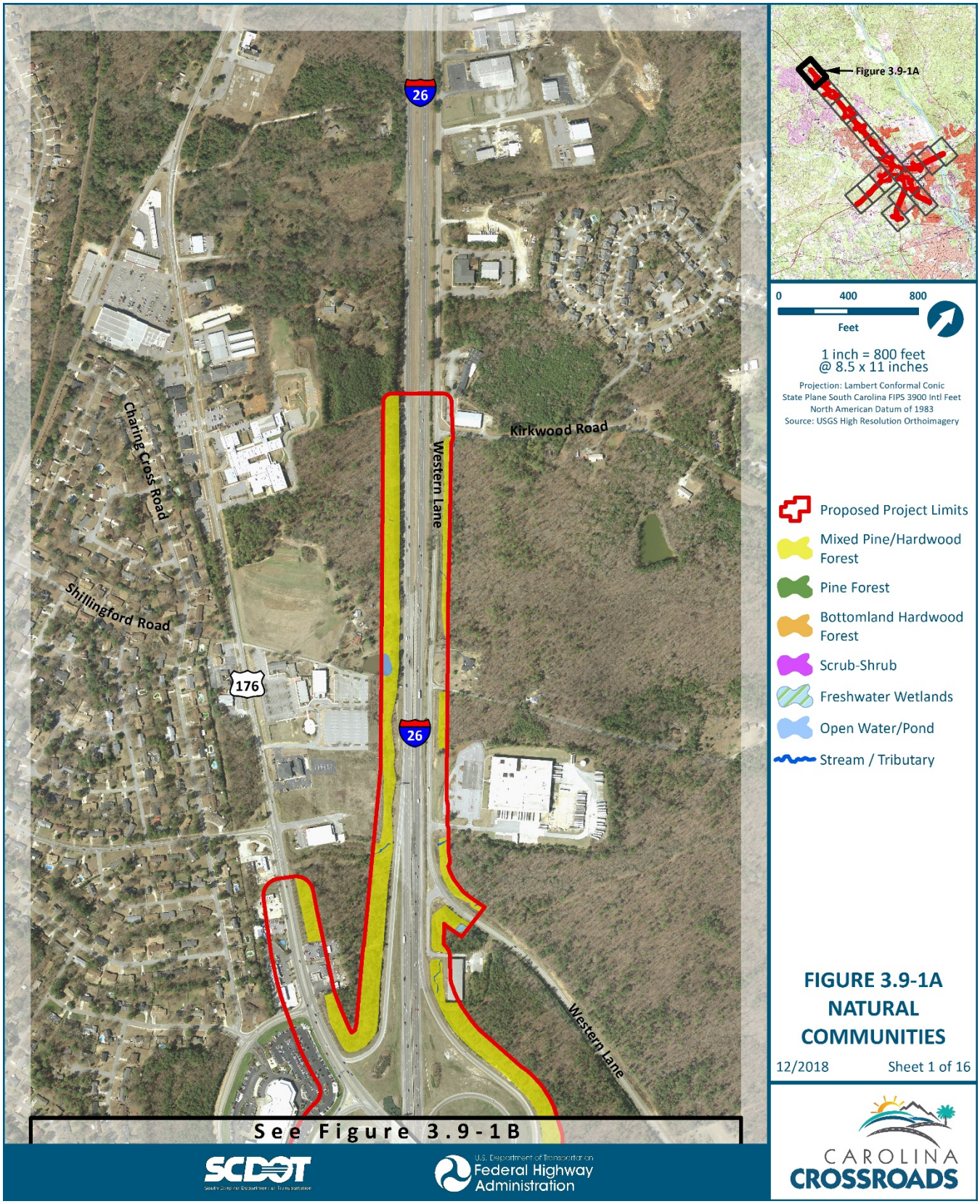
Freshwater Stream/Tributary

Freshwater stream or tributary comprises approximately 24.38 acres, or 1.6 percent, of the PSA. A total of 72 tributaries, including seasonal and perennial streams and navigable rivers/waterways, were identified and delineated within the PSA. These features are generally found in natural drainageways, ravines, and valleys, and convey storm water runoff. Some of these features within the PSA have been channelized, or otherwise altered by man, in an effort to increase storage and flow capacity. More information on the delineated tributaries, including approximate size, hydrology, substrate, morphological characteristics, and potential jurisdictional status, is included in Chapter 3.7 Water Resources.

Open Water/Pond

Five open waters or freshwater ponds totaling approximately 0.74 acre were identified by the project team and delineated within the PSA. Aquatic plant community components including submerged aquatic vegetation (SAV) were observed within the limits of the ponds. SAV includes species that grow to the surface of, but do not emerge from, shallow waters. SAV provides important ecological functions including providing food and habitat for a variety of aquatic birds, fish, and mammals. The ponds within the PSA are generally man-made and have been excavated from uplands or the headwaters of small streams and wetlands. More information on the open water pond features located within the PSA, including approximate size, hydrology, and jurisdictional status, is included in Chapter 3.7 Water Resources.

[10] Cowardin, L.M., et al., 1979. Classification of U.S. Wetland and Deepwater Habitats of the United States. Department of the Interior, U.S. Fish and Wildlife Service.


26
Kirkwood Road
Charing Cross Road
Western Lane
Shillingford Road
176
26
Western Lane
See Figure 3.9-1B
Figure 3.9-1A
0
400
800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1A
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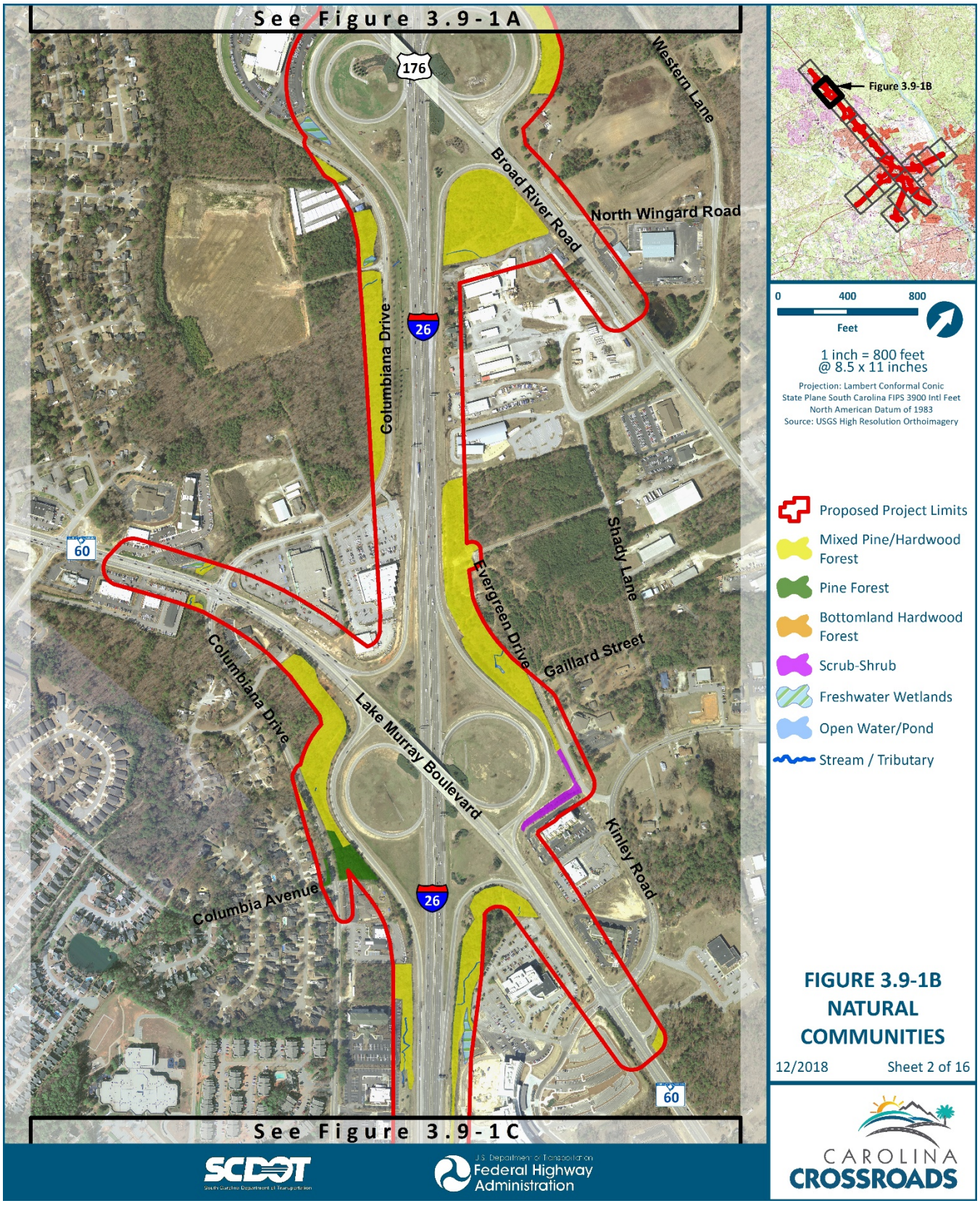
See Figure 3.9-1A
176
Western Lane
Broad River Road
North Wingard Road
Columbiana Drive
26
60
Shady Lane
Evergreen Drive
Gaillard Street
Columbiana Drive
Lake Murray Boulevard
Kinley Road
Columbia Avenue
26
60
See Figure 3.9-1C
Figure 3.9-1B
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1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1B
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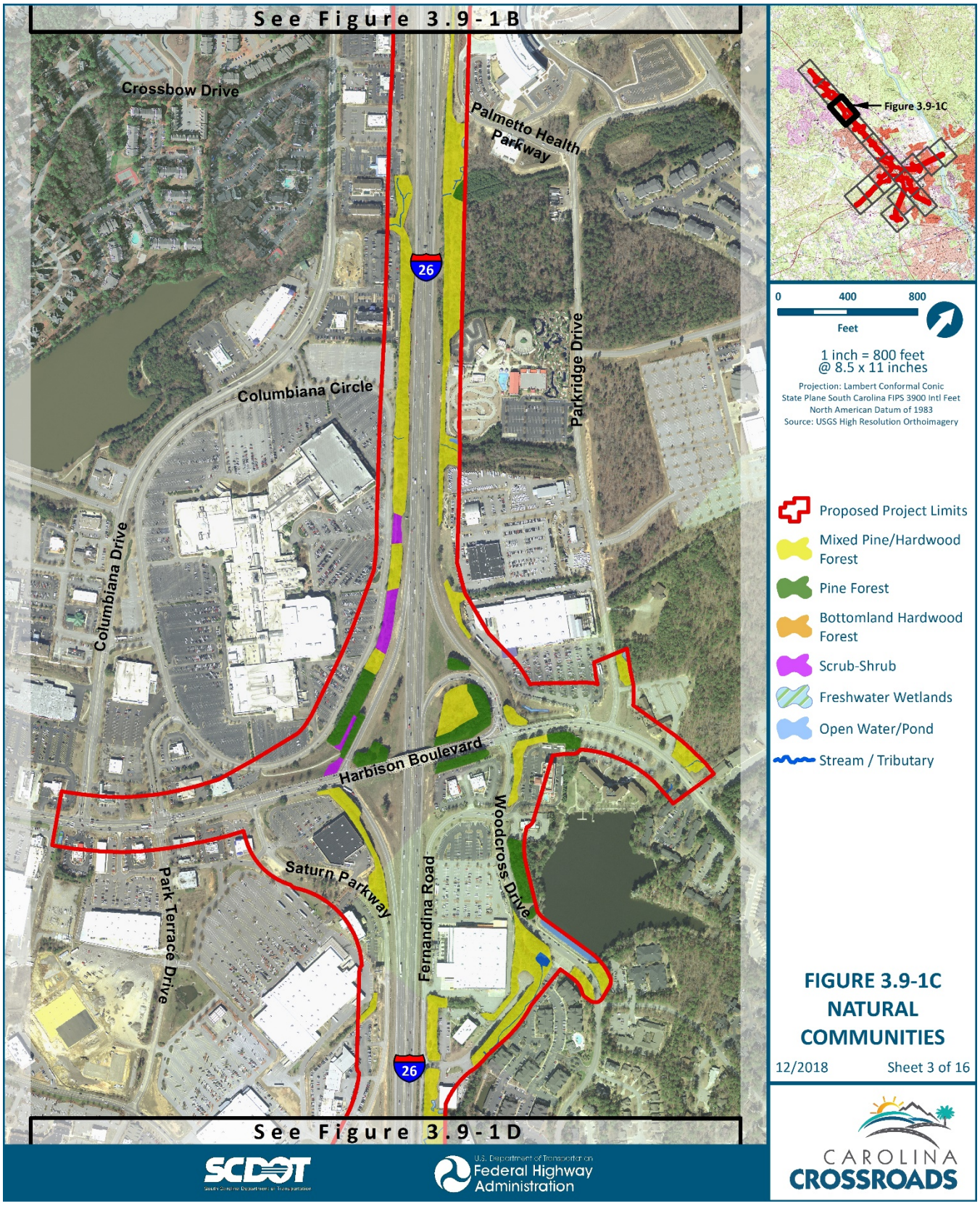
Federal Highway Administration


