3.7 Water Resources

3.7.1 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 area due to project design refinement, the number and area of wetlands and streams within the refined study area, and impact totals for the Refined Recommended Preferred Alternative (RPA).

3.7.2 WHAT ARE WATER RESOURCES?

Water resources is a broad term that includes the water that can be seen on the Earth's surface such rivers, creeks, lakes, ponds, and wetlands. It also includes water that exists in the soil and rock below the surface of the Earth. Water resources provide numerous ecological, economic, and cultural services including, but not limited to, drinking water, wildlife habitat, fisheries, transportation, power generation, and recreational opportunities. Careful use and protection of water resources is important to maintaining the quality of life of the communities that rely on them. The purpose of this chapter is to discuss existing water resources within the project study area. In addition, the regulatory framework governing water resources, environmental effects of the proposed project, and impact mitigation measures are discussed in detail.

What agencies regulate water resources within the Carolina Crossroads project study area?

The USACE and SCDHEC are primarily responsible for regulating water resources in South Carolina.

3.7.3 WHAT AGENCIES ARE RESPONSIBLE FOR REGULATING WATER RESOURCES WITHIN THE PROJECT STUDY AREA?

The U.S. Army Corps of Engineers (USACE) regulates "Waters of the U.S." (WOUS), including wetlands. The USACE's authority to regulate impacts to WOUS comes from Section 404 of the Clean Water Act (CWA).

Wetlands generally include swamps, marshes, bogs, and similar areas. The USACE utilizes specific hydrologic, soil, and vegetation criteria in establishing the boundary of wetlands within their jurisdiction.

In addition to wetlands, the USACE defines WOUS within CWA jurisdiction (as defined by 33 CFR Part 328) as Traditional Navigable Waters (TNWs) – including territorial seas and surface waters that flow to TNWs. Impoundments of these waters (ponds, lakes, and reservoirs) are also considered to be WOUS. Permitting associated with impacts to WOUS falls under Section 404 of the CWA.

The South Carolina Department of Health and Environmental Control (SCDHEC) also has jurisdiction over WOUS in South Carolina. The SCDHEC's regulatory authority derives from Section 401 of the CWA. A Section 401 water quality certification from SCDHEC is required whenever a project needs a federal license or permit for an activity that may result in a discharge to a navigable water or other WOUS.[1]

What waters are considered "Jurisdictional" under the Clean Water Act?

- **Territorial seas**
- **Navigable lakes and rivers**
- **Most streams and creeks**
- **Most wetlands**
- **Ponds that are connected to a stream**

The SCDHEC classifies waterbodies (streams and rivers) of South Carolina based on their desired uses. They have established standards for various parameters to protect all uses within each waterbody classification. Waterbody classifications are listed in South Carolina Regulation 61-68 (R.61-68), *Water Classifications and Standards.*[2] In addition to establishing the various waterbody classifications, R.61-68 also creates water quality standards that protect and maintain the existing and classified uses of those waters. S.C. Regulation 61-69, *Classified Waters*[3], is a list of larger South Carolina waters organized by name, county(ies), classification, any designation needed, a brief description of the waterbody, and any site-specific numeric criteria that apply. All waters of South Carolina are given a classification even if they are not specifically named or listed in R.61-69. Waters not listed are assigned the classification of the receiving waterbody to which they flow. Water quality standards are discussed in more detail in Chapter 3.7 of this document.

Significant groundwater withdrawals in South Carolina are regulated by the SCDHEC through the Groundwater Use and Reporting Program. The SCDHEC defines significant groundwater users as those who withdraw more than three million gallons in any month. In 1979, South Carolina began establishing Capacity Use Areas (CUA) to manage declining groundwater levels. A Groundwater Withdrawal Permit is required to withdraw and use groundwater equal to or greater than three million gallons in any month within any established CUA.

In the counties, or portions of counties, that are located in the Coastal Plain, but are outside of an established CUA, a Notice of Intent (NOI) must be provided to the SCDHEC at least 30 days prior to drilling a new well or increasing the capacity of an existing well such that the well will withdraw three million gallons or more in any

[1] SCDHEC. 1995. R.61-101 Water Quality Certification. Bureau of Water, Columbia, SC
[2] SCDHEC. 2014. R.61-68, Water Classifications and Standards. Bureau of Water, Columbia, SC
[3] SCDHEC. 2012. *R.61-69, Classified Waters*. Bureau of Water, Columbia, SC

month. Significant groundwater users outside of the coastal plain are not required to obtain a Groundwater Withdrawal Permit but are required to register their groundwater use with the SCDHEC.[4]

3.7.4 WHAT METHODOLOGY WAS USED FOR THE ANALYSIS OF WATER RESOURCES?

The following questions were used to develop methodologies to guide the water resources analysis:

- **What Information and data sources were used to identify and characterize the water resources within the Project Study Area?**
  Methodology: Information on water resources in the Project Study Area was obtained from federal, state, and local sources that include the SCDHEC, South Carolina Department of Natural Resources (SCDNR), United States Environmental Protection Agency (EPA), United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS), United States Fish and Wildlife Service (USFWS), United States Geological Survey (USGS), Lexington County, Richland County, City of Columbia, and the City of West Columbia. These sources of information were used to determine the existing water resources within the Project Study Area prior to undertaking field reconnaissance. Sources of information regarding surface water resources within the Project Study Area are listed in the Carolina Crossroad Natural Resources Technical Report[5] in Appendix L.

  Sources of information regarding groundwater resources within the Project Study Area include the USGS Ground Water Atlas of the U.S.[6] as well as water resources reports for Richland[7] and Lexington[8] Counties published by SCDNR.

  Information on drinking water resources within the Project Study Area was obtained from the City of Columbia's Water Utilities Division[9] and the City of West Columbia's Water and Sewer Utility.[10]

- **What Water Resources exist within the project study area?**
  Methodology: Initial desktop analyses of surface water within the Project Study Area was followed by an intensive field review. Wetlands were determined using the Routine On-Site Determination Method as defined in the *Corps of Engineers Wetland Delineation Manual* [11] and the appropriate Regional Supplements to the Manual. Field surveys were conducted on multiple dates in 2015, 2017, and 2018. The boundaries of water resources within the Project Study Area were flagged (delineated) in the field

[4] SCDHEC.– Groundwater Withdrawals, https://www.scdhec.gov/environment/WaterQuality/GroundUseReporting/, 5/17
[5] SCDOT. 2018. Natural Resources Technical Report – Carolina Crossroad I-20/I-26/I-126 Corridor Improvement Project. Prepared by Mead and Hunt.
[6] USGS. 1990. "Groundwater Atlas of the U.S. – Alabama, Florida, South Carolina". Accessed 05/12/2017. https://pubs.usgs.gov/ha/ha730/ch_g/G-text8.html
[7] Newbome, Roy, Jr. 2003 "Ground-water resources of Richland County, South Carolina". South Carolina Department of Natural Resources Water Resources Report 30
[8] Agerton, K.W. and Baker, S.E. 2006. "Water Resources of Lexington County, South Carolina". South Carolina Department of Natural Resources Water Resources Report 38
[9] City of Columbia. "Drinking Water." Accessed 05/15/2017. http://www.columbiasc.net/drinking-water
[10] City of West Columbia. "Water & Sewer." Accessed 05/15/2017. https://www.westcolumbiasc.gov/water-sewer/
[11] Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual", Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

during these surveys. Delineated waters were subsequently located using a handheld global positioning system (GPS) unit capable of sub-meter accuracy. The USACE approved and verified the boundaries of delineated wetland/waters of the U.S. and the verification was provided in the Preliminary Jurisdictional Determination (PJD) issued on March 9, 2016 and was revised June 27, 2018 (SAC 2015-10870-DS). An updated PJD was issued on February 4, 2019 due to modifications to the proposed project following the publication of the DEIS.

Groundwater resources were identified in the Project Study Area primarily through desktop research using the USGS Groundwater Atlas of the U.S., SCDNR Water Resources Reports for Lexington and Richland Counties, and the SCDHEC's monitoring report of users who withdraw more than 3 million gallons in any month.

- **How would water resources be impacted by the project?**
  Methodology: Analysis of the existing resources within the Project Study Area provided an understanding of the potential impacts that the no-build alternative and the reasonable alternatives would have on water resources. To evaluate the expected impacts on water resources from the reasonable alternatives, the types and extent of water resources within the project's right-of-way (ROW) were assessed in terms of the total number of linear feet and/or acres that would be impacted.

- **How would impacts be mitigated?**
  Methodology: The Council on Environmental Quality (CEQ) has defined mitigation to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts. Three general types of mitigation include avoidance, minimization, and compensatory mitigation. Compensatory mitigation means the restoration, establishment, enhancement, or perseveration of wetlands or streams to offset unavoidable impacts to similar resources. Under the 2008 Final Compensatory Mitigation Rule regulations, there are three mechanisms for providing compensatory mitigation (listed in order of preference as established by the regulation: mitigation banks, in-lieu fee programs, and permittee–responsible mitigation. Compensatory mitigation is normally required to offset unavoidable losses of Waters of the U.S. The mitigation strategy for the RPA and the Refined RPA includes a combination of avoidance, minimization, and compensatory mitigation.

3.7.5 WHAT IS THE PROJECT STUDY AREA FOR WATER RESOURCES?

The Project Study Area is located in Lexington and Richland Counties, South Carolina. The Project Study Area has been defined as a mainline corridor including I-20 from US 378 to the Broad River, I-26 from US 176 (Broad River Road) to US 378, and I-126 from I-26 to Colonial Life Boulevard. The area also extends approximately 100 feet beyond the existing SCDOT ROW limits within the mainline corridor. The Project Study Area was designed to include the limits of disturbance of the reasonable alternatives for the project.

3.7.6 WHAT WATER RESOURCES EXIST WITHIN THE PROJECT STUDY AREA?

This section describes the various water resources present within the Project Study Area. Existing water resources have been divided into three broad categories:

- Groundwater Resources
- Surface Water Resources
- Drinking Water Resources
- Wild and Scenic Rivers

The following sub-sections discuss each of these categories in detail.

3.7.6.1 Groundwater Resources

Groundwater is the water found in the cracks and spaces in soil, sand, and rock beneath the Earth's surface. This water may occur close to the surface or it may be many hundreds of feet below the surface. Groundwater accumulates in and moves through layers of permeable, water-bearing rock called aquifers. The amount of groundwater that can flow through soil or rock depends on the size of the spaces in the soil or rock and how well the spaces are connected. These spaces represent the "porosity" of the stratum**.** Permeability is a measure of how well the spaces are connected and how well water can move though the rock or soil.[12] Groundwater is replenished when precipitation that falls to the ground surface infiltrates through the soil and rock until it reaches impermeable rock or a rock formation that is already saturated. Groundwater can flow out of aquifers in the form of springs. Water can also be extracted from aquifers through the drilling or digging of wells. Groundwater extracted from wells is commonly used for drinking water, irrigation, and industrial uses.

Useful groundwater terminology:

- **Aquifer: a layer of rock or sediment that contains or transmits groundwater**
- **Porosity: a measure of the of spaces in a given rock or soil stratum that can store water**
- **Permeability: a measure of how well the spaces in a rock or soil layer are connected, and how easily water can move between the spaces**

[12] Clark, D.W. and Briar, D.W. 1993. "What is Groundwater?" USGS. Accessed 6/1/2017. https://pubs.usgs.gov/of/1993/ofr93-643/pdf/ofr93-643.pdf.

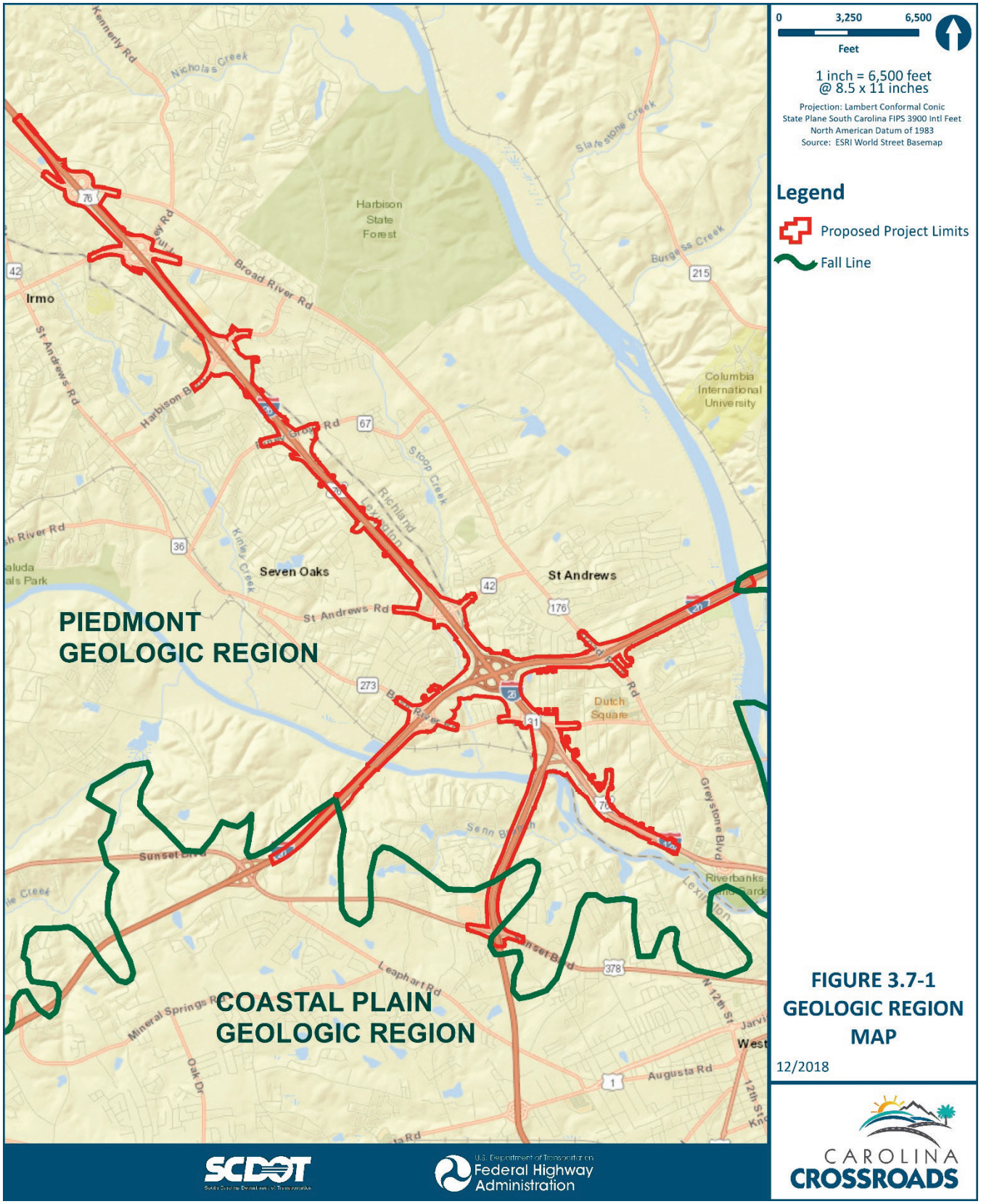


FIGURE 3.7-1 GEOLOGIC REGION MAP

12/2018

CAROLINA CROSSROADS

The majority of the Project Study Area is located just northwest of the Fall Line, which forms the divide between the Piedmont and the Coastal Plain geologic regions of South Carolina. Figure 3.7-1 shows the location of the Project Study Area in relation to the Fall Line. To the northwest of the Fall Line is the Piedmont, with its igneous and metamorphic bedrock exposed; and to the southeast is the Coastal Plain, which comprises sedimentary sand-and-clay formations. [13] The majority of the project study area is located in the Piedmont and the underlying rocks are part of the Carolina Slate Belt. The rocks forming this portion of the Carolina Slate Belt are not true slate, but consist of fine grained shale and schist.[14] These rocks typically have a low porosity but display complex fracture zones that form the conduits for water in the Piedmont aquifer system.[15] The bedrock in this area is overlain by saprolite that ranges in thickness from 0 to 100 ft.[16] Saprolite is a layer of decomposed rock developed by weathering of the bedrock; it has high porosity but relatively low permeability. Saprolite is typically the recharge zone for the underlying fractured bedrock.