See Figure 3.9-1B
Crossbow Drive
Palmetto Health Parkway
26
Columbiana Circle
Parkridge Drive
Columbiana Drive
Harbison Boulevard
Saturn Parkway
Park Terrace Drive
Fernandina Road
Woodcross Drive
26
See Figure 3.9-1D
Figure 3.9-1C
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Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1C
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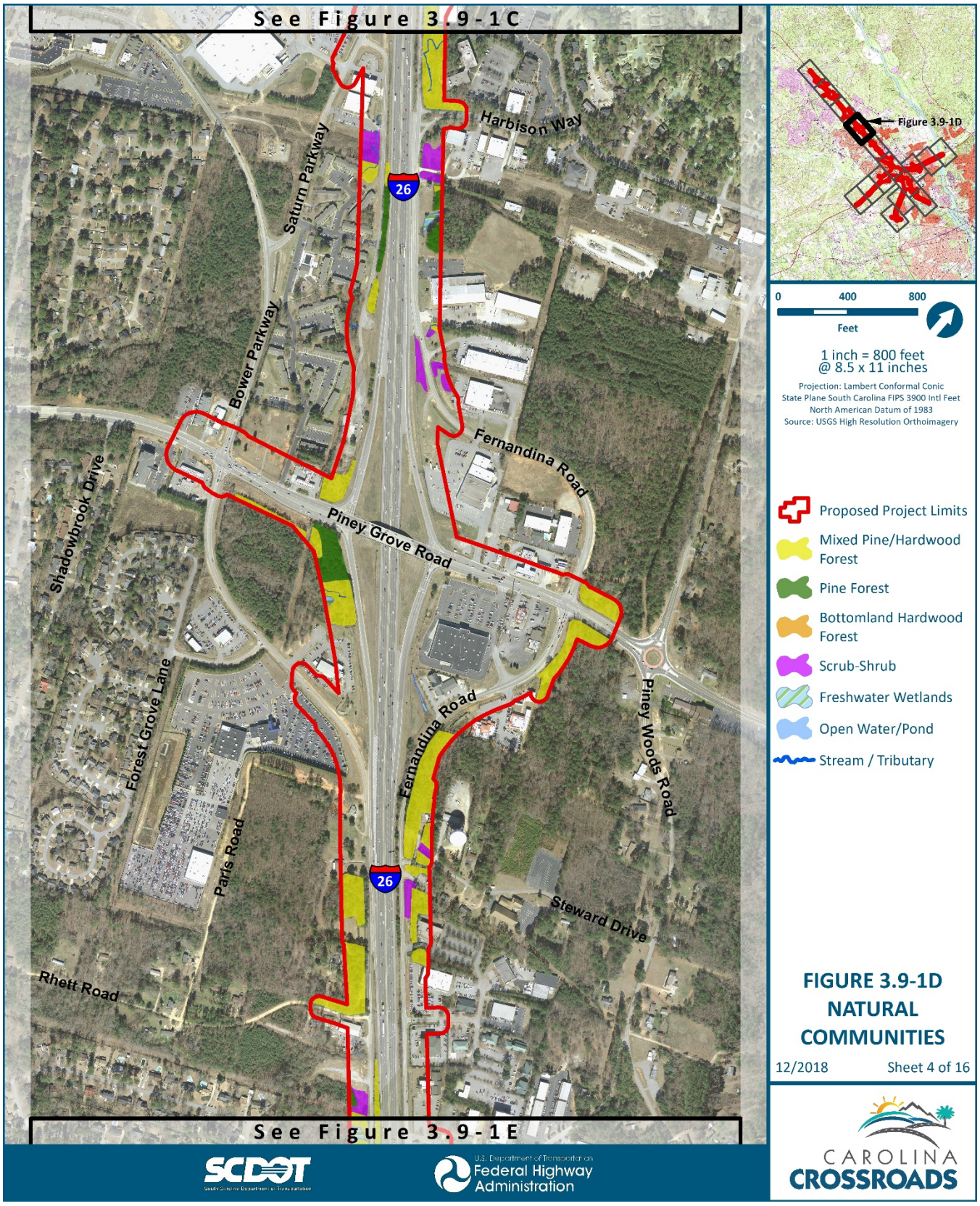
See Figure 3.9-1C
Harbison Way
Saturn Parkway
26
Bower Parkway
Fernandina Road
Shadowbrook Drive
Piney Grove Road
Forest Grove Lane
Fernandina Road
Piney Woods Road
Paris Road
26
Steward Drive
Rhett Road
See Figure 3.9-1E
Figure 3.9-1D
0
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Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1D
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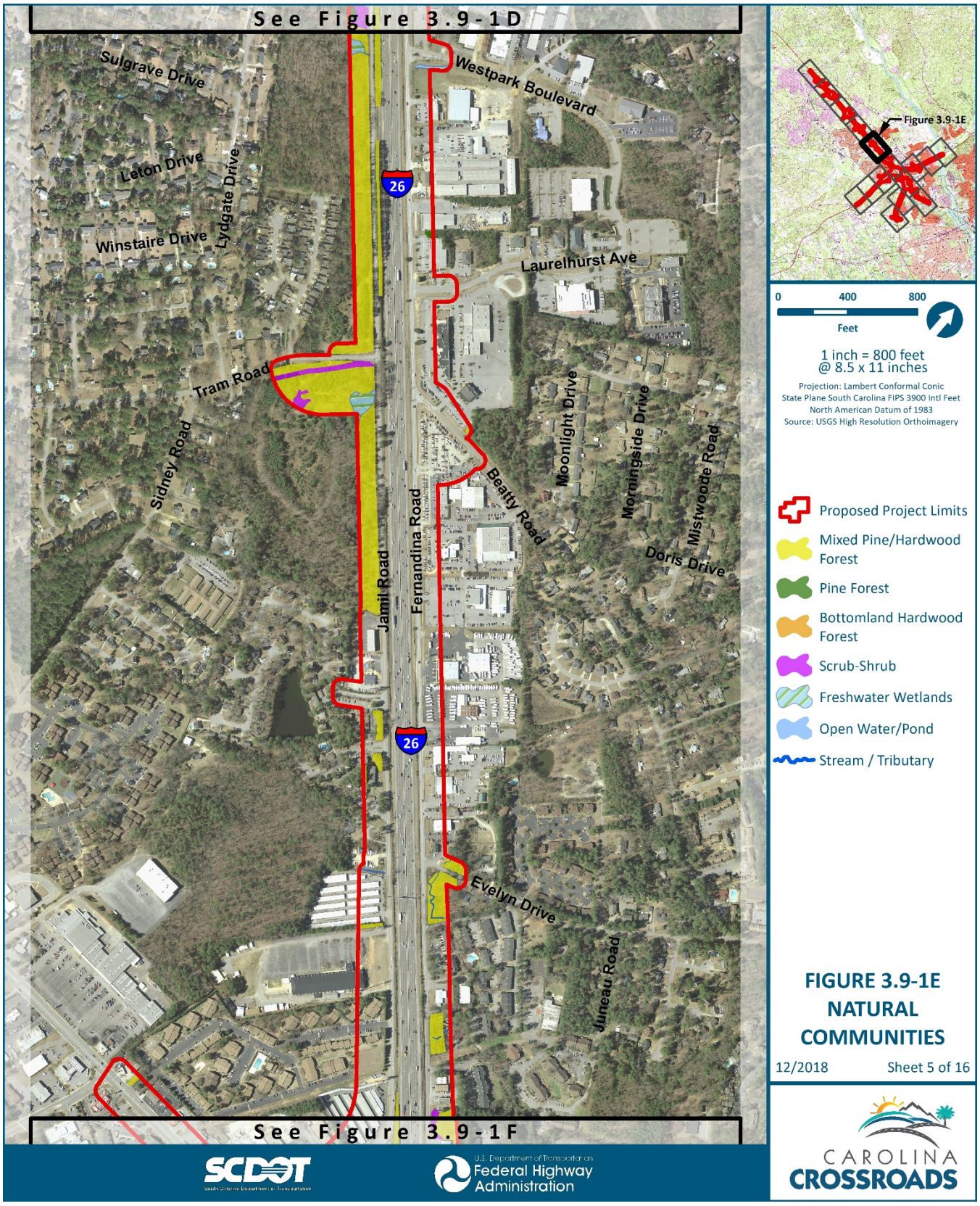
See Figure 3.9-1D
Sulgrave Drive
Westpark Boulevard
Leton Drive
Lydgate Drive
Winstaire Drive
26
Laurelhurst Ave
Tram Road
Sidney Road
Moonlight Drive
Morningside Drive
Mistwoode Road
Beatty Road
Fernandina Road
Jamil Road
Doris Drive
26
Evelyn Drive
Juneau Road
See Figure 3.9-1F
Figure 3.9-1E
0
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Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1E
NATURAL COMMUNITIES
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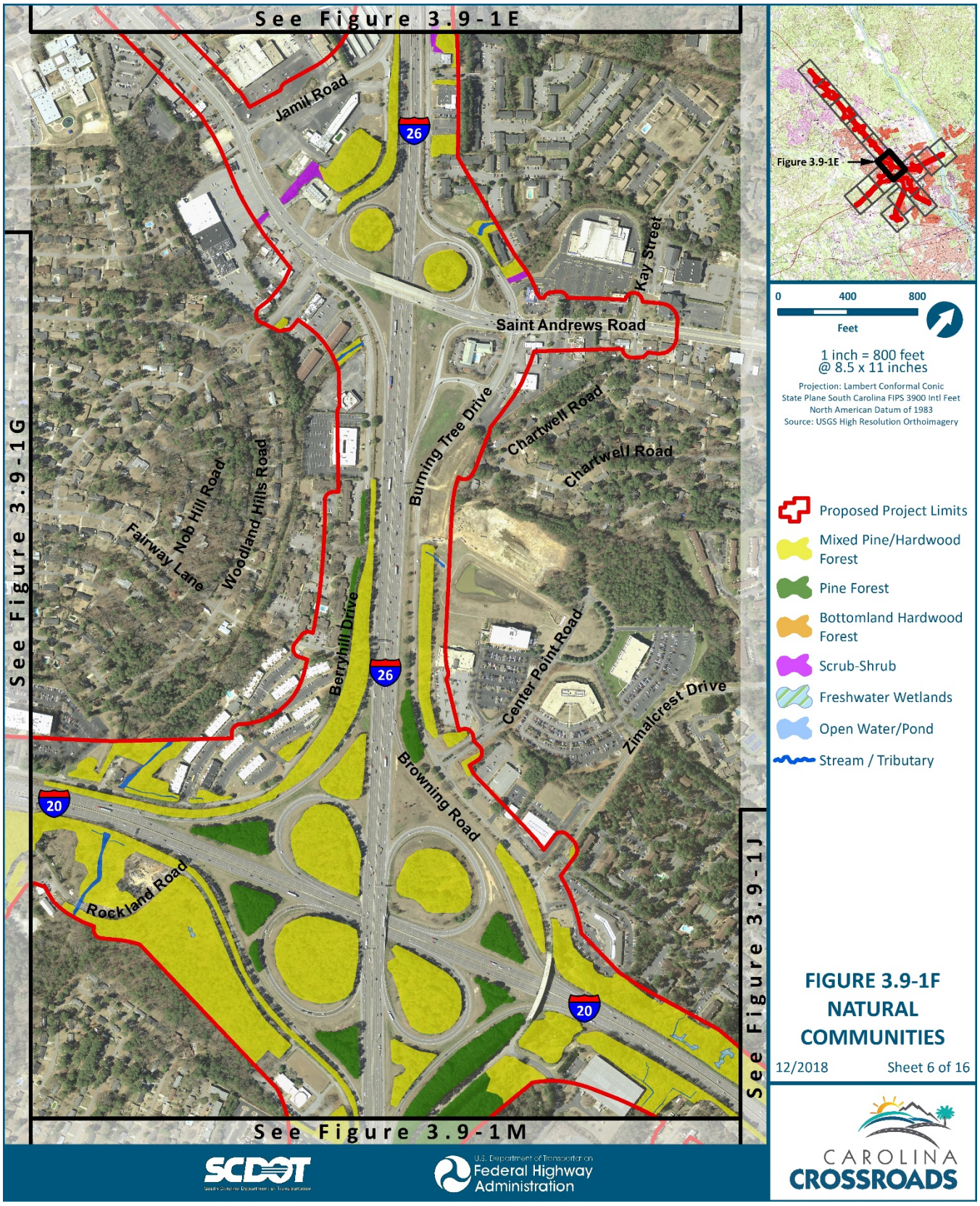
See Figure 3.9-1E
See Figure 3.9-1G
See Figure 3.9-1J
See Figure 3.9-1M
Jamil Road
Kay Street
Saint Andrews Road
Burning Tree Drive
Chartwell Road
Chartwell Road
Nob Hill Road
Woodland Hills Road
Fairway Lane
Berryhill Drive
Center Point Road
Zimalcrest Drive
Browning Road
Rockland Road
26
26
20
20
Figure 3.9-1E
0
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Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1F
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Woodland Hills Road NW
Westlawn Road
Bush River Road
East Meadow Court
Berryhill Drive
Rockland Road
Independence Avenue
Saluda River
20
20
See Figure 3.9-1H
See Figure 3.9-1F
Figure 3.9-1G
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800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1G
NATURAL COMMUNITIES
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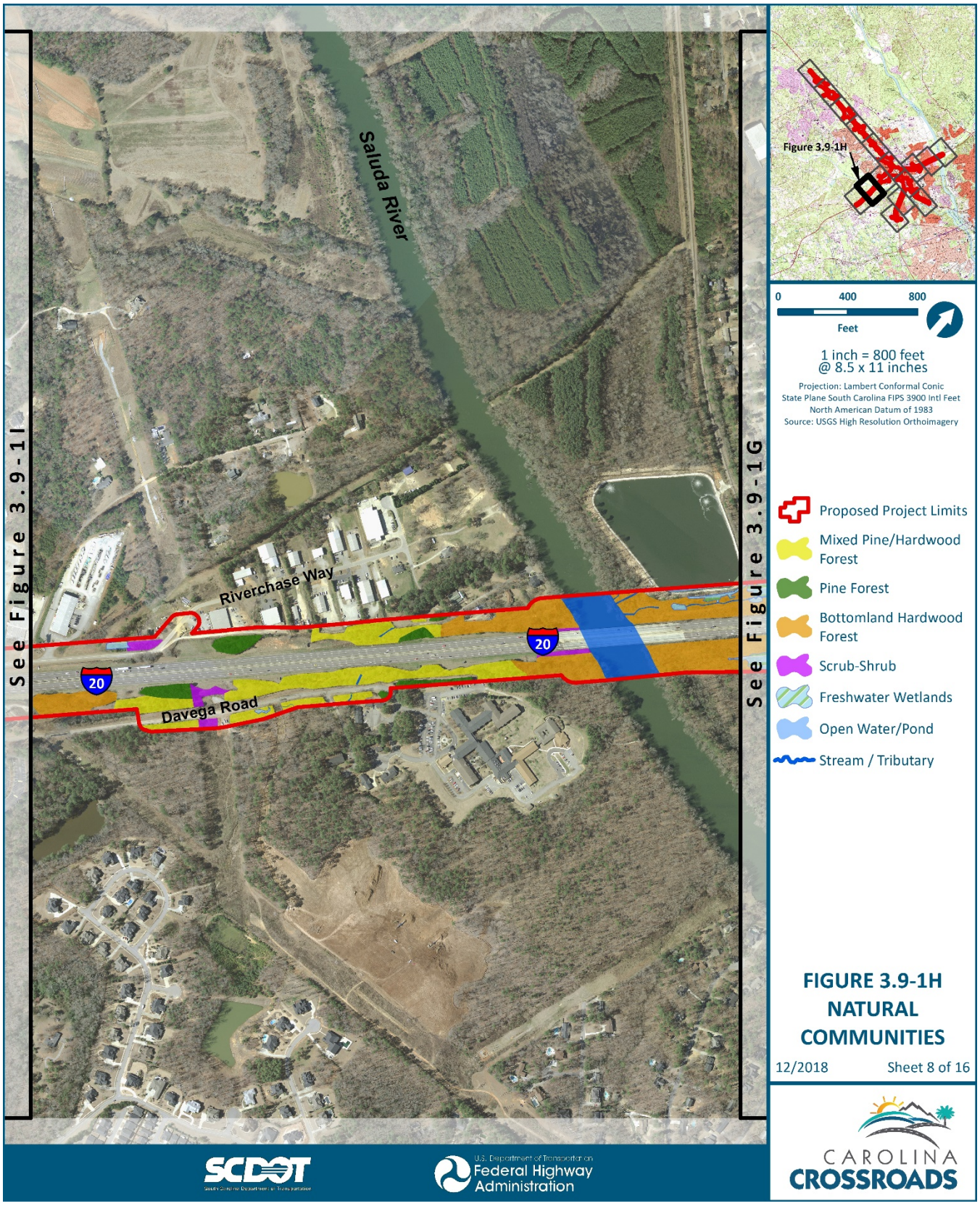
See Figure 3.9-1I
See Figure 3.9-1G
Saluda River
Riverchase Way
Davega Road
20
20
Figure 3.9-1H
0
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Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1H
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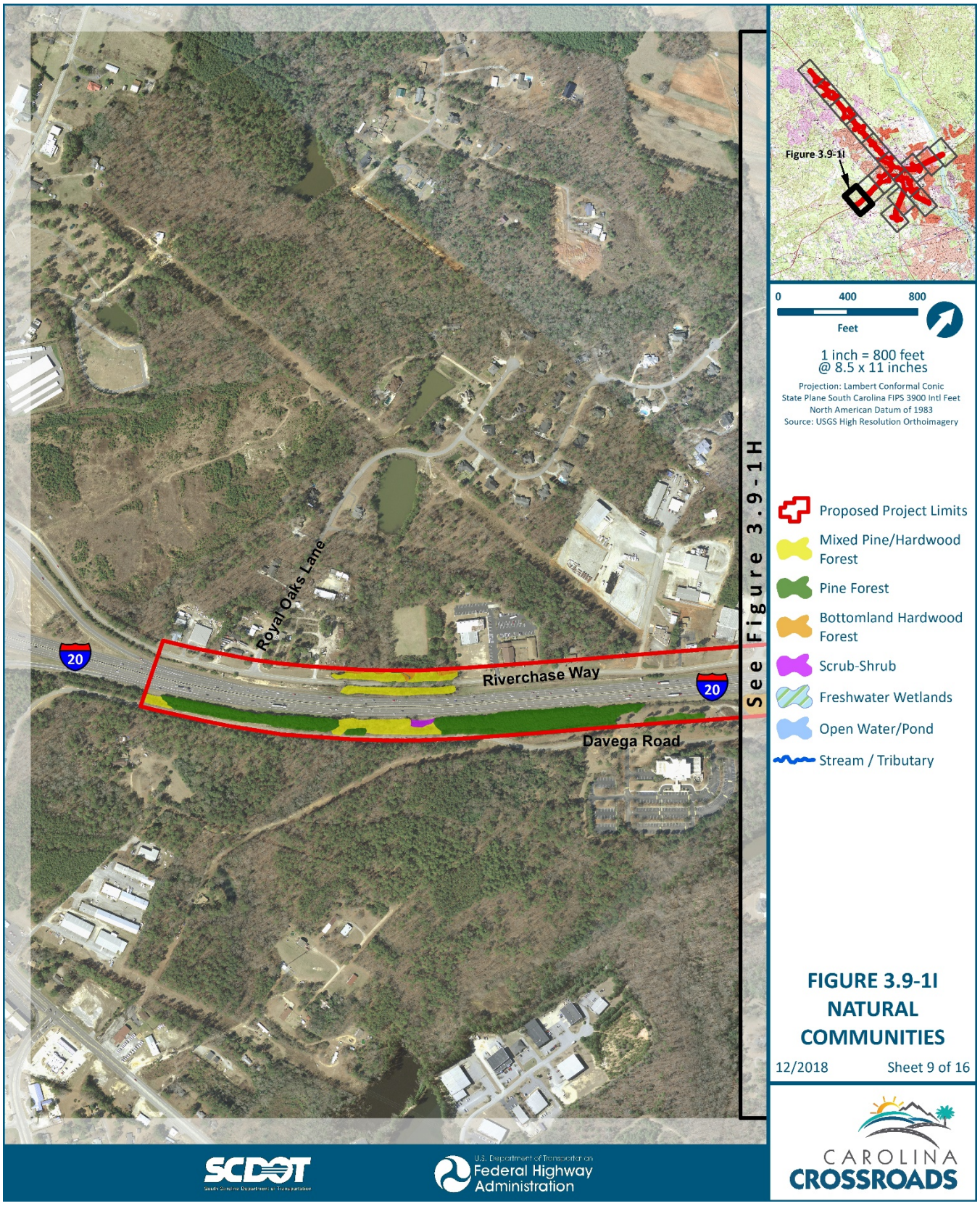
Federal Highway Administration
CAROLINA CROSSROADS


Royal Oaks Lane
Riverchase Way
Davega Road
20
20
See Figure 3.9-1H
Figure 3.9-1i
0
400
800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1I
NATURAL COMMUNITIES
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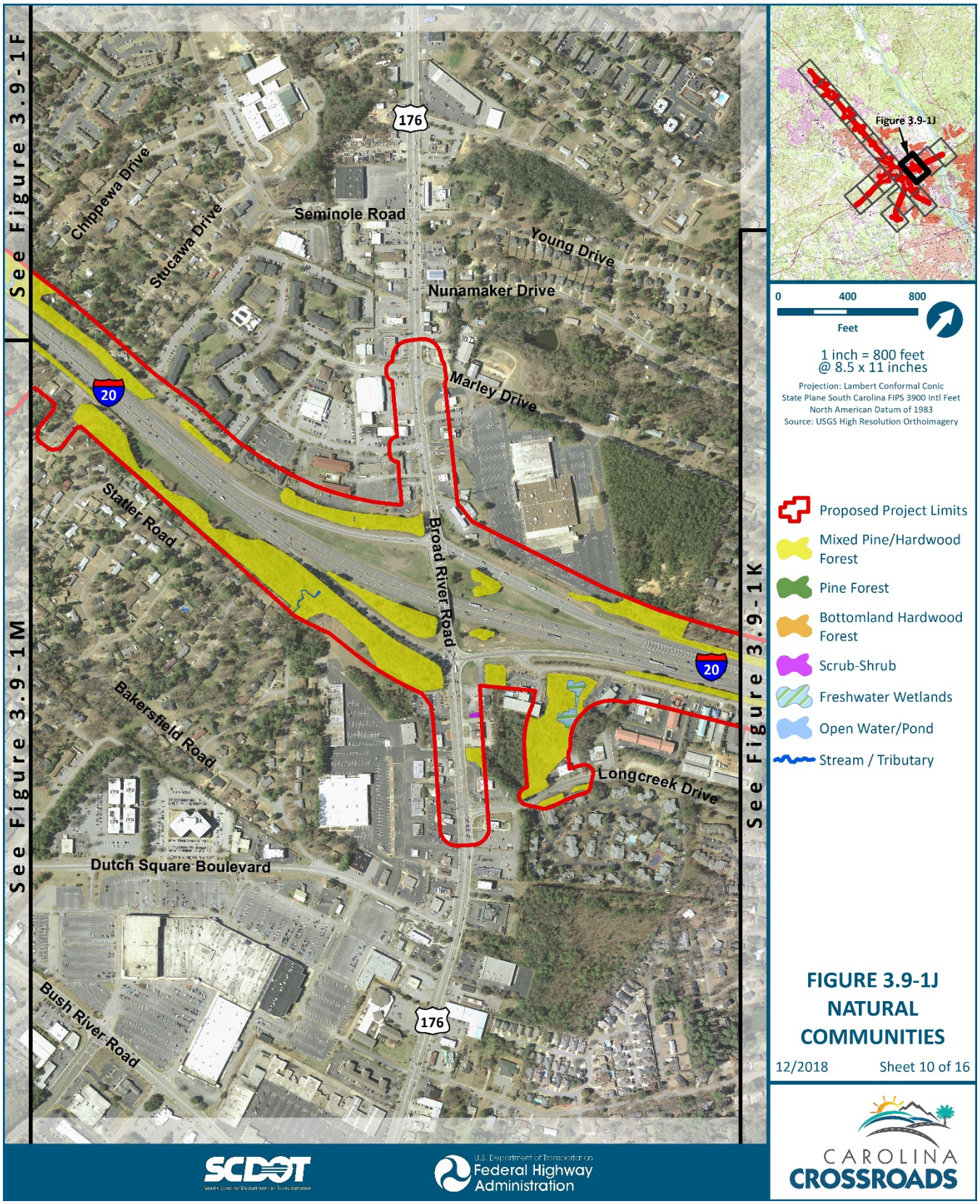
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