Groundwater availability in the Piedmont aquifer system is significantly less than in the aquifers of the nearby Coastal Plain. Water wells in the Project Study Area are generally several hundred feet deep and have low yields, commonly less than 10 gallons per minute. Wells in the bedrock are widely used for domestic water supplies in the northwestern part of Richland County.[17] In the Project Study Area, most domestic water supplies are provided by local municipalities.

A small portion of the Project Study Area is located southeast of the Fall Line and is therefore located in the Coastal Plain. Figure 3.7-2 illustrates the differences in the hydrogeology between the Piedmont and the Coastal Plain. In this area the igneous and metamorphic bedrock that are exposed in the Piedmont are overlain by geologically younger sand and clay layers. Because the sections of the Project Study Area that are located in the Coastal Plain are so close to the fall line, the depth of sediments above the bedrock is relatively shallow. Groundwater resources in the Coastal Plain portion of the Project Study Area exist in the form of shallow sand aquifers that sit atop of the fractured rock Piedmont aquifer.

[13] Newbome, Roy, Jr. 2003. Ground-water resources of Richland County, South Carolina: SCDNR Water Resources Report 30. Accessed 5/15/2017. http://www.dnr.sc.gov/water/admin/pubs/pdfs/richlandcounty.pdf
[14] USDA-NRCS, 1978, Soil Survey of Richland County, South Carolina.
[15] USGS. 1990. "Groundwater Atlas of the U.S. – Alabama, Florida, South Carolina". Accessed 05/12/2017. https://pubs.usgs.gov/ha/ha730/ch_g/G-text8.html
[16] Agerton, K.W. and Baker, S.E. 2006. Water Resources of Lexington County, South Carolina. SCDNR Water Resources Report 38. Accessed 5/15/2017. http://www.dnr.sc.gov/lwc/pubs/pdfs/Report38Lexington.pdf
[17] Newbome, Roy, Jr. 2003. Ground-water resources of Richland County, South Carolina: South Carolina Department of Natural Resources Water Resources Report 30. Accessed 5/15/2017. http://www.dnr.sc.gov/water/admin/pubs/pdfs/richlandcounty.pdf

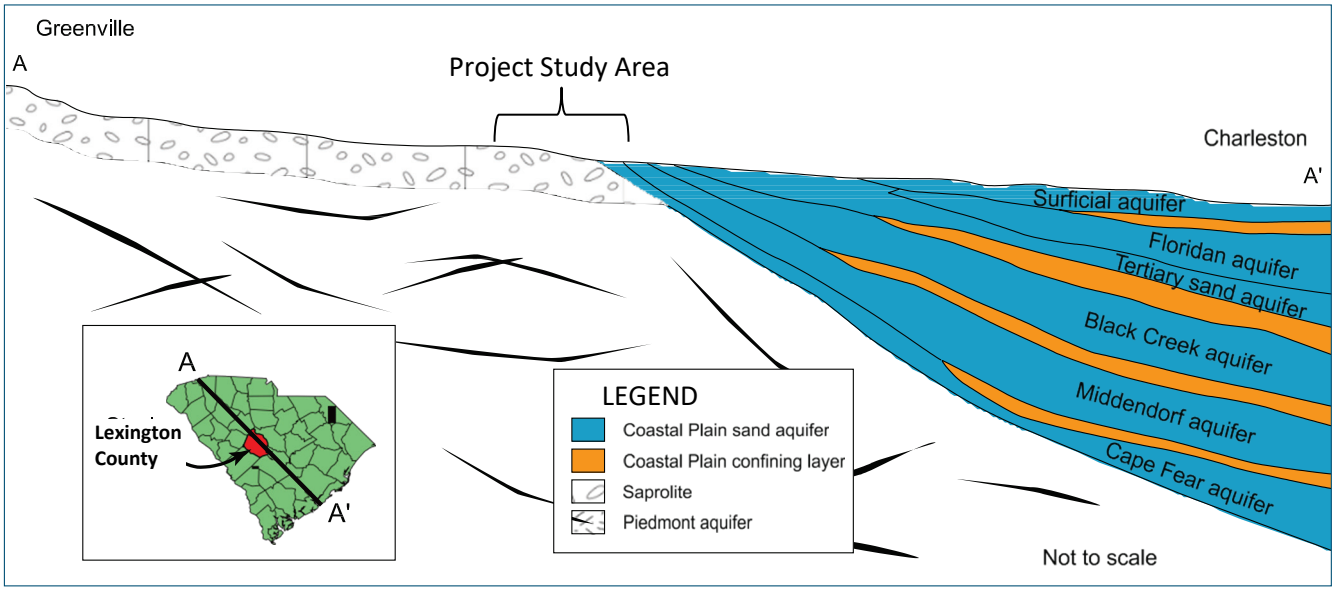


Figure 3.7-2 Generalized subsurface hydrogeology of project study area (modified from Aucott *et al*, 1987)[18]

In 1979, South Carolina began establishing Capacity Use Areas (CUA) as a way of managing declining groundwater levels. The Project Study Area lies outside of the current established CUAs. The SCDHEC defines significant groundwater users as those who withdraw 3 million gallons or more in any month. Significant groundwater users outside of the Coastal Plain are not required to obtain a Groundwater Withdrawal Permit but are required to register their groundwater use with the SCDHEC. Tables 3.7-1 and 3.7-2 provide a summary of groundwater use by significant users in Lexington and Richland Counties.

Table 3.7-1 Project Study Area Groundwater Resources – Lexington County

Ground water use Lexington County South Carolina, 2012		
Use type	**Number of significant groundwater users**	**Groundwater use in millions of gallons**
Industrial	9	358.806
Irrigation	55	3,122.452
Mining	8	333.791
Water supply	20	489.781
Total use		**4,304.830**

Source: SCDHEC Bureau of Water's Groundwater Use Report 2012 Annual Summary

[18] Aucott, W.R., Davis, M.E., and Speiran, G.K., 1987. Geohydrologic framework of the Coastal Plain aquifers of South Carolina: U.S. Geological Survey Water-Resources Investigations Report 85-4271, 7 sheets.

Table 3.7-2 Project Study Area Groundwater Resources – Richland County

Ground water use Richland County South Carolina, 2012		
Use type	**Number of significant groundwater users**	**Groundwater use in millions of gallons**
Aquaculture	1	16.300
Golf courses	20	52.975
Industrial	3	707.249
Irrigation	1	6.472
Mining	1	215.340
Water supply	10	222.785
Total Use		**1,221.121**

Source: SCDHEC Bureau of Water's Groundwater Use Report 2012 Annual Summary

3.7.6.2 Surface Water Resources

Surface waters are any waters that are on the surface of the Earth. These include natural features such as rivers, streams, lakes, and wetlands, as well as man-made or modified features such as ponds, reservoirs, canals, and irrigation ditches. The following section discusses the existing surface waters identified by the project team within the Project Study Area through desktop and field reviews.

Surface waters located within the Project Study Area are summarized in Table 3.7-3 and are discussed in detail in the following sections.

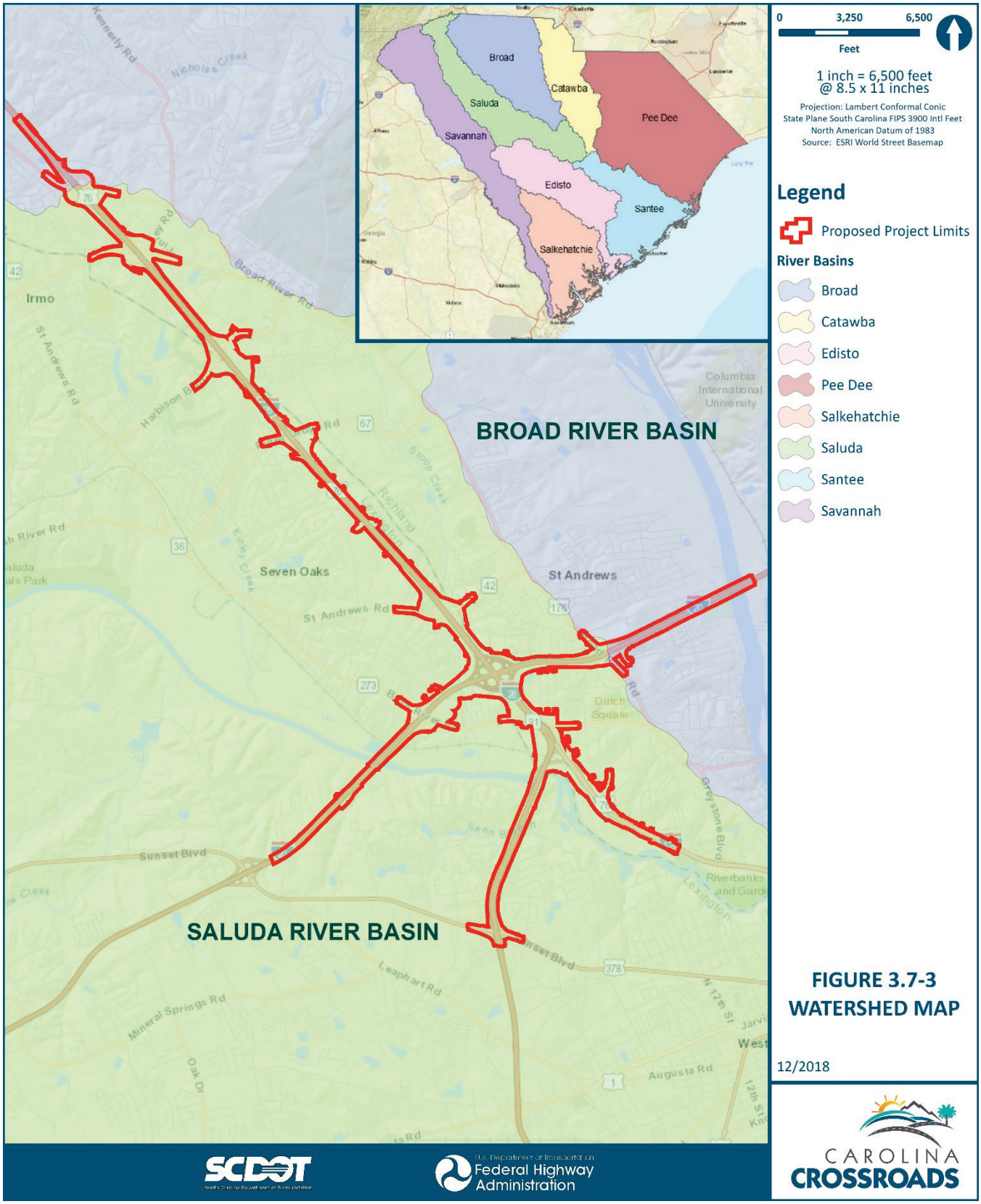
What are surface waters?

- **Rivers, creeks, and streams**
- **Lakes, ponds, and reservoirs**
- **Wetlands**

Table 3.7-3 Project Study Area Surface Water Resources*

Surface water type	Total linear feet	Total acres
Rivers and streams	27,922	24.339
Wetlands	N/A	12.219
Open waters	N/A	0.739
Total	**27,518**	**37.297**

*Resources based on preliminary jurisdictional determination and GIS data


Broad
Catawba
Saluda
Pee Dee
Savannah
Edisto
Santee
Salkehatchie
BROAD RIVER BASIN
SALUDA RIVER BASIN
Irmo
Seven Oaks
St Andrews
Columbia International University
Dutch Square
Sunset Blvd
Leaphart Rd
Mineral Springs Rd
Augusta Rd
St Andrews Rd
Harbison Blvd
Broad River Rd
Kennerly Rd
Nicholas Creek
Richland
Stoop Creek
Kinley Creek
Greystone Blvd
Riverbanks and Garde
0
3,250
6,500
Feet
1 inch = 6,500 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: ESRI World Street Basemap
Legend
Proposed Project Limits
River Basins
Broad
Catawba
Edisto
Pee Dee
Salkehatchie
Saluda
Santee
Savannah
FIGURE 3.7-3
WATERSHED MAP
12/2018
CAROLINA CROSSROADS
SCDOT
U.S. Department of Transportation
Federal Highway Administration

3.7.6.2.1 Watersheds and Drainage Basins

All surface waters in South Carolina can be assigned to a particular drainage or river basin. A basin can be described as a geographic area in which all surface waters drain to a common point. The SCDHEC divides South Carolina into eight major river basins. The Carolina Crossroads Project Study Area is located in two of these basins; the Saluda and Broad River Basins.

In what river basin is the project study area located?

- **88.6 percent is in the Saluda River basin**
- **11.4 percent is in the Broad River basin**

Broad River Basin

Approximately 11.4 percent of the Project Study Area is located within the Broad River Basin. The Broad River Basin extends across the Piedmont region of North Carolina and South Carolina. In South Carolina, it encompasses approximately 4,000 square miles and is roughly bounded by the cities of Greenville to the west, York to the east, and Columbia to the south. Approximately 59 percent of the Basin is forested land with agricultural and urban lands comprising most of the remainder. The Broad River Basin also contains nearly 4,700 stream miles and 18,500 acres of lake waters.

The Broad River Basin is subdivided into three major sub-basins, and 27 watersheds or hydrologic units. Each sub-basin and hydrologic unit is designated by an eight- or ten-digit Hydrologic Unit Code (HUC). The three major sub-basins in the Broad River Basin are the Enoree River Sub-Basin (HUC 03050108), the Tyger River Sub-Basin (HUC 03050107), and the Broad River Sub-Basin (HUCs 03050105 & 03050106). Of these, approximately 11.4 percent of the Project Study Area is located within the Broad River Sub-Basin.

Broad River Basin
Area drained: 4,000 square miles
Miles of stream: 4,700 miles
Acres of lakes and ponds: 18,500 acres
Sub-Basins: Enoree River (03050108)
Tyger River (03050107)
Broad River (03050105 & 03050106)

The Broad River Sub-Basin (HUCs 03050105 & 03050106) is located in Cherokee, Spartanburg, York, Union, Chester, Fairfield, Newberry, and Richland Counties, and encompasses approximately 2,500 square miles. Of the approximately 1.5 million acres, 60.6 percent is forested land, 23.8 percent is agricultural land, 1.2 percent is scrub/shrub land, 2.1 percent is forested wetland, 9.8 percent is urban land, 1.6 percent is water, and 0.9 percent is barren land. The urban land percentage is comprised primarily of the cities of Spartanburg, Gaffney, and Chester, and portions of the cities of York, Union, and Columbia. Within the Broad River Sub-Basin, there are approximately 2,800 stream miles and 14,500 acres of lake waters. The Broad River flows across the North Carolina/South Carolina state line and accepts drainage from Buffalo Creek, Cherokee Creek, Kings Creek, Thicketty Creek, Bullock Creek, the Pacolet River, Turkey Creek, the Sandy River, the Little River, and Cedar Creek before converging with the Saluda River in Columbia.[19]

[19] SCDHEC. 2007. Watershed Water Quality Assessment: Broad River Basin: Technical Report No.006-07. Bureau of Water, Columbia, S.C.