See Figure 3.9-1F
See Figure 3.9-1M
See Figure 3.9-1K
176
20
Chippewa Drive
Stucawa Drive
Seminole Road
Young Drive
Nunamaker Drive
Marley Drive
Statler Road
Broad River Road
Bakersfield Road
Longcreek Drive
Dutch Square Boulevard
Bush River Road
Figure 3.9-1J
0
400
800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1J
NATURAL COMMUNITIES
12/2018
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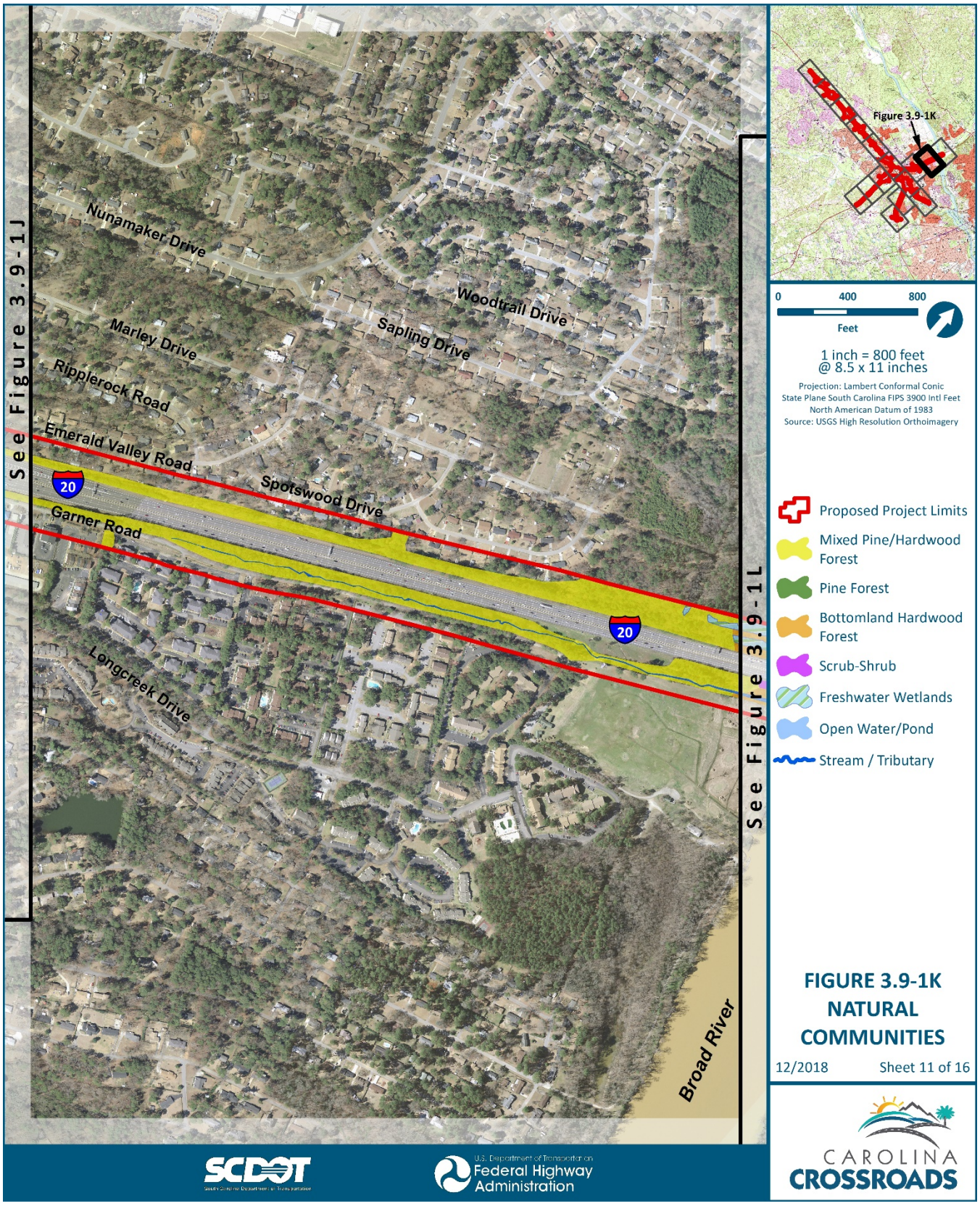
See Figure 3.9-1J
See Figure 3.9-1L
Nunamaker Drive
Woodtrail Drive
Marley Drive
Sapling Drive
Ripplerock Road
Emerald Valley Road
Spotswood Drive
Garner Road
Longcreek Drive
20
20
Broad River
Figure 3.9-1K
0
400
800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1K
NATURAL COMMUNITIES
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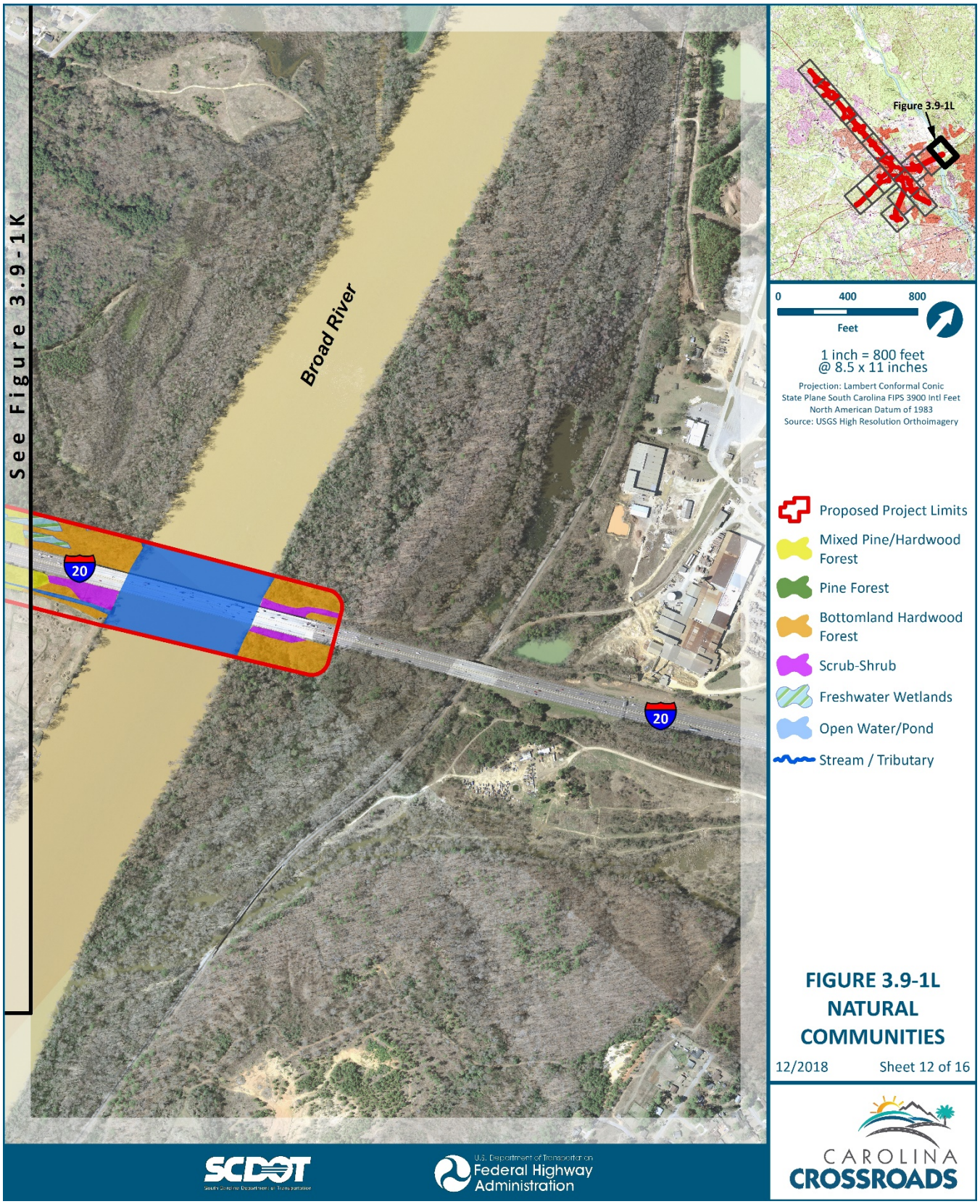
See Figure 3.9-1K
Broad River
20
20
Figure 3.9-1L
0
400
800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1L
NATURAL COMMUNITIES
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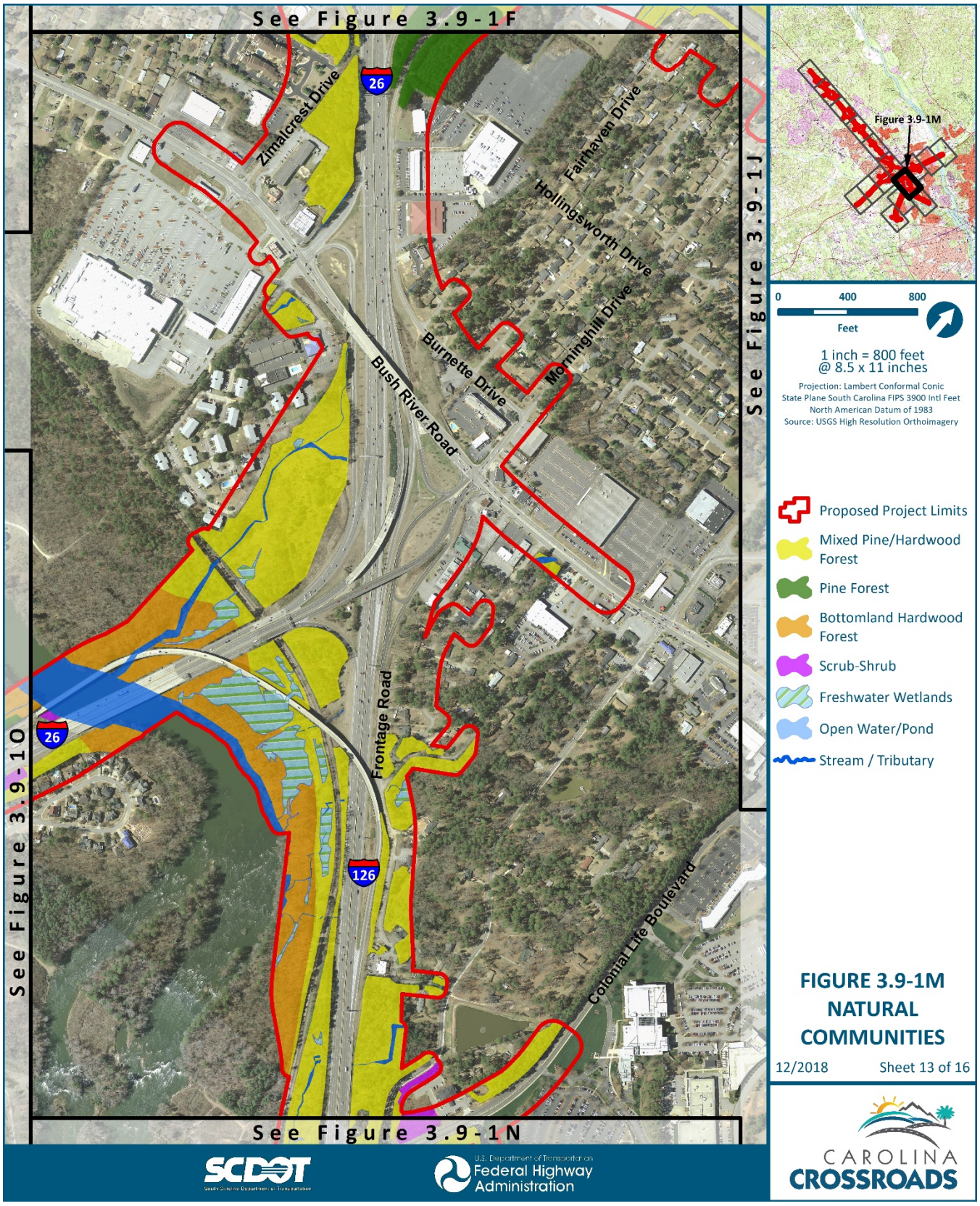
See Figure 3.9-1F
See Figure 3.9-1J
See Figure 3.9-1O
See Figure 3.9-1N
Zimalcrest Drive
Fairhaven Drive
Hollingsworth Drive
Morninghill Drive
Burnette Drive
Bush River Road
Frontage Road
Colonial Life Boulevard
26
126
Figure 3.9-1M
0
400
800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1M
NATURAL COMMUNITIES
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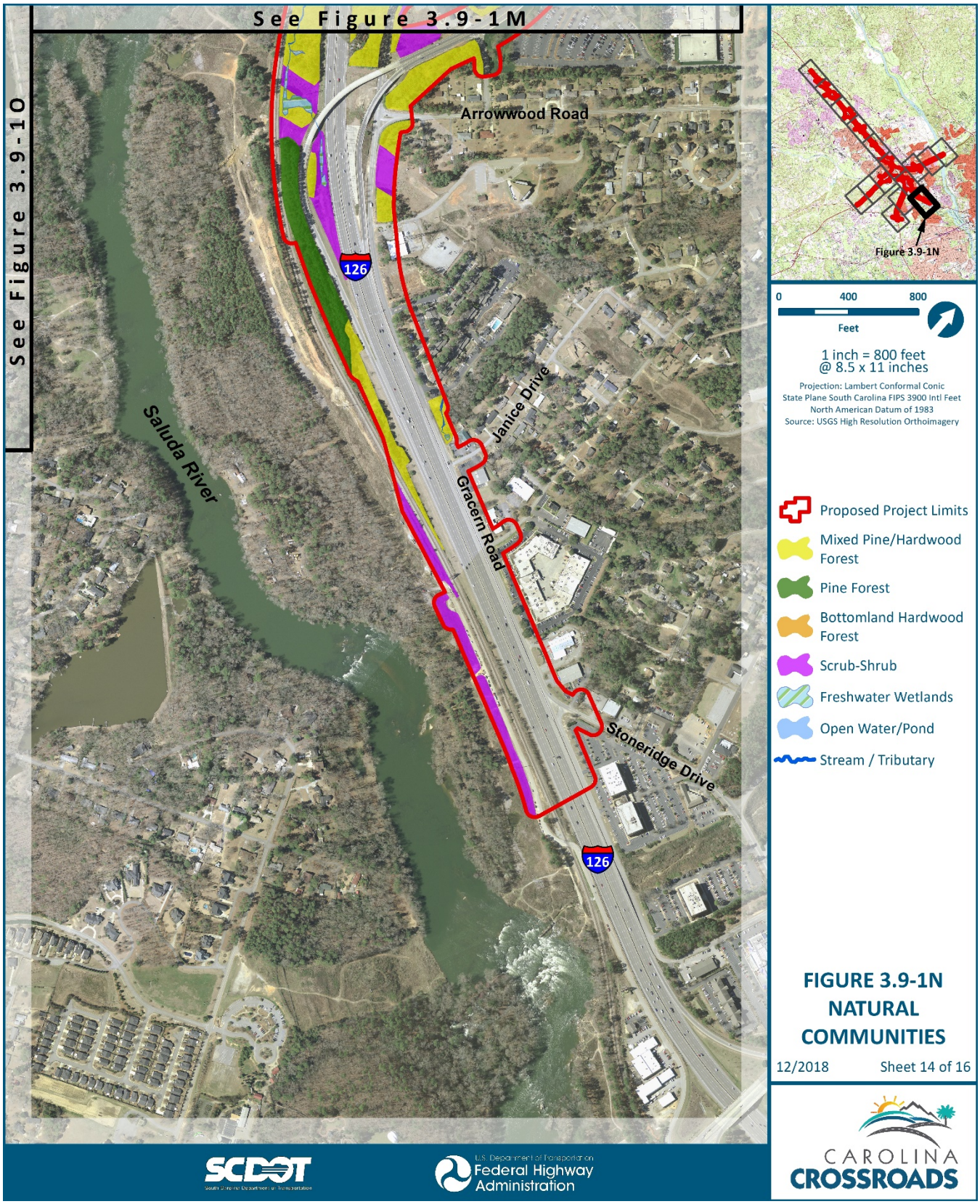
See Figure 3.9-1M
See Figure 3.9-10
Arrowwood Road
126
Janice Drive
Gracern Road
Saluda River
Stoneridge Drive
126
Figure 3.9-1N
0
400
800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1N
NATURAL COMMUNITIES
12/2018
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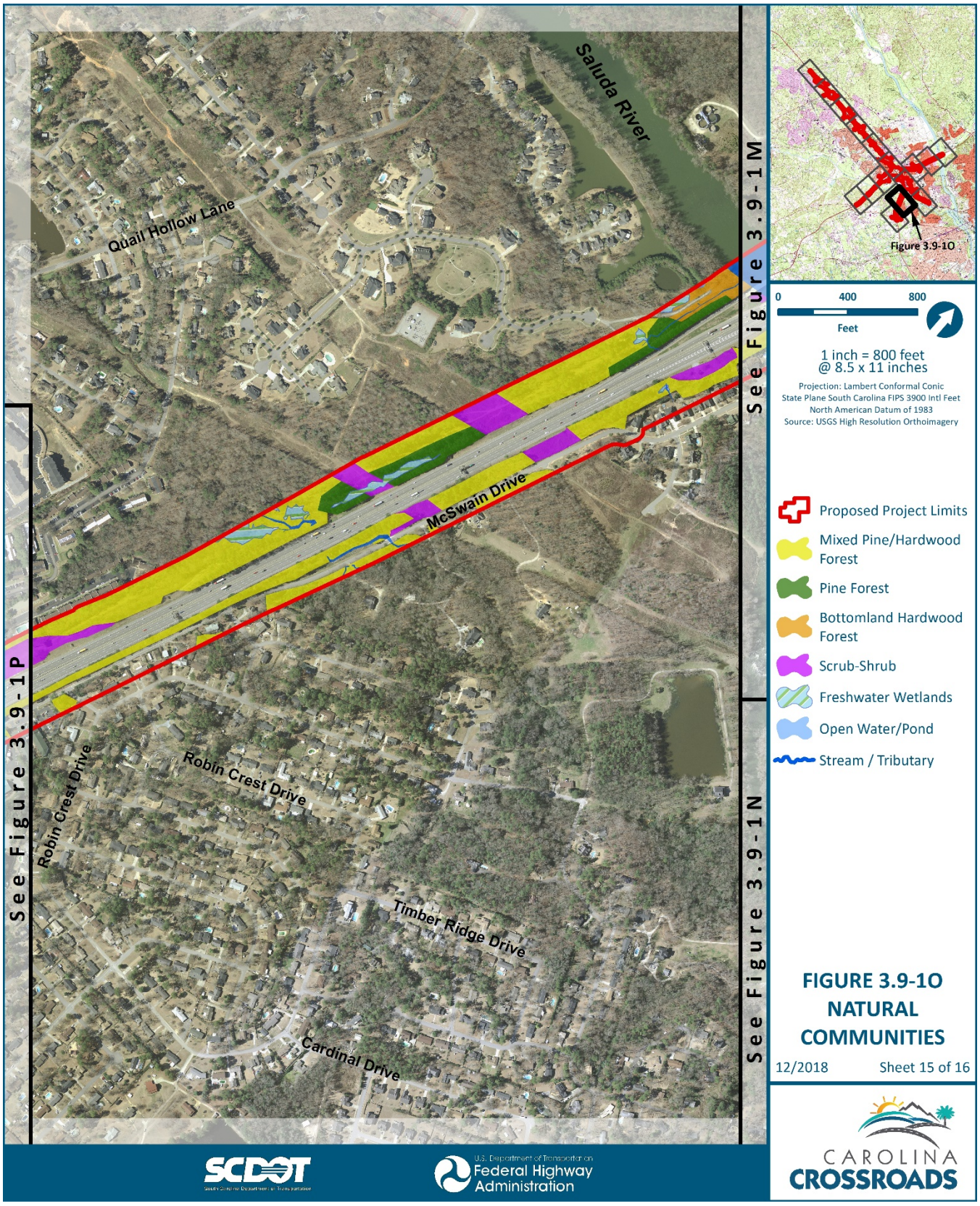
Saluda River
Quail Hollow Lane
McSwain Drive
Robin Crest Drive
Robin Crest Drive
Timber Ridge Drive
Cardinal Drive
See Figure 3.9-1M
See Figure 3.9-1N
See Figure 3.9-1P
Figure 3.9-1O
0
400
800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1O
NATURAL COMMUNITIES
12/2018
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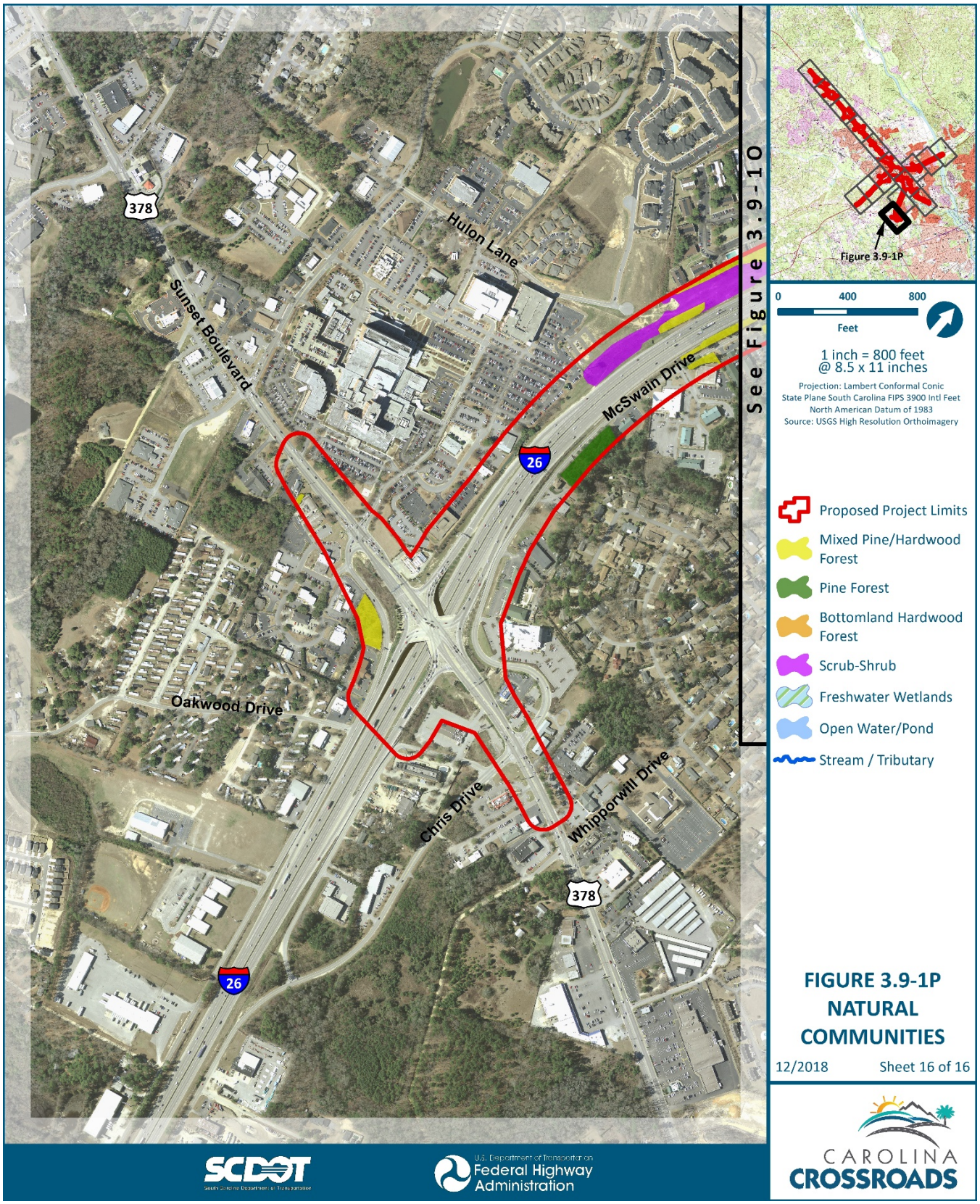
378
Hulon Lane
Sunset Boulevard
McSwain Drive
26
Oakwood Drive
Chris Drive
Whippoorwill Drive
378
26
See Figure 3.9-10
Figure 3.9-1P
0
400
800
Feet
1 inch = 800 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: USGS High Resolution Orthoimagery
Proposed Project Limits
Mixed Pine/Hardwood Forest
Pine Forest
Bottomland Hardwood Forest
Scrub-Shrub
Freshwater Wetlands
Open Water/Pond
Stream / Tributary
FIGURE 3.9-1P
NATURAL COMMUNITIES
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Federal Highway Administration