The portion of the Project Study Area within the Broad River Sub-Basin lies within the Broad River Watershed (HUC 03050106-07). HUC 03050106-07 is located in Newberry, Fairfield, and Richland Counties and consists primarily of the Broad River and its tributaries from the Parr Shoals Dam to its confluence with the Saluda River. Within the Project Study Area, the Broad River Watershed encompasses the northern portion of US-176 (Broad River Road) interchange with I-26, and the area along I-20 east of the interchange of US-176 (Broad River Road). Surface waters identified within the portion of the Project Study Area located in HUC 03050106-07 include six streams/rivers, eight wetlands, and one pond.

Saluda River Basin

Approximately 88.6 percent of the Project Study Area is located within the Saluda River Basin. The Saluda River Basin originates at the South Carolina state line and extends from the Blue Ridge Mountains through the Piedmont and into the Sandhills region. The basin encompasses approximately 2,500 square miles and is roughly bounded by the cities of Easley to the west, Greenville to the east, and Lake Marion to the south. Of the 1.6 million acres within the Basin, approximately 53 percent is forested land with agricultural and urban lands comprising most of the remainder. The Saluda River Basin contains over 6,700 stream miles and 74,500 acres of lake waters.

Saluda River Basin
Area drained: 2,500 square miles
Miles of stream: 6,700 miles
Acres of lakes and ponds: 74,500 acres
Sub-Basins: **Saluda River (03050109)**
Congaree River (03050110)

The Basin is subdivided into two major sub-basins including the Saluda River Sub-Basin (HUC 03050109) and the Congaree River Sub-Basin (HUC 03050110). Of these, approximately 88.6 percent of the Project Study Area is located within the Saluda River Sub-Basin.

The Saluda River Sub-Basin (HUC 03050109) is located in Greenville, Pickens, Anderson, Abbeville, Laurens, Greenwood, Newberry, Saluda, Lexington, and Richland Counties, and encompasses approximately 2,500 square miles. Of the 1.6 million acres, 53.7 percent is forested land, 26.1 percent is agricultural land, 12.9 percent is urban land, 4.2 percent is water, 2.1 percent is forested wetland, and 1.0 percent is barren land. The urban land percentage is comprised primarily of the cities of Greenville and Columbia, and to a lesser extent the cities of Laurens and Newberry.

Within the Saluda River Sub-Basin, there are approximately 5,600 stream miles and 69,000 acres of lake waters. The Saluda River forms at the confluence of the South Saluda River and North Saluda River, roughly 11 aerial miles northwest of the City of Greenville. The Saluda River flows past the City of Greenville and is joined by Georges Creek, Big Brushy Creek, Big Creek, and Broad Mouth Creek before forming the headwaters of Lake Greenwood. The Reedy River joins the Saluda River as a separate arm of Lake Greenwood. Downstream of the Lake, Ninety Six Creek and Little River flow into the Saluda River before joining the Little Saluda River and Bush

River to form the headwaters of Lake Murray. The Saluda River emerges from the Lake Murray Dam and joins the Broad River in the City of Columbia to form the Congaree River. [20]

The portion of the Project Study Area within the Saluda River Sub-Basin lies within the Lower Saluda River Watershed (HUC 03050109-14). HUC 03050109-14 is located in Lexington and Richland Counties and consists primarily of the lowest reach of the Saluda River and its tributaries from the Lake Murray Dam to its confluence with the Broad River. The Lower Saluda River Watershed encompasses the area south of US-176 (Broad River Road) at I-26, and the area west of US-176 (Broad River Road) at I-20. Surface waters identified within the portion of the Project Study Area located in HUC 03050109-14 include 66 streams/rivers, a National Pollutant Discharge Elimination System (NPDES)-Permitted Treatment Basin, three ponds, and 52 wetlands.

3.7.6.2.2 Streams and Rivers

The SCDHEC has classified the streams and rivers of South Carolina based on the desired uses of each waterbody. The water-use classifications for freshwater streams and rivers in South Carolina are as follows:

- **ORW**: Outstanding Resource Waters constitute an outstanding recreational or ecological resource, or those freshwaters suitable as a source for drinking water supply purposes.
- **ONRW**: Outstanding Natural Resource Waters constitute an outstanding national recreational or ecological resource.
- **Trout**: The State recognizes three types of trout waters: Natural (**TN**); Put, Grow, and Take (**TPGT**); and Put and Take (**TPT**).
- **FW**: Freshwaters are waters that are suitable for primary and secondary contact recreation and as a source for drinking water supply, after conventional treatment.

The water-use classifications for many South Carolina waterbodies are listed in S.C. Regulation 61-69. All waters of South Carolina are classified even if they are not specifically named or listed in R.61-69. Those waterbodies not listed in R61-69 are assigned the classification of the nearest classified waterbody to which they are a tributary.

A total of 72 streams, or tributaries, were delineated by the project team within the project study area during site reviews. Streams and rivers identified within the Project Study Area are summarized in Table 3.7-4. Of the 72 streams identified, 71 are classified as FW by the SCDHEC and the Saluda River is classified as a TPGT. A detailed description of each tributary located within the Project Study Area is included in the Carolina Crossroad Natural Resources Technical Report.[21]

[20] SCDHEC. 2011. Watershed Water Quality Assessment: Saluda River Basin: Technical Report No.9C21-11. Bureau of Water, Columbia, S.C.
[21] SCDOT. 2017. Natural Resources Technical Report – Carolina Crossroad I-20/I-26/I-126 Corridor Improvement Project. Prepared by Mead and Hunt.

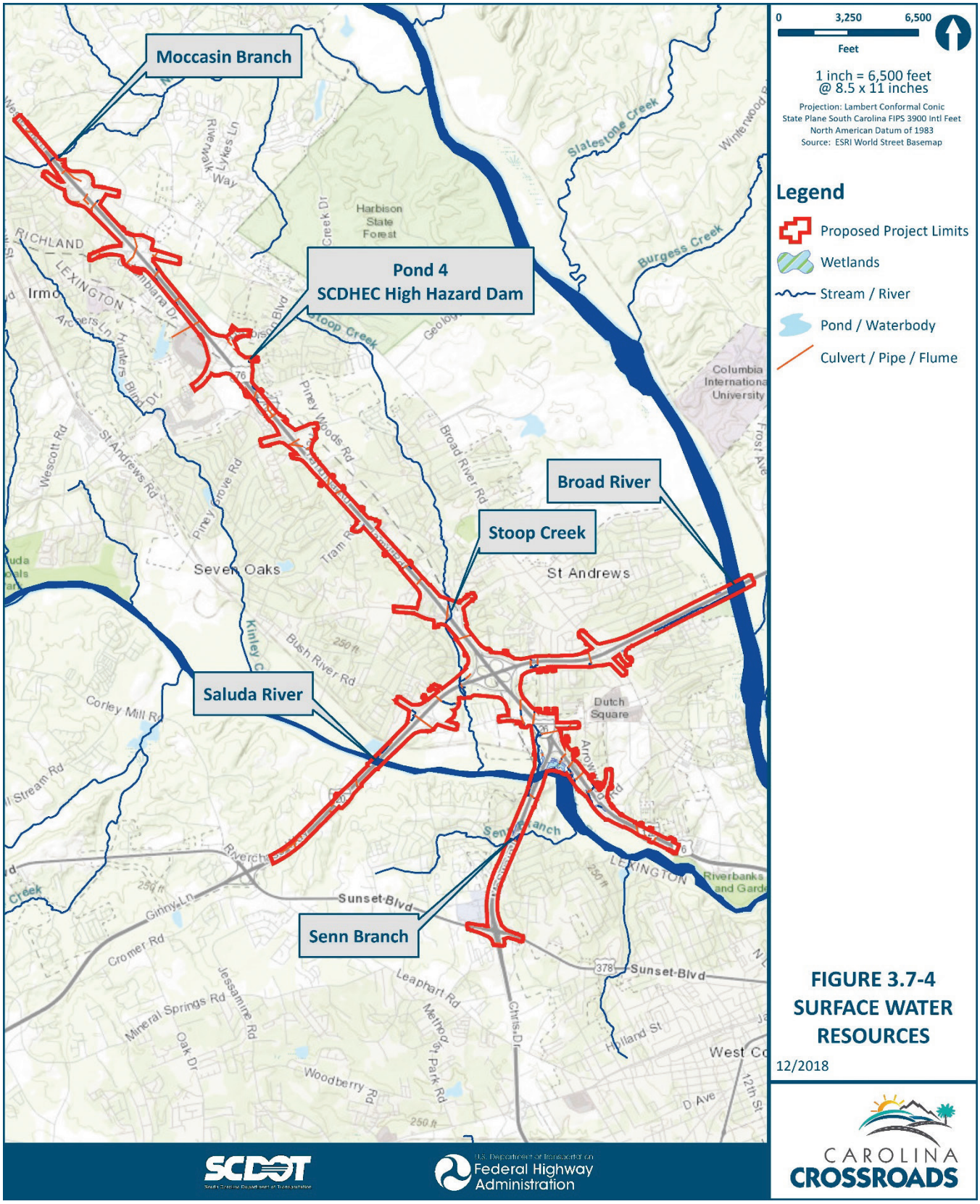

Moccasin Branch
Pond 4
SCDHEC High Hazard Dam
Broad River
Stoop Creek
Saluda River
Senn Branch
Harbison State Forest
Seven Oaks
St Andrews
Dutch Square
Columbia International University
Riverbanks and Gardens
Slatestone Creek
Burgess Creek
Broad River Rd
Bush River Rd
Sunset Blvd
Leaphart Rd
Mineral Springs Rd
Woodberry Rd
Piney Woods Rd
Piney Grove Rd
St Andrews Rd
Corley Mill Rd
Cromer Rd
Jessamine Rd
Oak Dr
Meltrose Park Rd
Chris Dr
Holland St
West Columbia
D Ave
12th St
Arrowood Rd
Wescott Rd
Hunters Blind Dr
Archers Ln
Riverwalk Way
Lykes Ln
Creek Dr
Geology Rd
Girtny Ln
Kinley Ct
Stream Rd
Irmo
RICHLAND
LEXINGTON
0
3,250
6,500
Feet
1 inch = 6,500 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane South Carolina FIPS 3900 Intl Feet
North American Datum of 1983
Source: ESRI World Street Basemap
Legend
Proposed Project Limits
Wetlands
Stream / River
Pond / Waterbody
Culvert / Pipe / Flume
FIGURE 3.7-4
SURFACE WATER RESOURCES
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Table 3.7-4 Rivers and Streams within the Project Study Area

Feature name	Number of features	SCDHEC Surface water classification	Delineated area	
			Linear feet	Acre
Unnamed Tributaries	63	FW	23,637	4.335
Saluda River	1	TPGT	1,345	9.956
Broad River	1	FW	531	9.247
Moccasin Branch	1	FW	195	0.030
Senn Branch	1	FW	933	0.279
Stoop Creek	1	FW	1,281	0.594
Total Streams and Rivers			**27,922**	**24.381**

3.7.6.2.3 Wetlands

Wetlands are natural areas where water covers or is present at or near the surface of the soil all year, or for a significant portion of the year, including the growing season. Prolonged periods of saturation promote the development of characteristic wetland soils and create conditions that are favorable for the growth of specially adapted plants. Wetland types vary based on the amount and duration of water present (hydrologic regime), their location in the landscape, vegetation community, and tidal influence. Types of wetlands include marshes, swamps, bogs, and fens. They can be forested or dominated by herbaceous plants.

Wetlands are vitally important ecosystems that support a large variety of microbes, plants, animals, insects, fish, and birds. In addition to supporting biodiversity, wetlands clean ground and surface waters through the removal of excessive nutrients and pollutants that are absorbed by wetland vegetation. Wetlands also reduce flooding by storing and slowly releasing storm water that would otherwise flow directly into streams and rivers. This reduces peak flows during storm events and helps maintain healthy base flows during drier periods. The boundary between wetlands and deepwater habitats, such as ponds or lakes, is defined as the maximum depth where rooted emergent vegetation may be found. Rooted emergent vegetation is generally present at depths less than six feet below mean low water during the growing season.

Wetland within the project study area

The USFWS has mapped wetlands across the United States to create the National Wetland Inventory (NWI). NWI mapping depicts the type of wetland that is expected to occur in an area but has not been verified by onsite investigations. A review of NWI data indicated 13 potential wetland communities within the Project Study Area.

A total of 60 wetland areas were identified by the project team within the Project Study Area during site reviews. Wetlands within the Project Study Area are listed in Table 3.7-5. A Preliminary Jurisdictional Determination was issued by the USACE for this project on March 9, 2016 and was revised on June 27, 2018. The PJD was revised following the DEIS due to project modification and was issued on February 4, 2019. A detailed description of each wetland located within the Project Study Area is included in the Carolina Crossroad Natural Resources Technical Report[22] in Appendix L.

Table 3.7-5 Wetlands within the Project Study Area*

Wetland type (Cowardin classification)	Number of wetland areas	Total acres
Forested wetland (PFO)	43	10.443
Shrub/scrub wetland (PSS)	3	0.231
Emergent wetland (PEM)	14	1.545
Total wetlands	**60**	**12.219**

*Wetland types based on field identification

Wetlands within the Project Study Area are predominantly small and highly fragmented due to urbanization. Some larger, more intact, wetlands exist on the floodplain of the Saluda River. These bottomland hardwood wetlands are of medium quality and are partially impaired due to ditching, the presence of invasive plant species such as Chinese privet, and fragmentation due to utilities, roads, and railroads. The shrub/scrub and Emergent wetlands within the Project Study Area are predominantly located within roadway or utility right of ways and are artificially maintained to prevent the growth of tall woody vegetation. Based on field verification by the project team, these wetlands are low quality due to loss of one or more wetland functions including wildlife habitat, groundwater recharge, and flood attenuation.

3.7.6.2.4 Open Waters and Ponds

A total of four ponds and one NPDES-Permitted Treatment Basin were identified by the project team within the Project Study Area during site reviews, as listed in Table 3.7-6.

Table 3.7-6 Open Waters and Ponds within the Project Study Area

Feature	Cowardin classification	Total acres
Pond 1	PUBh	0.035
Pond 2	PUBh	0.023
NPDES-permitted treatment basin	PUBh	0.161
Pond 3	PUBh	0.155

[22] SCDOT. 2018. Natural Resources Technical Report – Carolina Crossroad I-20/I-26/I-126 Corridor Improvement Project. Prepared by Mead and Hunt.

Feature	Cowardin classification	Total acres
Pond 4	PUBh	0.365
Total Open Waters		**0.739**

3.7.6.2.5 High Hazard Dams

Pond 4 is located in the southeastern quadrant of the I-26/Harbison Boulevard intersection, immediately north of Woodcross Drive. The dam for this pond has been classified by SCDHEC as a High Hazard (C1) Dam. Any impacts to this dam would likely require a dam modification permit from SCDHEC.

3.7.6.3 Wild and Scenic Rivers

3.7.6.3.1 Nationwide Rivers Inventory

The Nationwide Rivers Inventory (NRI) is a listing of more than 3,400 free-flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural value(s) judged to be of more than local or regional significance. All federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI listed river segments. The NRI is maintained by the National Park Service's Rivers, Trails, and Conservation Assistance Program and is a source of information for statewide river assessments and federal agencies involved with stream-related projects. For any group concerned with ecosystem management, the inventory can provide the location of the nearest naturally functioning system which might serve as a reference for monitoring activities. It also serves as a listing of plant and animal species for restoration efforts on a similar section of river. For the recreationalist, it provides a listing of free-flowing, relatively undisturbed river segments.[23]

A seven-mile section of the Saluda River in Lexington and Richland Counties was listed on the NRI in 1982. The listed stream section extends from river mile three upstream of Columbia to river mile 10 at the Lake Murray Dam. Outstanding Resource Values for the Saluda River include scenery, recreation, geology, fish, wildlife, history, and culture. The river is described as affording "scenic wilderness experience in urban areas; diversified flora and fauna."[24] The Project Study Area crosses this stream segment in two locations: the I-20 river crossing and the I-26 river crossing.