3.9.5.3 General Wildlife

No general wildlife surveys were conducted within the PSA; however, wildlife species readily observed and documented during the field reviews, or those species likely to occur within the PSA, are summarized below.

Bird species commonly occurring in the PSA within the various habitats include northern cardinal, American goldfinch, eastern towhee, Carolina wren, eastern bluebird, red-bellied woodpecker, barred owl, and red-shouldered hawk. Wading birds and waterfowl include Canada goose, wood duck, mallard, great egret, and great blue heron. Other less common wading bird species may inhabit portions of the rivers and large floodplain wetlands within the PSA during certain times of the year include great egret, snowy egret, green heron, and tri-colored heron.

No crayfish or fishes were readily observed in the PSA; however, crayfish species expected to occur in the PSA include Carolina needlenose crayfish, variable crayfish, red swamp crayfish, and white river crayfish. The Broad River provides important habitat for three migratory fish species which are the blueback herring and American and hickory shad. The Broad River also provides critical habitat for robust redhorse, an important conservation priority species in the southeast. The lower Saluda River provides habitat for numerous fish species including redbreast and redear sunfish, bluegill, channel catfish, largemouth bass and striped bass during their spawning season. SCDNR also manages and maintains an important recreational trout fishery for brown and rainbow trout in the lower Saluda River. The smaller streams and tributaries in the PSA watershed can vary greatly in habitat quality but may provide habitat for numerous species typically consisting of various shiner and chub species.

Common reptile and amphibian species occurring in the PSA include eastern garter snake, eastern king snake, black racer, eastern box turtle, snapping turtle, and American toad.

Common mammal species occurring in the PSA include white-tailed deer, eastern gray squirrel, eastern cottontail rabbit, and North American beaver.

3.9.5.4 Federal and/or State Protected Species

A search of the USFWS South Carolina Field Office's protected species database, updated October 3, 2017, provided existing information concerning the potential occurrence of threatened or endangered species within Lexington and Richland Counties. The database identifies eight federally threatened or endangered species known to occur or to have formerly occurred in Lexington and Richland Counties as listed in Table 3.9-1. (Note: The table also includes bald eagle which is no longer protected under the ESA but is afforded protection through the BGEPA of 1940 and the Migratory Bird Treaty Act of 1918.) The USFWS Information, Planning, and Conservation (IPaC) online database was also reviewed for information pertaining to designated protected species critical habitats.

The South Carolina Department of Natural Resources (SCDNR) Rare, Threatened and Endangered Species Inventory online database, accessed December 20, 2017, was also reviewed for information regarding species with state endangered or threatened status. As noted in Table 3.9-1, two additional species are currently listed as state threatened or endangered in Lexington or Richland Counties. The state-only protected species include

Rafinesque's big-eared bat and Pine Barrens treefrog. Additionally, per correspondence with SCDNR, Carolina needlenose crayfish is a SWAP species occurring in the PSA.

ARS and SWAP species are included in Table 3.9-1 for informational purposes. These species do not receive legal protection from the ESA; therefore, surveys for the species were not conducted.