Saluda River

[23] National Park Service (NPS). 2011. "Nationwide Rivers Inventory." Accessed 05/12/2017. https://www.nps.gov/ncrc/programs/rtca/nri/index.html
[24] NPS. 2009. "Nationwide Rivers Inventory: South Carolina Segments." Accessed 05/12/2017 https://www.nps.gov/ncrc/programs/rtca/nri/states/sc.html

3.7.6.3.2 State Designated Scenic Rivers

The South Carolina Scenic Rivers Act of 1989 has the purpose of protecting "unique or outstanding scenic, recreational, geologic, botanical, fish, wildlife, historic or cultural values" of selected rivers or river segments in the State.

A 10-mile segment of the Saluda River beginning one mile below the Lake Murray Dam to its confluence with the Broad River is designated as a State Scenic River. The Lower Saluda Scenic River is recognized as an outstanding recreational resource offering trout and striped bass fishing opportunities as well as whitewater and flatwater paddling.[25] This State Scenic River segment is crossed by the Project Study Area in two locations: the I-20 river crossing and the I-26 river crossing.

3.7.6.4 Drinking Water Resources

Surface waters are the primary source of drinking water for the Project Study Area. Properties within the portion of the Project Study Area located north of the Saluda River are served by the City of Columbia Water Utilities Division. The portion of the Project Study Area to the south of the Saluda River are served by the City of West Columbia's Water Utility.

Drinking water sources for the project study include:

- **Broad River**
- **Lake Murray**
- **Saluda River**

3.7.6.4.1 City of Columbia Water Utilities Division Service Area

The portion of the Project Study Area served by the City of Columbia Water Utilities Division gets its drinking water from the Broad River Diversion Canal and Lake Murray. Lake Murray is located in the Saluda River Basin while the Broad River collects water from a large portion of northern South Carolina and parts of North Carolina. Surface waters from the Broad River are treated at the Columbia Canal Water Treatment Plant, located at 300 Laurel Street. Water drawn from Lake Murray is treated at the Lake Murray Water Treatment Plant, located at 6 Rocky Point Road in Columbia. Drinking water is disinfected with chloramines and chlorine dioxide and fluoride is added as recommended by the American Dental Association, the SCDHEC and the EPA.

The City of Columbia Water Utilities Division operates and maintains the treatment, distribution, and storage system that serves City of Columbia customers. These customers include: properties located inside the Columbia city limits, major portions of Richland County, portions of Lexington County, and other local communities. The Columbia Canal Water Treatment Plant and Lake Murray Water Plant have a combined rated capacity of 150 million gallons per day and serve approximately 375,000 customers. The distribution system has over 2,400 miles of water lines, pump stations, storage tanks and pressure reducing valves that distribute water across 9 major pressure zones. Both water plants operate 24 hours a day, 365 days a year.[26]

[25] SCDNR. "Lower Saluda Scenic River." Access 04/12/2017, http://www.dnr.sc.gov/water/river/scenic/saluda.html
[26] City of Columbia. "Drinking Water". Accessed 05/16/2017. http://www.columbiasc.net/drinking-water

3.7.6.4.2 City of West Columbia Service Area

The portion of the project study area served by the City of West Columbia's Water and Sewer System obtains its drinking water from the Saluda River and Lake Murray. The System's service area includes all of the City of West Columbia and portions of unincorporated Lexington County. The system serves approximately 5 percent of the County's land area and 20 percent of the County's population. The service area is bounded by Lake Murray to the north, the City of Columbia to the east, on the southeast and south by the City of Cayce, in rural areas of the county served by the Joint Commission, and on the west by the Town of Lexington's water and sewer service area.

The City of West Columbia's Water and Sewer System currently consists of the following components: three finished water reservoirs with a total capacity of 870,000 gallons; four high service pumps which pump from 1,400 to 3,200 gallons per-minute (GPM), four elevated storage tanks (Green Hill Standpipe at 2.5 million gallons, Platt Springs Road at 500,000 gallons, Pony Hill Road at 1 million gallons, and the Laurel Road Standpipe at 2.03 million gallons), and two booster stations pumping from 520 to 625 GPM. The Water Utility has 106 miles of distribution lines varying from two inches to 36 inches in diameter. The City owns two water treatment facilities, a 6 million gallon per-day facility which is located on the Saluda River and the 22.5 million gallons per-day Lake Murray Plant. Average daily use for the Saluda River Plant is 3.273 million gallons per-day, and 9,023 million gallons per-day for the Lake Murray Plant.[27]

3.7.7 HOW WOULD WATER RESOURCES BE IMPACTED BY THE PROJECT?

This section discusses the potential effects of the proposed project on water resources within the Project Study Area. The direct impacts are discussed for each alternative.

3.7.7.1 How would the no-build alternative impact water resources?

Under the No-build Alternative no additional road improvements would be undertaken other than those already planned by SCDOT. The No-build Alternative would not result in any impacts to water resources within the Project Study Area.

[27] City of West Columbia. "Water & Sewer". Accessed 05/16/2017. https://www.westcolumbiasc.gov/water-sewer/

3.7.7.2 How would the Alternatives impact water resources?

Impacts to water resources associated with the RPA and the Refined RPA are discussed in this section.

3.7.7.2.1 Groundwater Impacts

The expected effects of the project on groundwater are similar for all of the reasonable alternatives considered.

Aquifer
An aquifer is a geological formation that can contain or transport groundwater, which can also be sources of drinking water.

Potential Groundwater Impacts

Potential construction related impacts:

- **Sediment contamination of aquifers**
- **Petrochemical spills from construction equipment**

Potential use related impacts:

- **Herbicide/pesticide contamination due to maintenance activity**
- **Heavy metal contamination from roadway runoff**
- **Petrochemical, oil, and grease runoff**

Mitigative measures:

- **Use of sediment and erosion control BMPs to prevent sediment pollution.**
- **Use of Storm water management BMPs to capture and treat roadway runoff.**

The alternatives would be unlikely to directly impact the fractured bedrock Piedmont Aquifer since this Aquifer is typically overlain by many feet of saprolite and is therefore unlikely to be impacted by the project. The shallow sand aquifers located to the southeast of the fall line could potentially be impacted by both point source and non-point source pollution from the project. There are no critical aquifer protection areas or sole-source aquifers that would be affected by the proposed project.

Vehicular use of the completed roadway could contribute to non-point source pollution to groundwater. The RPA and the Refined RPA would include stormwater management BMPs to collect and treat stormwater runoff from the roadway. This would decrease the potential for pollutants to impact groundwater quality.

Construction of the proposed project would result in an increase in impervious surface which would contribute to a cumulative decrease in available recharge area for the fractured rock piedmont aquifer and shallow sand aquifers within the Project Study Area. Impacts to wetlands would also result in a decrease in available groundwater recharge areas. However, due to extensive urbanization and existing land disturbance in the Project Study Area it is unlikely that the proposed project would have a substantial effect on groundwater recharge.

3.7.7.2.2 Impacts to Surface Waters

Preliminary Jurisdictional Determinations are non-binding "written indications that there may be waters of the United States, including wetlands, on a parcel or indications of the approximate location(s) of waters of the United States or wetlands on a parcel.

Impacts to surface waters have been assessed by the project team for the RPA and the Refined RPA. For the purposes of this document it has been assumed that, unless specified to the contrary, all streams within the proposed right-of-way would be piped and that all wetlands within the construction limits would be filled. The only exception to this is where existing bridged river crossings exist and/or new bridges are specified over the Saluda River. Direct impacts to these surface waters would include increased stormwater runoff and temporary construction impacts associated with bridge construction. Impacted surface waters include; Moccassin Branch, Stoop Creek, Senn Branch, the Saluda River, and 54 unnamed tributaries.

In addition to the amount of surface water that would be impacted, the quality of those resources was also assessed by the project team. Higher quality wetlands and streams are generally valued for their function, aesthetics, and wildlife habitat.

Definitions of wetland and stream quality are based on characteristics outlined in the USACE, Charleston District *Guidelines for Preparing a Compensatory Mitigation Plan* (dated October 7, 2010). The USACE Charleston District *Guidelines* consider the type and existing condition when evaluating impacts to wetlands and streams. For the purposes of this assessment, quality characteristics were assigned by the project team to delineated wetlands and streams based on understanding of the aquatic resources in the Project Study Area and an interpretation of aerial photographs. Wetland and stream quality is defined as follows:

Wetlands

- High quality:
  - Existing Condition: Fully functional wetlands that appear to the delineators to be primarily undisturbed or existing disturbances do not substantially alter important functions.
  - Type: Bottomland Hardwoods and Riverine systems including headwaters and riparian zones.
- Medium Quality:
  - Existing Condition: Partially impaired wetlands that appear to the delineators to have a partial or full loss of one or more functions. Examples include mixed pine-hardwood wetlands, scrub-shrub wetlands, segmented and/or ditched wetlands.
  - Type: Seeps and bogs, Depressions, Pocosins and Bays, Savannahs and Flatwoods
- Low Quality:
  - Existing Condition: Impaired or very impaired wetlands that appear to the delineators to have a permanent loss of one or more functions. Examples include stormwater basins, clear-cut wetlands, and permanently cleared utility corridors.
  - Type: Man-made lakes and ponds, impoundments.

Streams

- High quality:

  - Existing Condition: Fully functional streams that appear to be primarily undisturbed with stable vegetated stream banks and riparian buffers. Streams with listed species, trout streams, and streams identified as highly diverse are considered fully-functional.
  - Type: Headwater streams (1st and 2nd Order) as defined on USGS mapping as blue lines
- Medium Quality:
  - Existing Condition: Partially impaired streams that appear to have limited human-influence or natural disturbance, resulting in a partial loss of one or more functions. Some channelization and piping may be present.
  - Type: All other streams and rivers as defined on USGS mapping as blue lines
- Low Quality:
  - Existing Condition: Impaired or very impaired streams that appear to the delineators to have unvegetated stream banks and severe loss of function. Streams with significant human-influence or natural disturbance. Primarily piped or channelized tributaries or tributaries with minimal to no riparian buffer.
  - Type: Other streams as defined on USGS mapping as blue lines

Mitigation measures during the final design phase of the project may reduce the total impacts to surface waters. A detailed assessment of wetland and stream conditions, type, and functions using USACE Charleston District *Guidelines* would occur during Section 404 permitting. Table 3.7-7 summarizes the estimated direct impacts to surface waters associated with the RPA and the Refined RPA, and the quality of those resources.

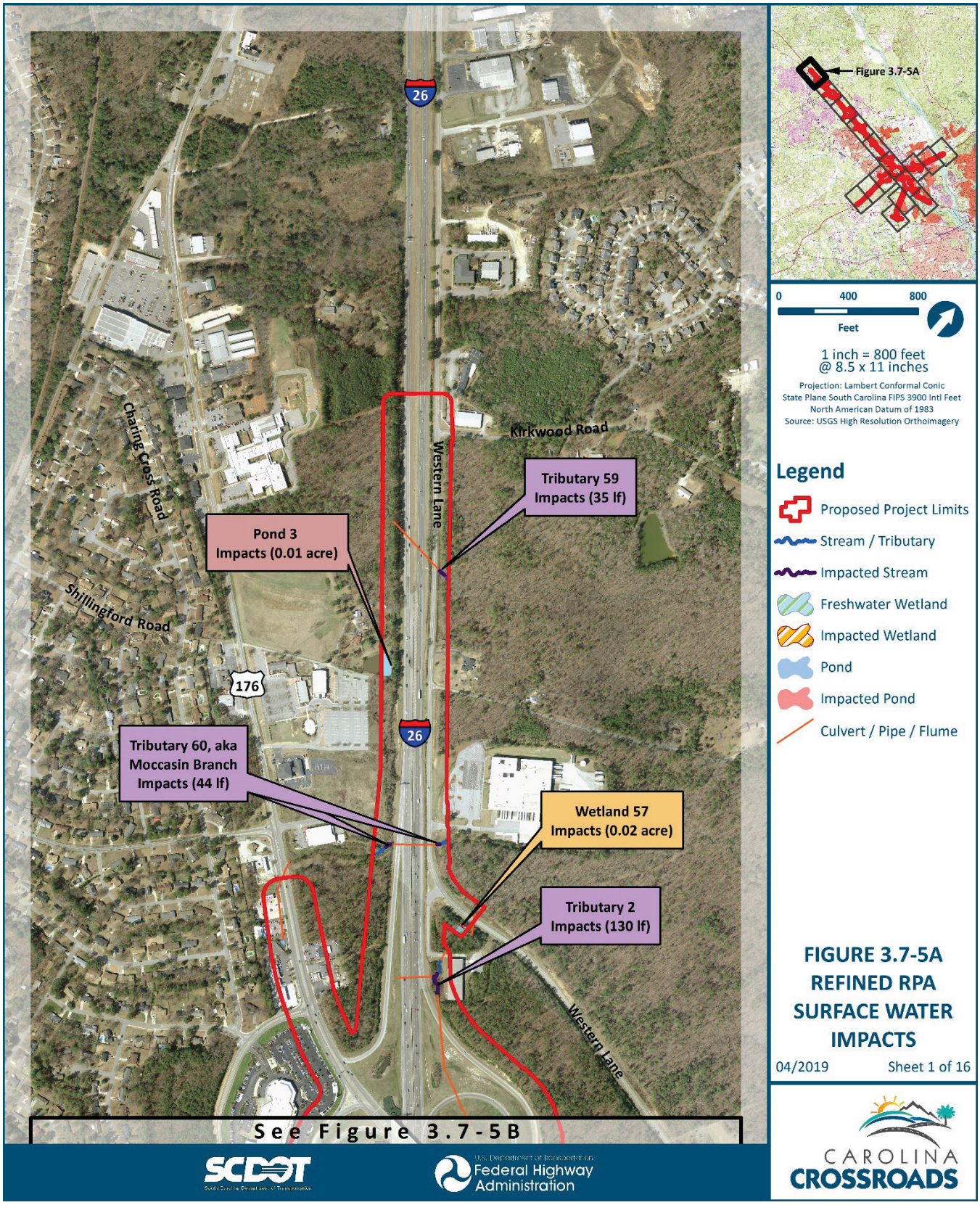
Table 3.7-7 Impact Comparison of the Recommended Preferred Alternative and the Refined Recommended Preferred Alternative

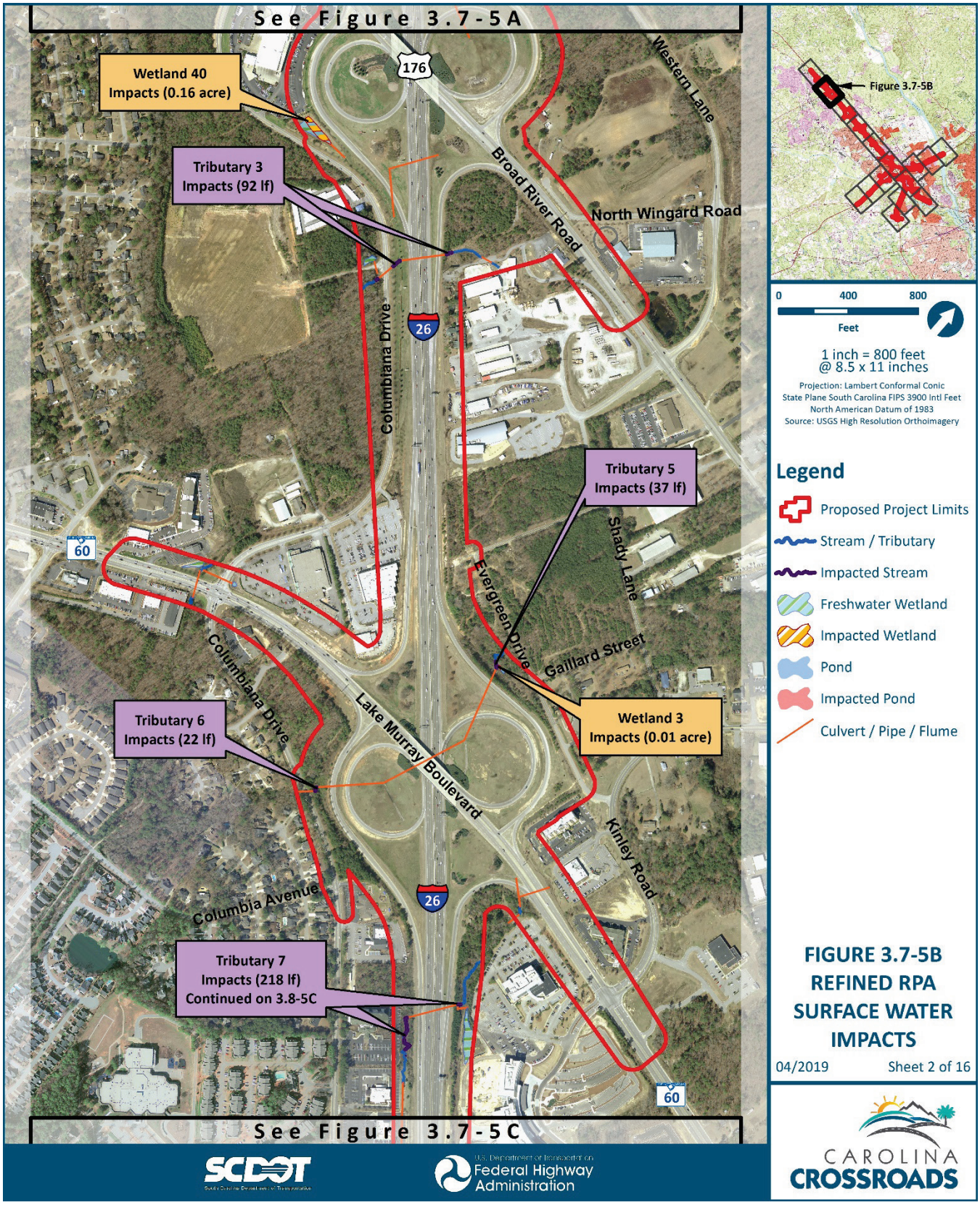
Resource type impacted	Quality of resource	Recommended Preferred Alternative	Refined Recommended Preferred Alternative estimated impacts
Potentially jurisdictional streams	Low	4,593 lf	5,326 lf
	Medium	8,975 lf	8,358 lf
	High	2,182 lf	2,567 lf
	Total	**15,750 lf**	**16,251 lf**
Potentially jurisdictional wetlands	Low	0.38 acre	0.49 acre
	Medium	3.79 acres	4.06 acres
	High	2.38 acres	2.39 acres
	Total	**6.55 acres**	**6.88 acres**
Potentially jurisdictional ponds	Low	0.02 acre	0.01 acre
	Medium	-	-
	High	-	-
	Total	**0.02 acre**	**0.01 acre**

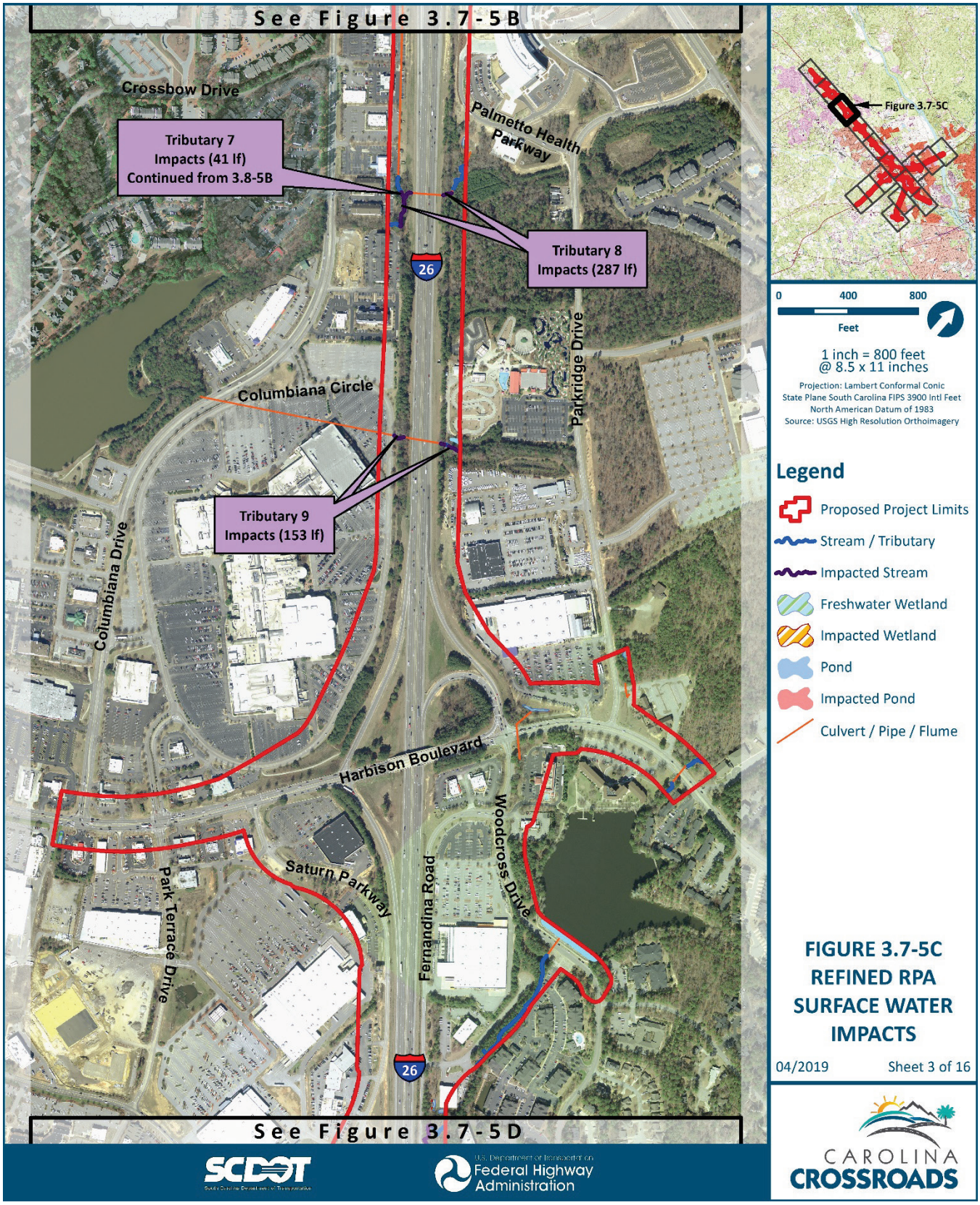
The RPA would impact approximately 6.55 acres of potentially jurisdictional wetlands and 0.02 acre of ponds; whereas the Refined RPA would impact approximately 6.88 acres of potentially jurisdictional wetlands and 0.01

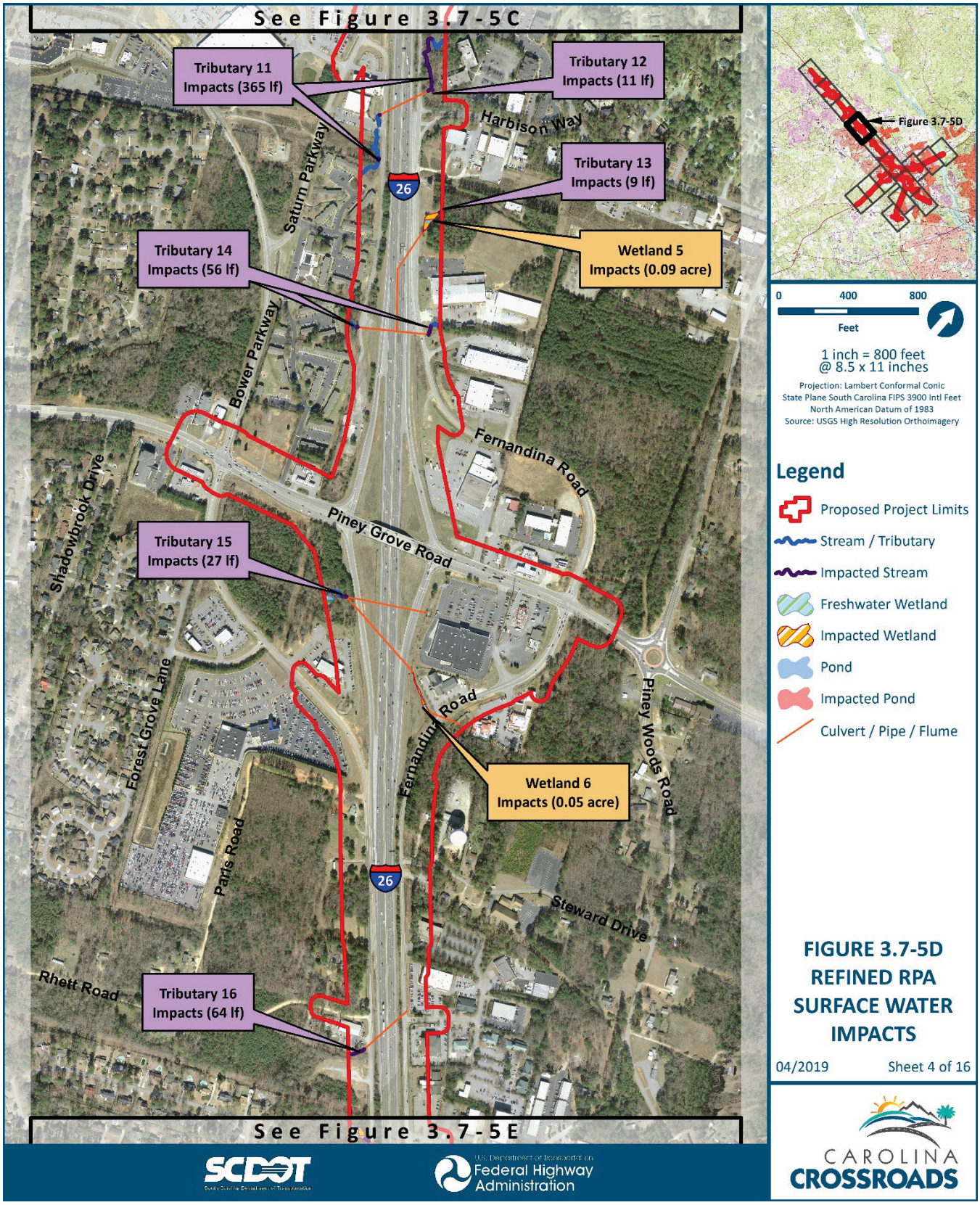
acre of ponds (Figures 3.7-5A – 3.7-5P). Potential impacts for both alternatives would be predominantly to forested wetlands and some maintained emergent wetlands located within existing road right-of-way and utility easements. Impacted wetlands would likely be filled, resulting in the loss of all existing function in the impacted area. Note: As the RPA and the Refined RPA footprints are similar, impacts to potentially jurisdictional streams, wetlands, and ponds between the RPA and the Refined RPA are minor and would be difficult to discern on a map. Therefore figures showing the differences in impacts between the two alternatives are not included. Unimpacted wetland areas within the Project Study Area would retain their existing function including flood storage, wildlife habitat, and water pollution abatement. Hydrologic connectivity for remaining wetland areas would be maintained through the use of pipes and culverts as needed and/or appropriate.

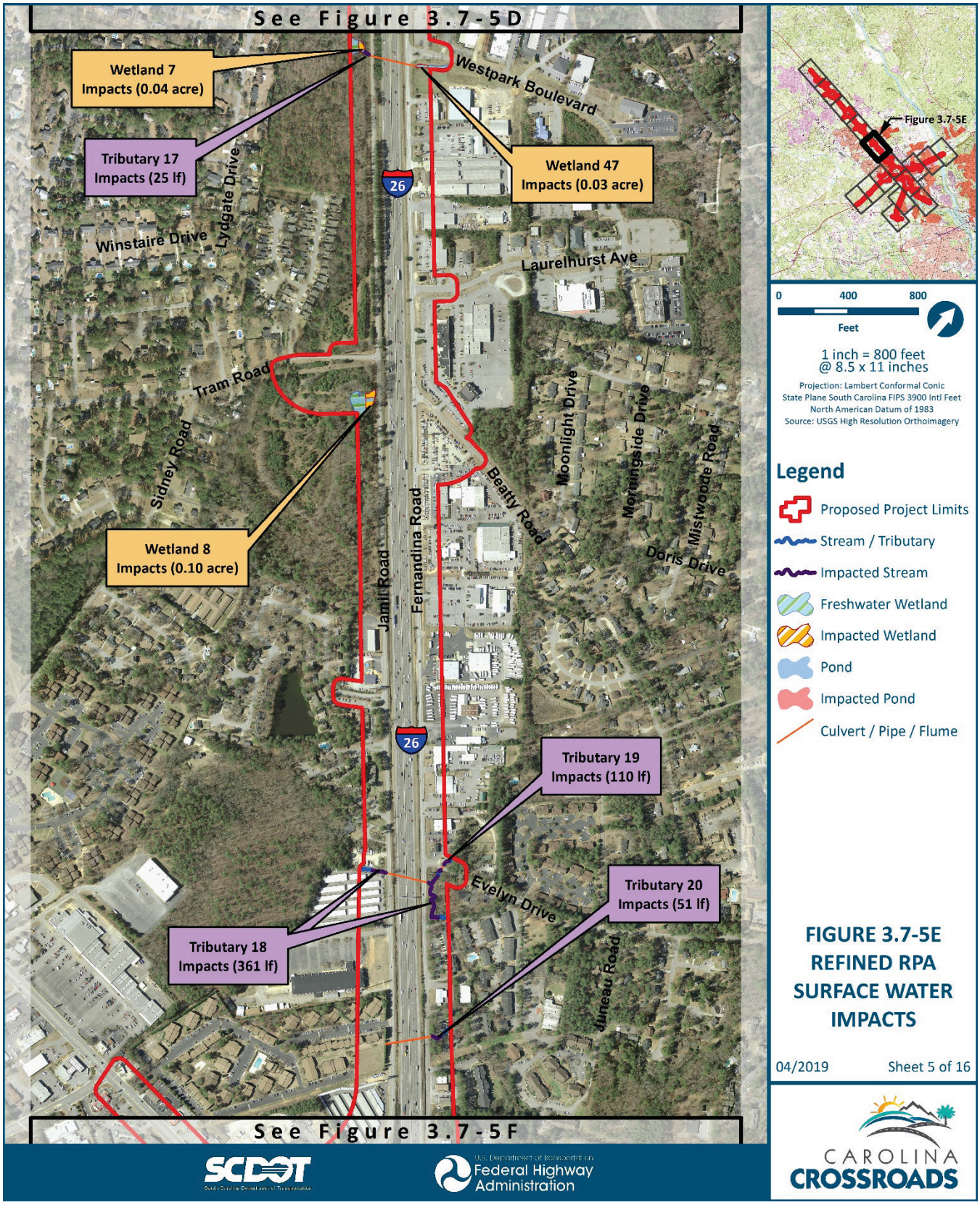
Both the RPA and the Refined RPA would cross the Saluda River, Senn Branch, Stoop Creek, and Moccasin Branch. The remainder of the crossings would be of unnamed creeks and tributaries. In total, 52 separate streams or rivers would be crossed for a total of 15,750 linear feet of potential stream impacts under the RPA; and 55 separate streams or rivers would be crossed for a total of 16,251 linear feet of potential stream impacts under the Refined RPA. Most of the stream impacts associated with both alternatives would occur on low- to medium-quality urban streams that have been disturbed, partially piped or channelized in the past, and have extensive development in their watersheds. Impacts would likely include the extension of existing pipes and culverts, placement of rip-rap in the stream channel, and loss of riparian buffers. These impacts would likely result in a partial or complete loss of habitat function in the impacted stream section. The exact type and extent of impacts to streams would be determined during the final design phase of the project and addressed in the Section 404/401 permitting process.