Table 3.9-1 Threatened and Endangered Species in Lexington and Richland Counties, South Carolina

Protected species		County listed	Protection status	
Common name	Scientific name		Federal	State
Amphibian Species				
Chamberlain's dwarf salamander	*Eurycea chamberlaini*	Richland	ARS	-
Pine Barrens treefrog	*Hyla andersonii*	Richland	-	T
Bird species				
American wood stork	*Mycteria americana*	Lexington & Richland	T	-
Bald eagle	*Haliaeetus leucocephalus*	Lexington & Richland	BGEPA	T
Red-cockaded woodpecker	*Picoides borealis*	Lexington & Richland	E	E
Crustacean species				
Broad River spiny crayfish	*Cambarus spicatus*	Richland	ARS	-
Carolina needlenose crayfish	*Cambarus aldermanorum*	Richland	-	SWAP
Insect species				
Monarch butterfly	*Danaus plexippus*	Lexington & Richland	ARS	-
Fish species				
Atlantic sturgeon*	*Acipenser oxyrinchus*	Richland	E	-
Blueback herring	*Alosa aestivalis*	Lexington & Richland	ARS	-
Robust redhorse	*Moxostoma robustum*	Lexington & Richland	ARS	-
Shortnose sturgeon*	*Acipenser brevirostrum*	Richland	E	-
Mammal species				
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	Richland	ARS	E
Tri-colored bat	*Perimyotis subflavus*	Lexington & Richland	ARS	-
Plant species				
Bog spicebush	*Lindera subcoriacea*	Lexington & Richland	ARS	-
Canby's dropwort	*Oxypolis canbyi*	Richland	E	-
Carolina-birds-in-a-nest	*Macbridea caroliniana*	Lexington & Richland	ARS	-
Ciliate-leaf tickseed	*Coreopsis integrifolia*	Lexington & Richland	ARS	-
Georgia aster	*Symphyotrichum georgianum*	Richland	ARS	-
Michaux's sumac	*Rhus michauxii*	Richland	E	-
Purple balduina	*Balduina atropurpurea*	Richland	ARS	-
Rough-leaved loosestrife	*Lysimachia asperulaefolia*	Richland	E	-
Smooth coneflower	*Echinacea laevigata*	Lexington & Richland	E	-
Wire-leaved dropseed	*Sporobolus teretifolius*	Lexington & Richland	ARS	-

Protected species Common name	Scientific name	County listed	Protection status Federal	 State
Reptile species				
Florida pine snake	*Pituophis melanoleucus mugitus*	Lexington	ARS	-
Southern hognose snake	*Heterdon simus*	Lexington & Richland	ARS	T
Spotted turtle	*Clemmys guttata*	Lexington	ARS	-

E = Endangered; T = Threatened; BGEPA = Bald and Gold Eagle Protection Act; ARS = At Risk Species; SWAP = State Wildlife Action Plan

* Jurisdiction of National Marine Fisheries Service

The list of protected species for Lexington and Richland Counties was reviewed, and literature and field reviews were performed to determine the presence of potential habitat for the protected species within the project study area (PSA). Specifically, field reviews of the PSA were conducted between April 2015 and April 2016. Areas that matched the descriptions of preferred habitat for protected species were classified as protected species habitat and surveyed accordingly for the presence of individuals. Species-specific surveys were conducted in accordance with protocols provided by the USFWS. Prior to the field reviews, the USFWS Information, Planning, and Conservation (IPaC) online database was reviewed to obtain information pertaining to any federally designated critical habitat for the protected species. Per review of the USWFS IPaC database, no USWFS-designated critical habitat for any of the protected species is located within the PSA. The SCDNR South Carolina Heritage Trust (SCHT) Geographic Database of Rare and Endangered Species, updated January 17, 2006, was also reviewed to determine the presence of known populations of protected species within the vicinity of the project. Information obtained from the SCDNR-SCHT database revealed one known documented occurrence of bald eagle (*Haliaeetus leucocephalus*) within approximately one mile of the PSA. According to the SCDNR-SCHT records, the occurrence was observed in 1977 on the Broad River approximately 0.75 mile north of its confluence with the Saluda River. The present status of the occurrence is reported as unknown. The SCDNR-SCHT database does not include any other occurrences of threatened or endangered species within two miles of the PSA.

Descriptions of the federal and/or state-listed endangered and threatened species, determinations of potential habitat, and survey methodology are included below.

American wood stork – Federal Threatened

The American wood stork is a large, long-legged wading bird that prefers freshwater and estuarine wetlands for breeding, feeding, and roosting. American wood storks are colonial nesters with colonies ranging from less than 12 to more than 500 in size. Nesting occurs in small to large trees typically on small islands surrounded by standing water. The species generally forages in water six to 10 inches deep. No habitat for the American wood stork was identified within the PSA; therefore, the project would have no effect to the American wood stork.

Photo credit: Wikimedia user: Googie man (2008)

Photo credit: http://true-wildlife.blogspot.com/2011/02/eagle.html

Bald eagle – Bald and Golden Eagle Protection Act/State Threatened

The bald eagle is a large raptor species that nests in large, mature live pine or cypress trees near water. Bald eagles typically nest within two miles of coasts, rivers, and lakes near waterbodies in which the bird feeds. In South Carolina, bald eagles nest from October 1st through May 15th. Potential nesting and foraging habitat for bald eagle is located within the PSA in the vicinity of the Broad and Saluda Rivers and within mature forested tracts located adjacent to these large waterways; therefore, species-specific surveys were conducted.

Surveys for bald eagle were completed in October 2015 and April 2016 during the USFWS-designated optimum survey window. For more information on the bald eagle survey, please refer to Appendix L for a species-specific survey report detailing the methodology and results of the survey. Per USFWS survey protocol, the bald eagle survey area included a 660-foot buffer around potential nesting habitat as this is the specified distance at which project construction activities have been determined to disturb nesting eagles. Additionally, where applicable, the survey area was extended approximately 3,280 feet (one km) out from the open water nesting habitat as this is the specified distance in which nesting may occur.

No bald eagles and no evidence of nesting were observed during the species-specific field surveys. The potential habitat present within the bald eagle survey area was determined to be less than optimal and occurrences of bald eagles are unlikely due to the relatively few number of large mature pine trees in the overstory of the forests located adjacent to the rivers and the high level of development and associated noise. Per coordination with the SCDNR-SCHT program, there is one documented historic bald eagle nesting site located within approximately one mile of the PSA; however, this historic nesting site is located outside of the bald eagle survey area. Additionally, per the local river guides, no bald eagles have been sited on the portions of the Broad or Saluda River located within the project survey area. Thus, the project would unlikely impact the bald eagle.

Photo credit: James Hanula (1992)

Red-cockaded woodpecker – Federal and State Endangered

Red-cockaded woodpeckers are native to southern pine forests and typically nests within open pine stands containing trees 80 years or older. Roosting and nesting cavities are excavated within live pine trees which are often infected with a fungus that causes what is known as red-heart disease. Foraging occurs in open pine and/or mixed pine-hardwood stands 30 years or older containing a dominance of trees 10 inches or larger in diameter at breast height (dbh). Potential foraging habitat for red-cockaded woodpecker was identified in the PSA within areas of mature pine forest; therefore, species-specific surveys were conducted.

Surveys for red-cockaded woodpecker were completed in May 2015 during the USFWS-designated optimum survey window. Per USFWS survey protocol for red-cockaded woodpecker, a one-half mile buffer around potential foraging habitat identified within the PSA was also reviewed for potential red-cockaded woodpecker nesting habitat.

No red-cockaded woodpeckers and no nesting habitat were observed within the PSA or within the one-half mile buffer area during the species-specific field surveys. Habitat was determined to be unsuitable due to the age of pine trees, highway traffic, mechanical silvicultural practices, and the relatively dense subcanopies of pine forests. Thus, the project may affect but is not likely to adversely affect the red-cockaded woodpecker.

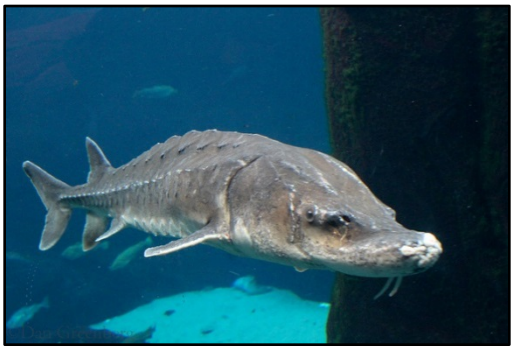

Photo credit: Dan Greenburg (2011)

Atlantic sturgeon – Federal Endangered

The Atlantic sturgeon is an anadromous fish species meaning it spends most of the year in brackish or salt water but moves into freshwaters during the spring to spawn. Optimum spawning habitat includes clean, deep, swiftly flowing water over a hard, rough, or rocky bottom. No habitat for Atlantic sturgeon is present in the PSA.

On August 17, 2017, NOAA-NMFS issued 82 Fed. Reg. 39160 to issue critical habitat designations for the Atlantic sturgeon.[11] According to this final rule, the segments of the Broad and Saluda Rivers above the Columbia Dam are not included in a critical habitat unit. Additionally, the NOAA-NMFS has recently concluded population and habitat studies for sturgeon species in the southeastern United States. Occurrence maps included in the NOAA-NMFS Southeast Regional Office (SERO) Best Management Practices Manual indicate that sturgeon species have not been identified in the Broad or Saluda Rivers above the Columbia Dam. Based on the NOAA-NMFS data and guidance documents, the Atlantic sturgeon is not expected to occur within the portions of the Broad or Saluda Rivers located within the PSA; thus, the project would have no effect to the Atlantic sturgeon.

[11] Endangered and Threatened Species: Designation of Critical Habitat for the Endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments of Atlantic Sturgeon and the Threatened Gulf of Maine Distinct Population Segment of Atlantic Sturgeon; Final Rule, 82 Fed. Reg. 39160 (August 17, 2017). Available at: https://www.gpo.gov/fdsys/pkg/FR-2017-08-17/pdf/2017-17207.pdf

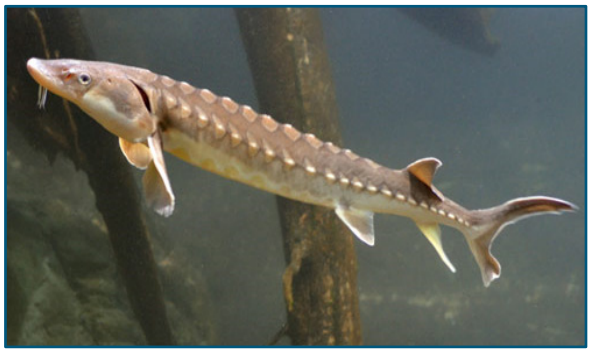

Photo credit: Virginia Living Museum (2017)

Shortnose sturgeon – Federal Endangered

The shortnose sturgeon is also an anadromous fish species similar in habitat requirement and appearance to the Atlantic sturgeon. The shortnose sturgeon shares the same habitat as the Atlantic sturgeon inhabiting the lower portions of large rivers and coastal bays and estuaries along the Atlantic Coast and moving up rivers into similar freshwater habitat to spawn. No habitat for shortnose sturgeon is present in the PSA.

Based on the NOAA-NMFS data and guidance documents, as noted above for Atlantic sturgeon, the shortnose sturgeon is not expected to occur within the portions of the Broad or Saluda Rivers located within the PSA; thus, the project would have no effect to the shortnose sturgeon.

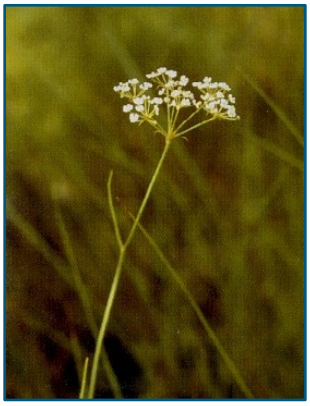

Photo credit: USFWS (1997)

Canby's dropwort – Federal Endangered

Canby's dropwort is a perennial herbaceous (i.e., non-woody) plant species that grows in moist habitats, including wet meadows, wet pineland savannas, ditches, sloughs, and along the edges of Cypress-pine ponds, in the coastal plain and sandhill regions of South Carolina. The plant seems to be more abundant in open areas where any underbrush has been burned or otherwise maintained. No habitat for Canby's dropwort was identified within the PSA; therefore, the project would have no effect to Canby's dropwort.

Photo credit: USFWS/Susan Miller (2011)

Michaux's sumac – Federal Endangered

Michaux's sumac is a small, densely hairy shrub generally flowering from June to July. The plant produces fruits from August to October. Michaux's sumac grows in sandy or rocky open areas including clear cuts, roadsides, and utility line rights-of-way. No habitat for Michaux's sumac was identified within the PSA; therefore, the project would have no effect on the species.