26
Kirkwood Road
Western Lane
Charing Cross Road
Shillingford Road
176
26
Tributary 59
Impacts (35 lf)
Pond 3
Impacts (0.01 acre)
Tributary 60, aka
Moccasin Branch
Impacts (44 lf)
Wetland 57
Impacts (0.02 acre)
Tributary 2
Impacts (130 lf)
Western Lane
See Figure 3.7-5B
Figure 3.7-5A
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5A
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 1 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


See Figure 3.7-5A
Wetland 40
Impacts (0.16 acre)
Tributary 3
Impacts (92 lf)
Tributary 5
Impacts (37 lf)
Wetland 3
Impacts (0.01 acre)
Tributary 6
Impacts (22 lf)
Tributary 7
Impacts (218 lf)
Continued on 3.8-5C
176
26
60
Western Lane
Broad River Road
North Wingard Road
Columbiana Drive
Shady Lane
Evergreen Drive
Gaillard Street
Lake Murray Boulevard
Kinley Road
Columbia Avenue
See Figure 3.7-5C
Figure 3.7-5B
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5B
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 2 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


See Figure 3.7-5B
Crossbow Drive
Tributary 7
Impacts (41 lf)
Continued from 3.8-5B
Palmetto Health Parkway
Tributary 8
Impacts (287 lf)
26
Parkridge Drive
Columbiana Circle
Tributary 9
Impacts (153 lf)
Columbiana Drive
Harbison Boulevard
Woodcross Drive
Saturn Parkway
Park Terrace Drive
Fernandina Road
26
See Figure 3.7-5D
Figure 3.7-5C
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5C
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 3 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


See Figure 3.7-5C
Tributary 11 Impacts (365 lf)
Tributary 12 Impacts (11 lf)
Harbison Way
Saturn Parkway
Tributary 13 Impacts (9 lf)
26
Tributary 14 Impacts (56 lf)
Wetland 5 Impacts (0.09 acre)
Bower Parkway
Fernandina Road
Shadowbrook Drive
Piney Grove Road
Tributary 15 Impacts (27 lf)
Forest Grove Lane
Fernandina Road
Piney Woods Road
Wetland 6 Impacts (0.05 acre)
Paris Road
26
Steward Drive
Rhett Road
Tributary 16 Impacts (64 lf)
See Figure 3.7-5E
Figure 3.7-5D
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5D
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 4 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


See Figure 3.7-5D
Wetland 7
Impacts (0.04 acre)
Tributary 17
Impacts (25 lf)
Wetland 47
Impacts (0.03 acre)
Wetland 8
Impacts (0.10 acre)
Tributary 19
Impacts (110 lf)
Tributary 20
Impacts (51 lf)
Tributary 18
Impacts (361 lf)
Westpark Boulevard
Lydgate Drive
Winstaire Drive
Laurelhurst Ave
Tram Road
Sidney Road
Moonlight Drive
Normandy Drive
Mistwoode Road
Beatty Road
Doris Drive
Fernandina Road
Jamil Road
Evelyn Drive
Juneau Road
26
See Figure 3.7-5F
Figure 3.7-5E
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5E
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 5 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


See Figure 3.7-5E
See Figure 3.7-5G
See Figure 3.7-5J
See Figure 3.7-5M
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
Tributary 21, aka Stoop Creek Impacts (637 lf)
Tributary 22 Impacts (107 lf)
Tributary 33 Impacts (101 lf)
Tributary 34 Impacts (382 lf)
Wetland 14 Impacts (0.09 acre)
Wetland 13 Impacts (0.07 acre)
Tributary 37 Impacts (220 lf)
Tributary 32 Impacts (70 lf)
Wetland 14 Impacts (0.02 acre)
Tributary 35 Impacts (194 lf)
26
20
Figure 3.7-5F
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5F
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 6 of 16
CAROLINA CROSSROADS
SCDOT
U.S. Department of Transportation
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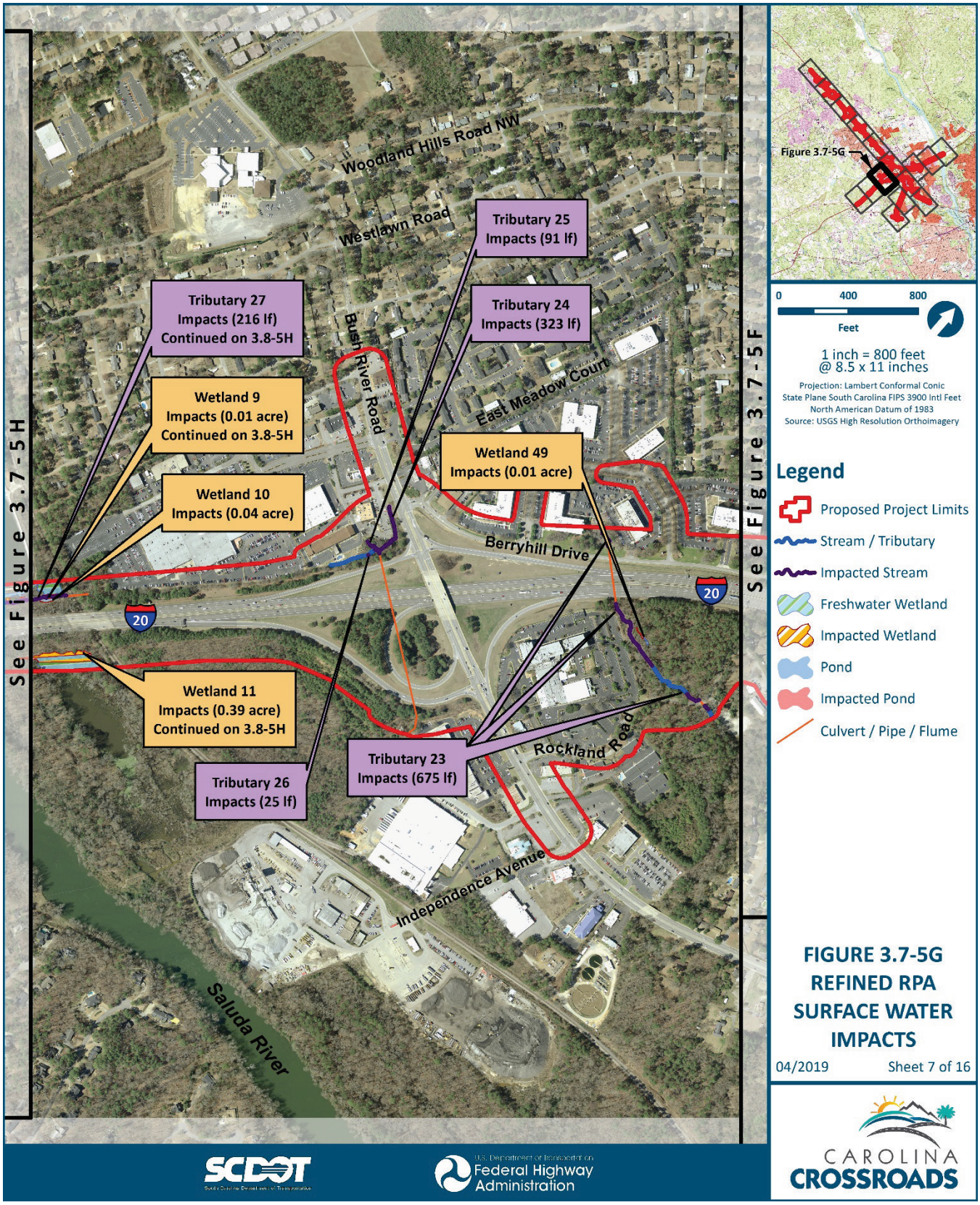
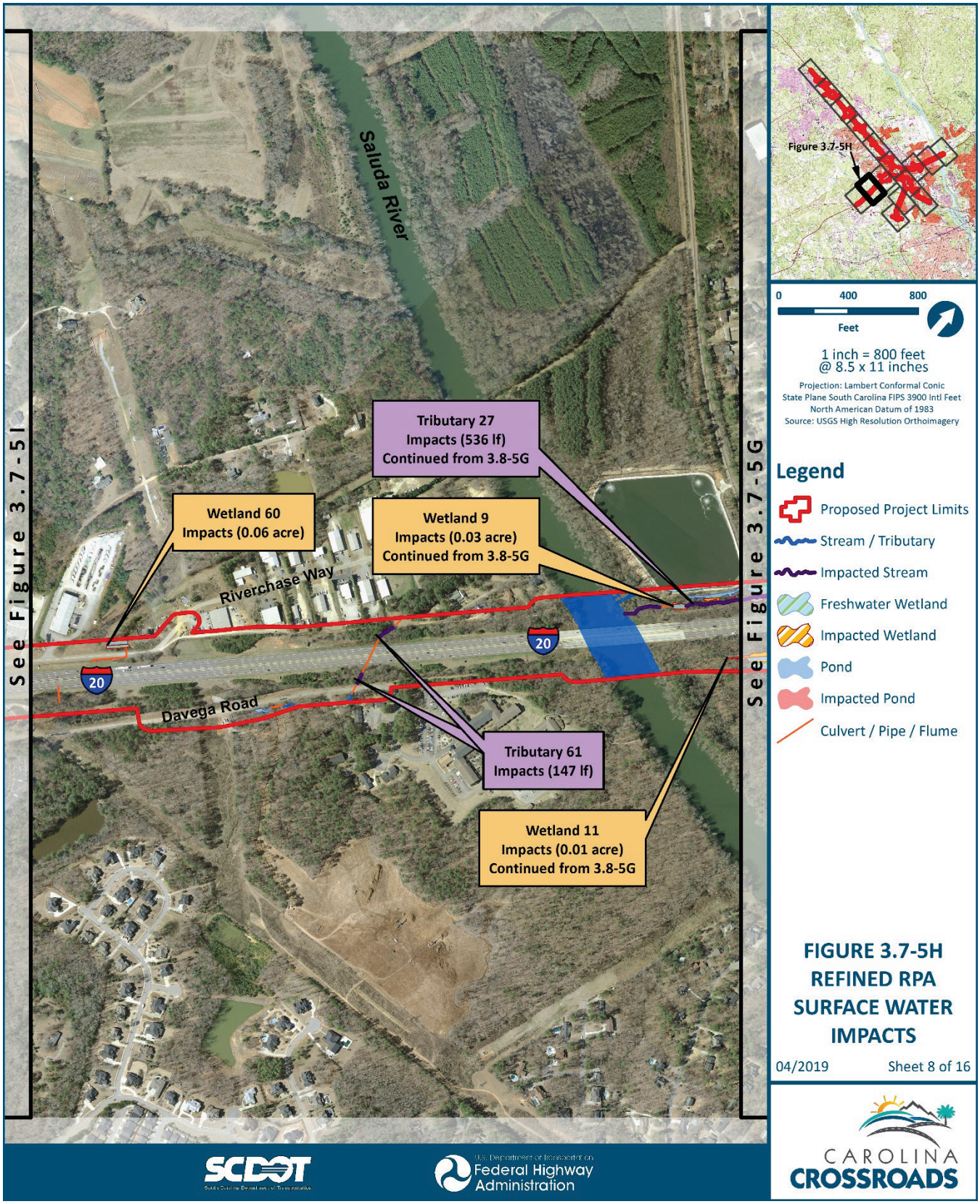
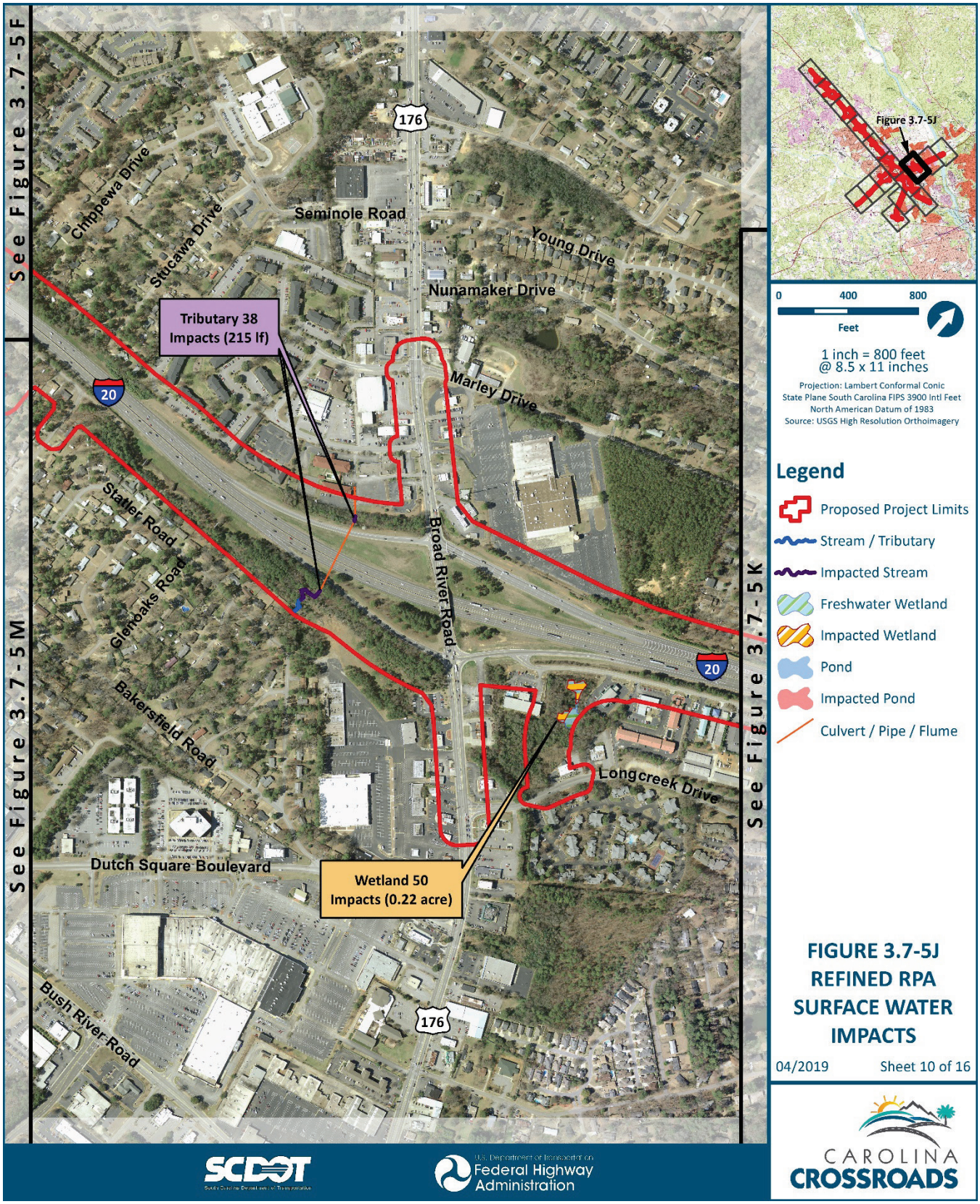
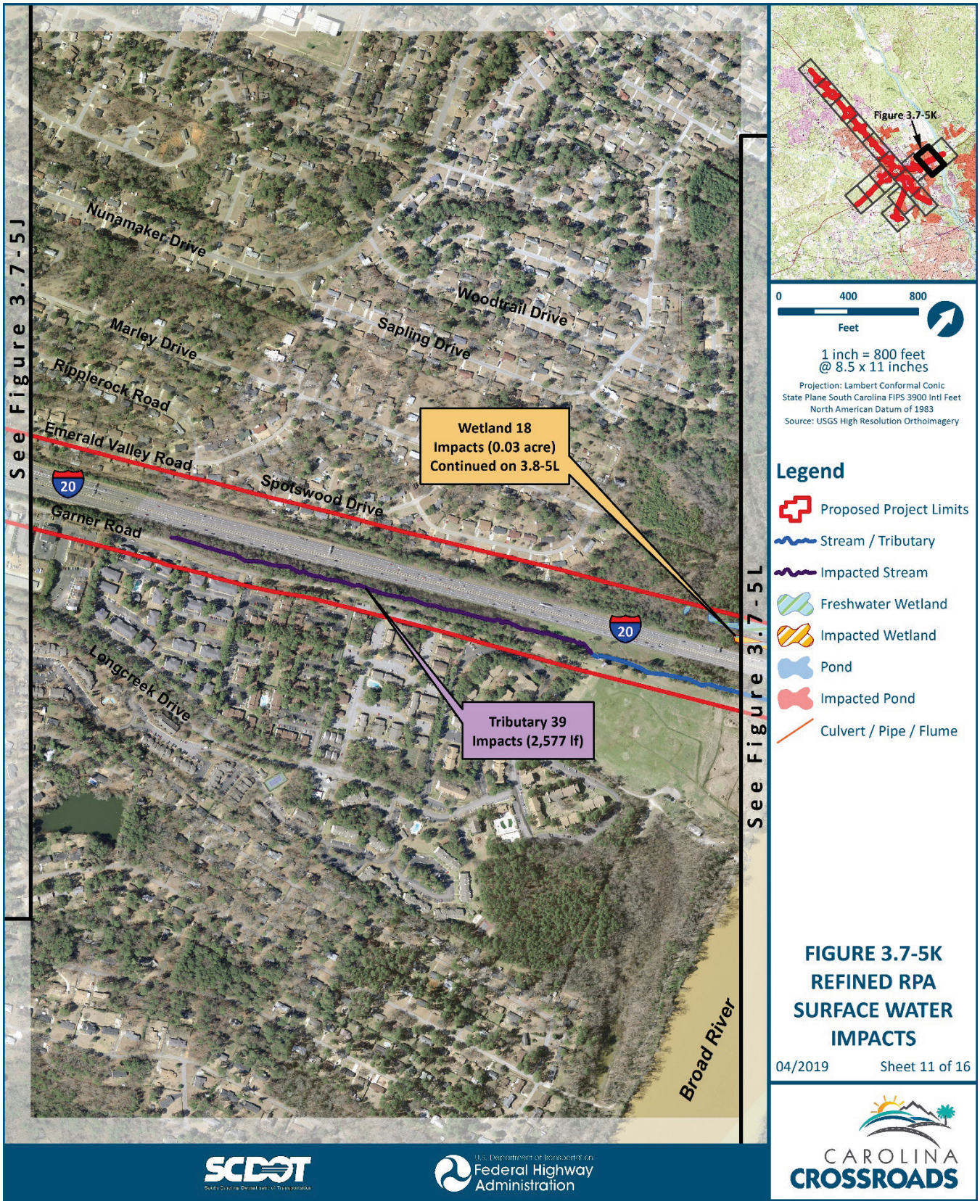
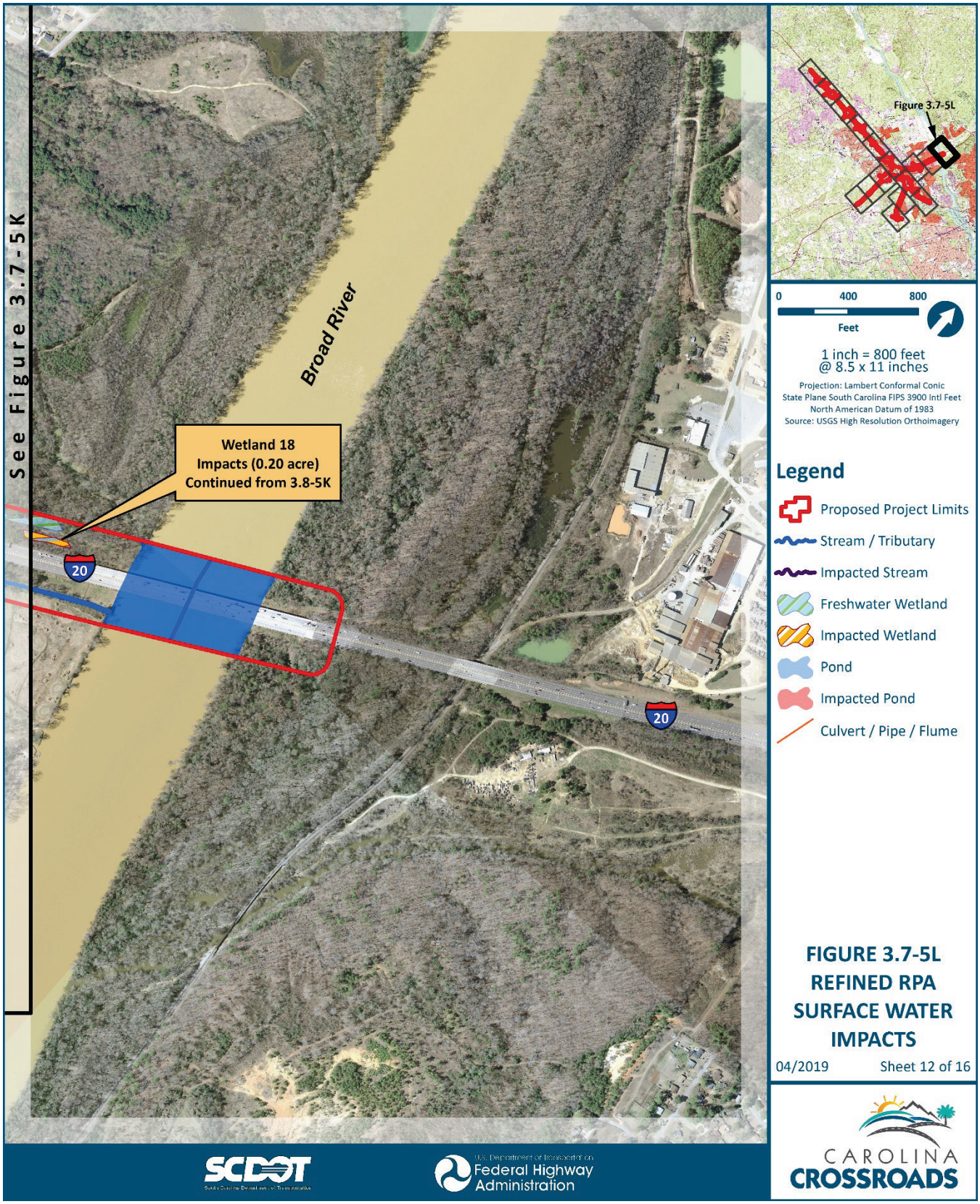

Woodland Hills Road NW
Westlawn Road
Bush River Road
East Meadow Court
Berryhill Drive
Rockland Road
Independence Avenue
Saluda River
20
Tributary 25
Impacts (91 lf)
Tributary 24
Impacts (323 lf)
Tributary 27
Impacts (216 lf)
Continued on 3.8-5H
Wetland 9
Impacts (0.01 acre)
Continued on 3.8-5H
Wetland 10
Impacts (0.04 acre)
Wetland 49
Impacts (0.01 acre)
Wetland 11
Impacts (0.39 acre)
Continued on 3.8-5H
Tributary 23
Impacts (675 lf)
Tributary 26
Impacts (25 lf)
See Figure 3.7-5H
See Figure 3.7-5F
Figure 3.7-5G
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5G
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 7 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS

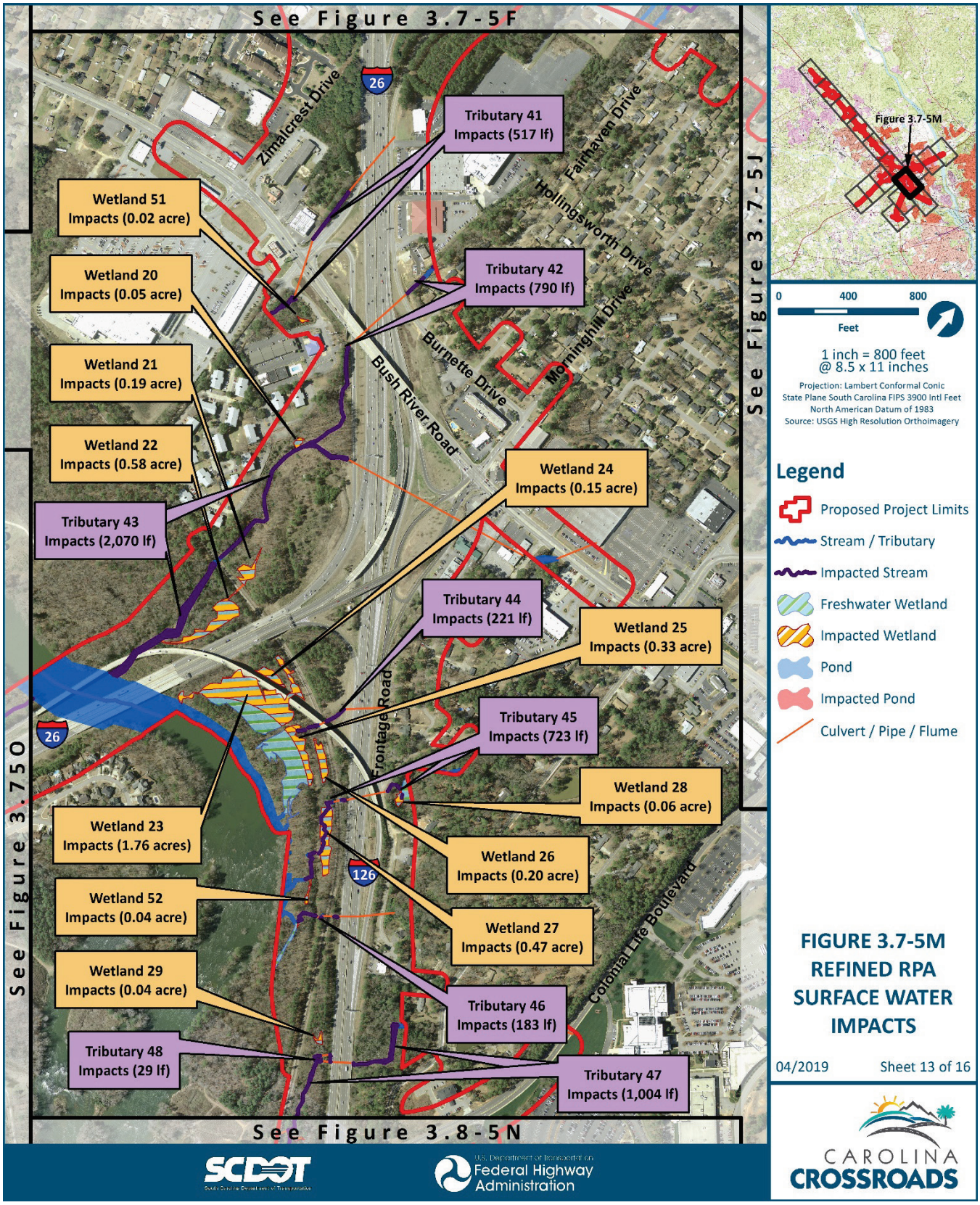

Saluda River
Tributary 27
Impacts (536 lf)
Continued from 3.8-5G
Wetland 60
Impacts (0.06 acre)
Wetland 9
Impacts (0.03 acre)
Continued from 3.8-5G
Riverchase Way
Davega Road
Tributary 61
Impacts (147 lf)
Wetland 11
Impacts (0.01 acre)
Continued from 3.8-5G
See Figure 3.7-5I
See Figure 3.7-5G
20
20
Figure 3.7-5H
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5H
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 8 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


Tributary 71
Impacts (23 lf)
Royal Oaks Lane
Riverchase Way
Davega Road
20
20
See Figure 3.7-5H
Figure 3.7-5I
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5I
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 9 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS

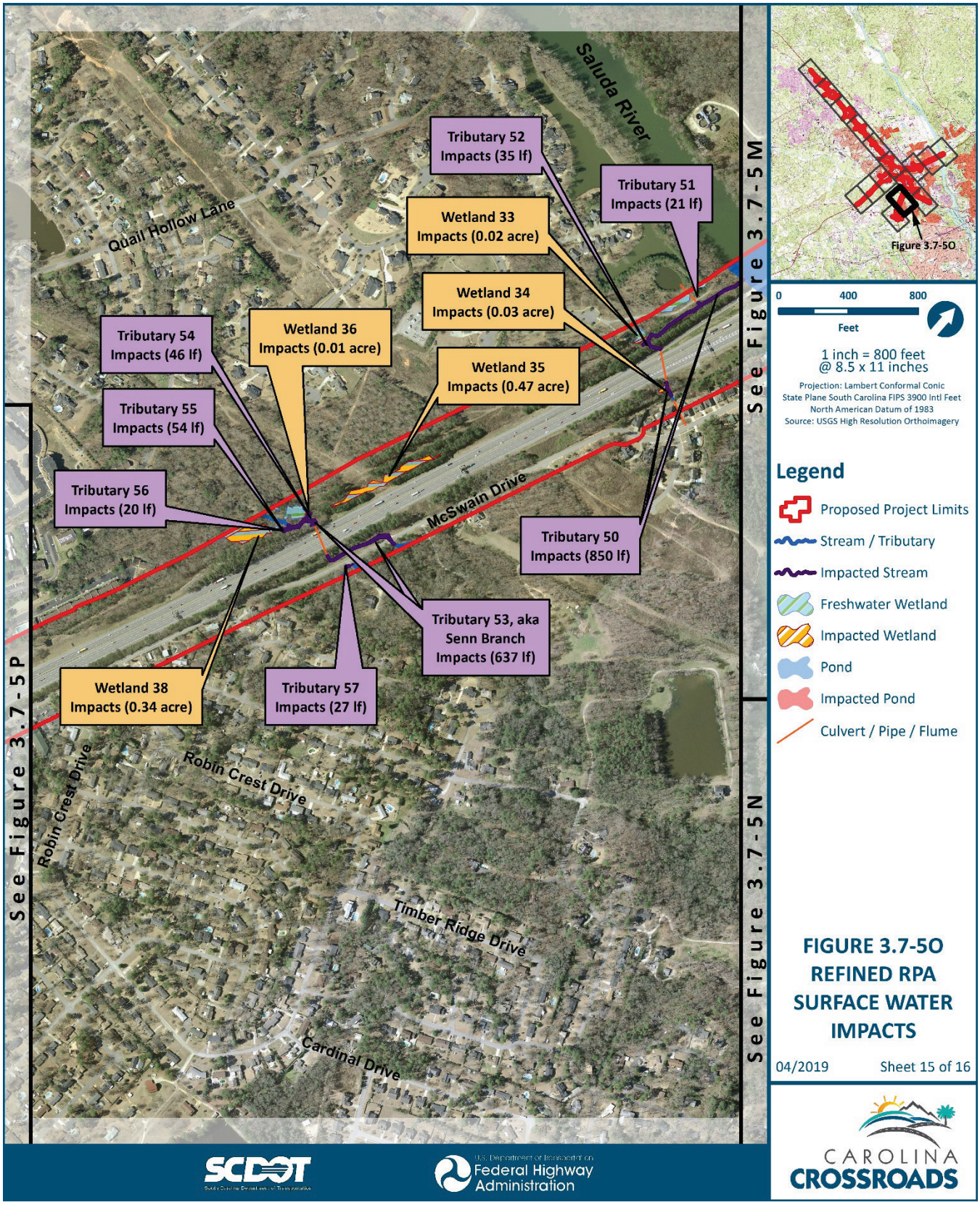

See Figure 3.7-5F
See Figure 3.7-5M
See Figure 3.7-5K
176
Chippewa Drive
Stucawa Drive
Seminole Road
Young Drive
Nunamaker Drive
Tributary 38
Impacts (215 lf)
20
Marley Drive
Statler Road
Glenoaks Road
Broad River Road
Bakersfield Road
Longcreek Drive
Dutch Square Boulevard
Wetland 50
Impacts (0.22 acre)
Bush River Road
Figure 3.7-5J
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5J
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 10 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS

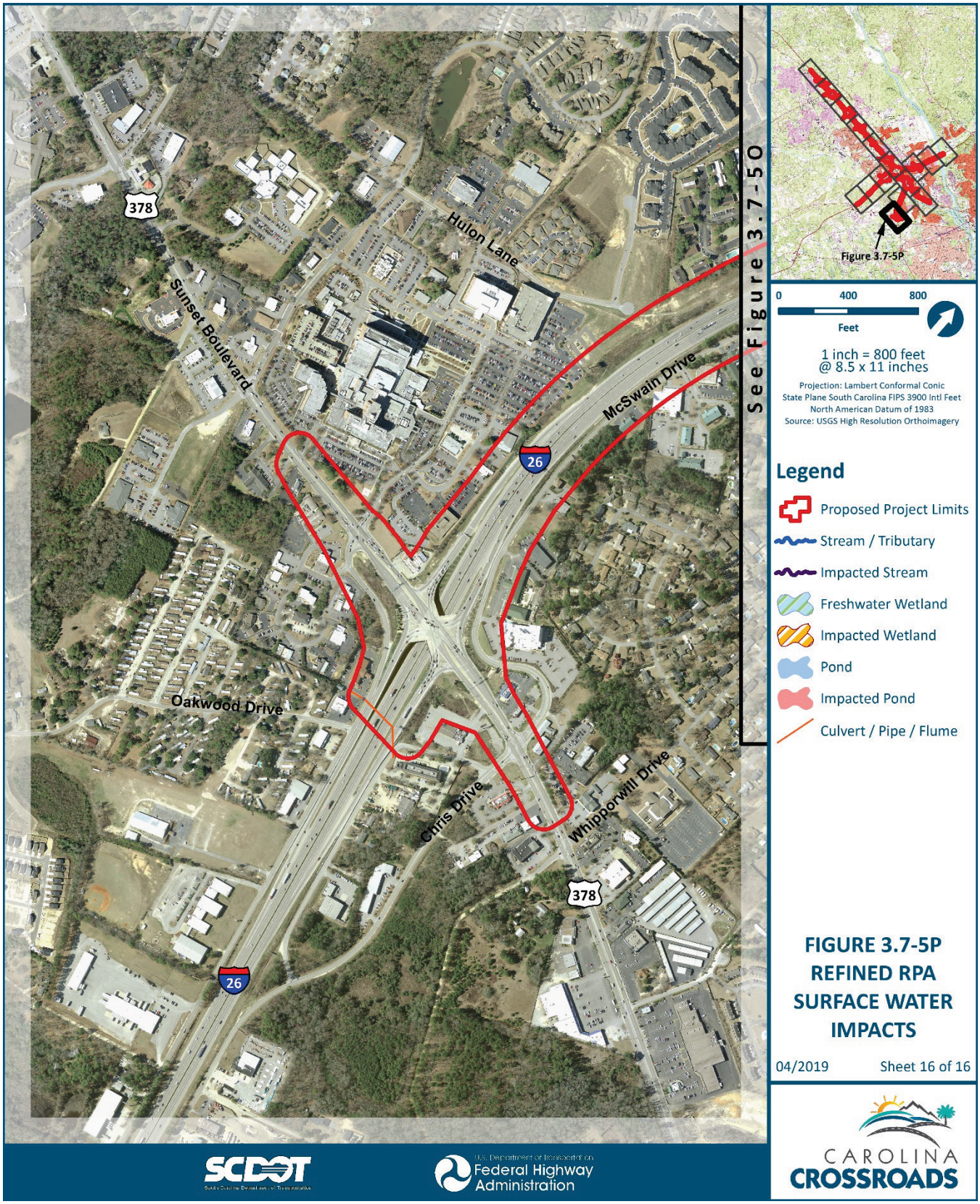

See Figure 3.7-5J
See Figure 3.7-5L
Nunamaker Drive
Woodtrail Drive
Marley Drive
Sapling Drive
Ripplerock Road
Emerald Valley Road
Spotswood Drive
Garner Road
Longcreek Drive
20
20
Wetland 18
Impacts (0.03 acre)
Continued on 3.8-5L
Tributary 39
Impacts (2,577 lf)
Broad River
Figure 3.7-5K
0
400
800
Feet
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5K
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 11 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


See Figure 3.7-5K
Broad River
Wetland 18
Impacts (0.20 acre)
Continued from 3.8-5K
20
20
Figure 3.7-5L
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5L
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 12 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


See Figure 3.7-5F
See Figure 3.7-5J
See Figure 3.750
See Figure 3.8-5N
Tributary 41 Impacts (517 lf)
Wetland 51 Impacts (0.02 acre)
Wetland 20 Impacts (0.05 acre)
Tributary 42 Impacts (790 lf)
Wetland 21 Impacts (0.19 acre)
Wetland 22 Impacts (0.58 acre)
Wetland 24 Impacts (0.15 acre)
Tributary 43 Impacts (2,070 lf)
Tributary 44 Impacts (221 lf)
Wetland 25 Impacts (0.33 acre)
Tributary 45 Impacts (723 lf)
Wetland 28 Impacts (0.06 acre)
Wetland 23 Impacts (1.76 acres)
Wetland 26 Impacts (0.20 acre)
Wetland 52 Impacts (0.04 acre)
Wetland 27 Impacts (0.47 acre)
Wetland 29 Impacts (0.04 acre)
Tributary 46 Impacts (183 lf)
Tributary 48 Impacts (29 lf)
Tributary 47 Impacts (1,004 lf)
Zimalcrest Drive
Fairhaven Drive
Hollingsworth Drive
Morninghill Drive
Burnette Drive
Bush River Road
Frontage Road
Colonial Life Boulevard
26
126
Figure 3.7-5M
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5M
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 13 of 16
CAROLINA CROSSROADS
SCDOT
U.S. Department of Transportation
Federal Highway Administration


See Figure 3.7-5M
See Figure 3.7-5O
Wetland 54
Impacts (0.02 acre)
Tributary 49
Impacts (298 lf)
Wetland 31
Impacts (0.11 acre)
Wetland 30
Impacts (0.31 acre)
Tributary 66
Impacts (35 lf)
Tributary 65
Impacts (14 lf)
Arrowwood Road
Janice Drive
Gracern Road
Stoneridge Drive
Saluda River
126
126
Figure 3.7-5N
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5N
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 14 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


Saluda River
Quail Hollow Lane
McSwain Drive
Robin Crest Drive
Robin Crest Drive
Timber Ridge Drive
Cardinal Drive
Tributary 52 Impacts (35 lf)
Tributary 51 Impacts (21 lf)
Wetland 33 Impacts (0.02 acre)
Wetland 34 Impacts (0.03 acre)
Wetland 36 Impacts (0.01 acre)
Wetland 35 Impacts (0.47 acre)
Tributary 54 Impacts (46 lf)
Tributary 55 Impacts (54 lf)
Tributary 56 Impacts (20 lf)
Tributary 50 Impacts (850 lf)
Tributary 53, aka Senn Branch Impacts (637 lf)
Wetland 38 Impacts (0.34 acre)
Tributary 57 Impacts (27 lf)
See Figure 3.7-5M
See Figure 3.7-5N
See Figure 3.7-5P
Figure 3.7-5O
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5O
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 15 of 16
SCDOT
U.S. Department of Transportation
Federal Highway Administration
CAROLINA CROSSROADS


See Figure 3.7-5O
Figure 3.7-5P
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
Legend
Proposed Project Limits
Stream / Tributary
Impacted Stream
Freshwater Wetland
Impacted Wetland
Pond
Impacted Pond
Culvert / Pipe / Flume
FIGURE 3.7-5P
REFINED RPA
SURFACE WATER
IMPACTS
04/2019
Sheet 16 of 16
CAROLINA CROSSROADS
SCDOT
U.S. Department of Transportation
Federal Highway Administration
378
Hulon Lane
Sunset Boulevard
McSwain Drive
26
Oakwood Drive
Chris Drive
Whippoorwill Drive
378
26

3.7.7.2.3 Impacts to High Hazard Dams

Currently no impacts to the High Hazard Dam associated with Pond 4 are anticipated for the RPA or for the Refined RPA. In fact, one of the design refinements of the Refined RPA minimizes the potential to impact the dam. If changes during the final design phase of the project necessitate impacts to this dam, any impacts would require coordination with SCDHEC and would likely require a Dam Modification Permit. Appropriate hydrologic and hydraulic modeling would be required as part of the permitting process.

3.7.7.2.4 Impacts to Drinking Water

The RPA and the Refined RPA are both unlikely to have a direct impact on drinking water within the Project Study Area. Much of the drinking water within the Project Study Area is sourced from Lake Murray which would not be impacted by either alternative. The remainder of the drinking water within the Project Study Area is sourced from the Saluda River and Broad River (Columbia Canal). Because both alternatives cross the Saluda River upstream of the City of West Columbia's water intake there is some potential for drinking water to be affected by construction activities associated with the proposed project. The use of BMPs during construction would decrease the possibility of pollutants and sediments impacting drinking water. Neither alternative crosses the Broad River; therefore, it is unlikely that drinking water sourced from the Broad River would be impacted by the project.

3.7.7.2.5 Impacts to Designated State Scenic Rivers

The proposed crossings of the Saluda River would be located in the same locations as existing bridges for both the RPA and the Refined RPA; therefore, neither alternative would be in conflict with the goals of State designation as a Scenic River.

3.7.8 HOW WOULD IMPACTS TO WATER RESOURCES BE MITIGATED?

Mitigation is defined by Council on Environmental Quality (CEQ) regulations (40 CFR Part 1508.20) as avoiding impacts, minimizing impacts, rectifying impacts, reducing or eliminating impacts over time, and compensating for impacts by replacing or substituting resources or environments. The general approach to mitigation for impacts to water resources has been to first avoid impacts wherever possible through the development and selection of reasonable alternatives. Secondly, impacts would be minimized through the project design process and implementation of best management practices during the construction phase of the project. Finally, unavoidable impacts to water resources would be compensated through a process known as compensatory mitigation. This approach satisfies the requirements of U.S. Executive Order 11990, *Protection of Wetlands,* 1977 (EO 11990).

3.7.8.1 Avoidance

Avoidance of impacts to water resources was considered during the development of the alternatives. As discussed in Chapter 2, complete avoidance of impacts to water resources, including wetlands, was not possible due to the high density of natural and community resources within the Project Study Area. As required by EO 11990, efforts were made to develop alternatives that avoid impacting water resources, particularly Waters of the U.S., to the greatest extent practicable.

The RPA was chosen, in part, because it would result in the least amount of impacts to jurisdictional streams and wetlands compared to other reasonable alternatives. The refinements to it resulting in the Refined RPA did not add substantial additional impacts.

3.7.8.2 Minimization

Minimization efforts would include the identification and consideration of measures to reduce adverse impacts to surface waters. As shown in Chapter 2, wetland and stream impacts were considered during the Level 2 Screening analysis that minimized impacts through the selection of Reasonable Alternatives with the least amount of proposed impacts to water resources. The RPA was chosen in the DEIS because it minimizes potential stream and wetland impacts. Minimization of impacts to Waters of the U.S. would continue during the final design phase of the project. Further minimization of impacts would be achieved primarily though design efforts to reduce the footprint of the proposed project to the greatest extent practicable. This may be achieved through reductions in right-of-way widths, fill slopes, culvert lengths, and the use of bridges in lieu of culverts where appropriate. Additional documentation of minimization efforts would be required as part of the Section 404/401 permitting process for the project. Potential impacts to water resources would also be minimized through the implementation of best management practices during the construction phase of the project.

3.7.8.3 Compensatory Mitigation

Compensatory mitigation means the restoration, establishment, enhancement, and/or in certain circumstances preservation of wetlands, streams and other aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved (33 CFR 332.2). Under the USEPA and the USACE jointly promulgated 2010 Final Compensatory Mitigation Rule regulations, there are three mechanisms for providing compensatory mitigation (listed in order of preference as established by the regulations): private mitigation banks, in-lieu fee programs, and permittee-responsible mitigation (PRM).

South Carolina does not currently operate in-lieu fee programs; therefore, the mitigation strategy for this project focused on mitigation banks and PRM. The SCDOT estimated stream and wetland impacts associated with the RPA and the Refined RPA in order to prepare a mitigation strategy for the project. All streams and wetlands within the preliminary construction limits of the alternatives, plus a designated buffer width of 10 feet, were calculated as potential impacts. This estimate did not include streams and wetlands in bridged areas as impacts; however, inlet and outlet armoring was estimated and included in the final mitigation calculation. This estimate also assumed that impacts to Tributary 39, which is a 3,959 linear foot long tributary that parallels I-20, would be avoided and/or minimized. This assumption was made because Tributary 39 is located near the project termini on I-20, and construction limits would likely be adjusted to avoid full impact of this feature. Using these assumptions, SCDOT estimates that the proposed project would need approximately 58,750 to 68,287 stream credits and 21 to 26 wetland credits to offset project impacts for the project impacts. Mitigation credit estimates are based on the Charleston District USACE 2010 Compensatory Mitigation Guidelines.

Credit availability at mitigation banks has been tracked using the Regulatory In-Lieu Fee and Bank Information Tracking System (RIBITS) and by contacting existing private mitigation banks on a monthly basis. Public Notices from the USACE, Charleston District have also been monitored to identify proposed mitigation banks that may serve the project.

Compensatory Mitigation Definitions (33 CFR §332.2)

Mitigation Bank: a site, or group of sites, where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced, and/or preserved for the purpose of providing compensatory mitigation for impacts authorized by Department of the Army permits. A mitigation bank sells compensatory mitigation credits to a permit applicant.

In-lieu Fee Program: a program involving the restoration, establishment, enhancement, and/or reservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements.

Permittee-Responsible Mitigation (PRM): an aquatic resource restoration, establishment, enhancement, and/or preservation activity undertaken by the permit applicant to provide compensatory mitigation for which the applicant retains full responsibility.

No existing mitigation banks have readily available credits to fulfill the estimated stream mitigation need of the proposed project. Therefore, it is anticipated that compensatory mitigation for permanent impacts associated with this project would be obtained through PRM.

PRM plans that are developed using a watershed approach are environmentally preferable (33 CFR 332.3). The required compensatory mitigation should be located within the same watershed as the impact site, and should be located where it is most likely to successfully replace lost functions and services, taking into account such watershed scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources, trends in land use, ecological benefits, and compatibility with adjacent land uses (33 CFR 332.3). In accordance with the USACE Charleston District mitigation guidance, SCDOT is considering these factors and using readily available information to identify potential mitigation opportunities within the same 8-digit Hydrologic Unit Code (HUC) as the proposed project. Since most of the stream impacts for the Carolina Crossroads project are located in the Saluda River watershed (8-digit HUC 03050109), SCDOT has focused the PRM site selection search on the Saluda River watershed and the Piedmont ecoregion. SCDOT is developing PRM plans for sites in the Saluda River watershed and Piedmont ecoregion that would meet the stream mitigation needs for the Carolina Crossroads project. Specific mitigation requirements would be established during the Section 404/401 permitting process, during which another public notice would be issued for the project and additional comments on the proposed mitigation plan could be addressed.

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