Photo credit: James Henderson; Bugwood.org (2004)

Rough-leaved loosestrife – Federal Endangered

The rough-leaved loosestrife is a perennial herbaceous plant that flowers from mid-May through June and fruits from July through October. Rough-leaved loosestrife typically grows in densely vegetated areas along the edges of longleaf pine uplands and pond pine pocosins. Rough-leaved loosestrife has also been identified in other wet areas containing saturated sands and deep organic material or peat. No habitat for rough-leaved loosestrife was identified within the PSA; therefore, the project would have no effect on the species.

Smooth coneflower – Federal Endangered

Smooth coneflower is a perennial herbaceous plant that flowers from late May through mid-July. Fruiting occurs from late June to September with fruits often persisting on plants through the fall. Historically, smooth coneflower occurred in prairie-like habitats or oak-savannas maintained by natural or man-made fire. Now, the plant occurs primarily in maintained openings within wooded areas, clear cuts, and along roadsides and utility line rights-of-way. Smooth coneflower requires full or partial sun and is usually found in areas containing magnesium and calcium-rich soils. Associated plant species include eastern red cedar and rattlesnake master. Potential habitat for smooth coneflower is present in the PSA within clear cuts and roadway and utility line rights-of-way; therefore, species-specific surveys were conducted.

Photo credit: U.S. Forest Service (Date unknown)

Surveys for smooth coneflower were conducted in 2015 within the USFWS-designated optimum survey window and flowering period of the plant. No smooth coneflower plants were identified during the surveys. Thus, the project may affect but is not likely to adversely affect the smooth coneflower.

Photo credit: Bill Beck (2017)

Pine Barrens tree frog – State Threatened

The Pine Barrens tree frog is a small, predominately green-colored frog that occurs in seepages within the downslopes of herbaceous and/or shrubby bogs, pocosins, wet pine forests, and other related open disturbed wet habitats. The Pine Barrens tree frog typically lays its eggs in shallow, acidic ponds. No habitat for the Pine Barrens tree frog was identified within the PSA. State listed species are not provided protection under the ESA.

Photo credit: J. Scott Altenbach (2017)

Rafinesque's big-eared bat – State Endangered

The Rafinesque's big-eared bat occurs in a variety of habitats within the southeastern United States and hibernate rather than migrate. Rafinesque's big-eared bats characteristically roost in dilapidated buildings or tree cavities near water and have been known to day-roost under bridges. Potential habitat for Rafinesque's big-eared bat is present within the PSA. Specifically, roosting habitat for Rafinesque's big-eared bat may exist in tree cavities near waterbodies within the PSA. Additionally, bridges within the PSA also provide day-roosting habitat for the species. State listed species are not provided protection under the ESA.

Migratory Birds

The USFWS IPaC online database was reviewed for information pertaining to migratory bird species. Twenty migratory bird species are designated by the USFWS as occurring in Lexington and Richland Counties. These species include American bittern, American kestrel, Bachman's sparrow, bald eagle, brown-headed nuthatch, Chuck-will's widow, fox sparrow, Kentucky warbler, least bittern, loggerhead shrike, painted bunting, peregrine falcon, prairie warbler, prothonotary warbler, red-headed woodpecker, rusty blackbird, sedge wren, short-eared owl, wood thrush, and worm-eating warbler. None of the above-listed migratory bird species were observed during the field reviews of the PSA.

3.9.6 HOW WOULD THE NO-BUILD ALTERNATIVE IMPACT NATURAL RESOURCES?

The No-Build Alternative would have no effect on natural resources since existing conditions would remain unchanged.

3.9.7 HOW WOULD THE ALTERNATIVES IMPACT NATURAL RESOURCES?

Project impacts to natural resources, including soils and natural habitat communities, associated with the Recommended Preferred Alternative and the Refined Recommended Preferred Alternative were determined

utilizing ArcGIS and Microstation software. Specifically, the preliminary proposed right-of-way limits were overlaid onto the mapped areas of soils and natural habitat communities to identify and quantify area of probable impact for the project. The exact type and amount of impact to these resources would be determined upon finalization of the project design. Project impacts to protected species, including federally designated endangered or threatened species and migratory birds, were determined by the literature and field reviews of the PSA conducted by the project team. The anticipated project impacts to natural resources associated with the Recommended Preferred Alternative and the Refined Recommended Preferred Alternative are discussed below:

3.9.7.1 Soils

Project construction activities, including excavation, filling, and grading for new roadway and drainage infrastructure, associated with the proposed project would result in permanent impacts to soils. Mechanized clearing and grubbing of vegetation for equipment access and operation would also result in temporary soil impacts. Specifically, most of the impacts would occur to soils located adjacent to existing roadways where improvements are proposed. More information on construction-related impacts is included in Chapter 3.13 Construction.

3.9.7.2 Natural Habitat Communities and Wildlife

Due to the current land use and high levels of development present in the PSA, impacts to natural habitat communities and wildlife associated with the proposed project would be relatively minor and primarily contained to existing fragmented or disturbed upland habitats located adjacent to existing roadway interchanges; see Table 3.9-2 for estimated impacts to the natural habitat communities based on preliminary right-of-way limits.

Table 3.9-2 Summary of Preliminary Estimated Impacts to Natural Habitat Communities

	Habitat community type and impact (acres)			
	Mixed pine/hardwood forest	Pine forest	Bottomland hardwood forest	Scrub-shrub
Recommended Preferred Alternative (from the DEIS)	171.04	23.90	15.18	11.52
Refined Recommended Preferred Alternative	176.26	26.54	15.43	11.84

Potential impacts to jurisdictional waters, including freshwater streams and wetlands, would be avoided or minimized to the greatest extent practicable; however, it is anticipated that the project would result in fill, piping, and/or clearing and grubbing impacts to these features. More information on potential project impacts to jurisdictional streams and wetlands is included in Chapter 3.7 Water Resources. More information on construction-related impacts is included in Chapter 3.13 Construction.

3.9.7.3 Federal and/or State Protected Species

Based on the literature and field reviews and agency correspondence, it has been determined that the proposed project would have 'no effect' on American wood stork, Atlantic sturgeon, shortnose sturgeon, Canby's dropwort, Michaux's sumac, and rough-leaved loosestrife. It has been determined that the proposed project 'may affect, not likely to adversely affect' red-cockaded woodpecker and smooth coneflower due to the presence of potential habitat within the PSA for these species. A project affect determination on bald eagle is not necessary as the species is no longer protected by the ESA and does not require Section 7 consultation. In complying with Section 7 of the ESA, the project team has coordinated with the USFWS regarding the 'may affect, not likely to adversely affect' project affect determinations, and the USFWS concurred with the findings on March 28, 2018 (Appendix B). The following table summarizes the determinations of potential habitat and biological conclusions.

Table 3.9-3 Summary of Federally Endangered and Threatened Species and Biological Conclusions

Federally endangered/threatened species		Potential habitat	Biological conclusion
Common name	**Scientific name**		
Bird species			
American wood stork	*Mycteria americana*	No	'No effect'
Bald eagle	*Haliaeetus leucocephalus*	Yes	No impact
Red-cockaded woodpecker	*Picoides borealis*	Yes (foraging)	'May affect, not likely to adversely affect'
Fish species			
Atlantic sturgeon*	*Acipenser oxyrinchus*	No	'No effect'
Shortnose sturgeon*	*Acipenser brevirostrum*	No	'No effect'
Plant species			
Canby's dropwort	*Oxypolis canbyi*	No	'No effect'
Michaux's sumac	*Rhus michauxii*	No	'No effect'
Rough-leaved loosestrife	*Lysimachia asperulaefolia*	No	'No effect'
Smooth coneflower	*Echinacea laevigata*	Yes	'May affect, not likely to adversely affect'

* Jurisdiction of National Marine Fisheries Service

3.9.7.4 Migratory Birds

Migratory birds have been documented to use bridges and other artificial roadway drainage structures, such as large culverts, as nesting sites. The PSA contains many bridges and large drainage structures; however, no migratory birds or evidence of these birds utilizing these structures was observed during field reviews. Based on the field reviews, it has been determined that the proposed project would not impact any migratory bird species. Migratory birds that may be utilizing habitats within the PSA are also less likely to be affected by project impacts as they can generally move more readily from construction-related disturbances.

3.9.8 HOW WOULD PROJECT IMPACTS TO NATURAL RESOURCES BE MITIGATED?

3.9.8.1 Landforms and Soils

During construction activities, erosion and sediment runoff would be minimized through the implementation of construction best management practices, reflecting policies contained in 23 CFR 650 B and S.C. Code of Regulations 72-400. In areas of disturbance where soils have been exposed, soils would also be stabilized per the SCDOT's Supplemental Technical Specification for Seeding.

Potential borrow areas to be used for fill dirt for the project would be field reviewed and assessed for the presence of any jurisdictional features, and BMPs would be applied prior to disturbance to avoid and/or minimize erosion and runoff of sediments.

3.9.8.2 Natural Habitat Communities and Wildlife

Impacts to natural habitat communities would be minimized to the extent necessary to construct the project. Construction activities would be conducted within the disturbed footprint of the existing roadway and utility rights-of-way to the maximum extent practicable. To mitigate for natural upland forested habitats lost as a result of the project, the SCDOT would consider planting trees (native species) within the rights-of-way adjacent to new or improved interchanges and roadways outside of required clear safety zones.

No mitigation for wildlife would be provided. The majority of wildlife located in the PSA is common and typical of suburban and disturbed environments and species are expected to adapt to changes in the PSA resulting from the project. Impacts to areas providing significant wildlife habitat, such as river floodplains and other large riparian buffers, would be minimized to the extent practicable through avoidance and minimization design measures.

3.9.8.3 Federal and/or State Protected Species

Should any endangered or threatened species be observed during construction of the project, construction activities within the area of observance would be ceased immediately and the USFWS or NMFS notified as applicable. Should any ARS or any other additional species be listed as federally endangered or threatened prior to the start of project construction, consultations would be conducted with the USFWS, as appropriate.

Preliminary project design includes the potential widening or replacement of bridges and addition of ramps over the Broad and Saluda Rivers. Impacts to these waters and the protected fish and wildlife species dependent upon them would be avoided to the extent practicable. Based on the previously noted data and guidance documents from the NOAA-NMFS-SERO regarding sturgeon species, project impacts to Atlantic and shortnose sturgeon are not expected.

3.9.8.4 Migratory Birds

The SCDOT would comply with the Migratory Bird Treaty Act of 1918 in regard to the avoidance of taking of individual migratory birds and the destruction of their active nests. Specifically, the construction contractor would notify the Resident Construction Engineer (RCE) at least four (4) weeks prior to the construction, demolition, or maintenance of any artificial habitat structures including bridges and box culverts. Subsequently, the RCE would notify the SCDOT Environmental Services Office (ESO) Compliance Division who would coordinate with the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) to conduct inspections for migratory birds. Any migratory birds' nests would be removed by USDA APHIS personnel. If a suspect migratory bird nest is observed after construction, demolition, or maintenance activities have begun, the contractor would cease work and immediately notify the RCE who would notify the ESO Compliance Division. In an effort to prevent birds from nesting after project activities have commenced, the contractor may implement the use of deterrents as approved by the RCE with coordination from the ESO Compliance Division.