SCDOT

U.S. Department of Transportation
Federal Highway Administration

U.S. 17 (Speedway Boulevard) Improvements and New Bridge Over Back River, Hutchinson Island in Chatham County, Georgia, to S.C. 315 in Jasper County, South Carolina

Environmental Assessment

Federal Aid Project No. 0039168
PIN: 0039168

Michael Baker
INTERNATIONAL

Project ID: 0039168

Federal Aid Project Number: 0039168

Proposed U.S. 17 (Speedway Boulevard) Improvements and New Bridge Over Back River, Hutchinson Island in Chatham County, Georgia, to S.C. 315 in Jasper County, South Carolina

ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to 42 U.S.C. §4332(2)(c)
by the
U.S. Department of Transportation, Federal Highway Administration
and
South Carolina Department of Transportation, Environmental Management Office

Project Description: SCDOT proposes widening and improvements of U.S. 17 (Speedway Boulevard) from Hutchinson Island in Savannah, Chatham County, Georgia to South Carolina (S.C.) 315 (South Okatie Highway) located southwest of Bluffton, South Carolina. Approximately 3,000 feet of the project corridor is located in Chatham County, Georgia and approximately 3.6 miles is located in Jasper County, South Carolina for a total project length of approximately 4.2 miles. The proposed improvements include the widening of U.S. 17 from two to four travel lanes, divided by a grassed median. In addition, a new two-lane bridge structure would be constructed over the Back River to accommodate the additional travel lanes. As part of the proposed project, SCDOT would construct a new two-lane bridge parallel to the existing bridge in order to tie into the four-lane section of the Talmadge Memorial Bridge over the Savannah River. The proposed bridge over the Back River will consist of a 58.5-foot bridge cross section that features two 12-foot lanes, two 10-foot shoulders, a 10-foot multi-use path, and three 1.5-foot parapets. Upon completion of the proposed project, the existing two-lane bridge would accommodate southbound traffic and the new two-lane bridge would accommodate northbound traffic.

2/6/17 — Date of Approval

Mr. Chad C. Long, NEPA Division Manager
South Carolina Department of Transportation

2/6/2017 — Date of Approval

Mr. J. Shane Belcher, Environmental Coordinator
Federal Highway Administration, South Carolina Division

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Date: 01/30/17	SCDOT NEPA ENVIRONMENTAL COMMITMENTS FORM	

Project ID : 0039168 | County : Jasper | District : 6 | Doc Type: EA | Total # of Commitments: 15

Project Name: U.S. 17 (Speedway Boulevard) Widening and New Bridge Over Back River Draft Environmental Assessment

The Environmental Commitment **Contractor Responsible** measures listed below **are to be included in the contract and must be implemented**. It is the responsibility of the Program Manager to make sure the Environmental Commitment **SCDOT Responsible** measures are adhered to. If there are questions regarding the commitments listed please contact:

CONTACT NAME: Chad Long **PHONE #:** 803-737-1396

ENVIRONMENTAL COMMITMENTS FOR THE PROJECT

Air Quality Responsibility: Contractor

Construction equipment will be maintained in a satisfactory condition to meet minimum exhaust emission standards. The contractor will comply with South Carolina Air Pollution Control Laws, Regulations and Standards, as well as with county and local air pollution regulations. To reduce dust, the contractor will comply with all regulations and standards for construction outlined in the South Carolina Standard Specifications for Highway Construction. Typical Best Management Practices such as vegetative cover, mulch, spray-on adhesive, calcium chloride application, water sprinkling, stone, tillage, wind barriers, and temporary graveled entrances/exits to residences and businesses may be implemented. (Refer to EA Section 3.8.3, page 3-31)

Individual Permit Responsibility: SCDOT

Impacts to jurisdictional waters will be permitted under a Department of the Army Section 404 permit from the U.S. Army Corps of Engineers. Based on preliminary design, it is anticipated that the proposed project would be permitted under an Individual Army Corps of Engineers Permit (IP). SCDOT will provide the Army Corps with information regarding any proposed demolition activities during the Section 404 permitting process. The required mitigation for this project will be determined through consultation with the USACE and other resource agencies. (Refer to EA Section 3.13.3, page 3-60)

Temporary Wetland Impacts Responsibility: Contractor

Reclamation of wetland areas temporarily lost through construction activities would involve returning temporarily disturbed areas to their original elevations to the maximum extent possible. (Refer to EA Section 3.13.4, page 3-61)

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ENVIRONMENTAL COMMITMENTS FOR THE PROJECT

Noise	Responsibility:	SCDOT

SCDOT will inform local planning officials of future, generalized noise levels expected to occur in the project vicinity after FHWA has made a final decision on the Environmental document. (Refer to EA Section 3.7.5, page 3-22)

Water Quality	Responsibility:	SCDOT

The contractor will be required to minimize possible water quality impacts through implementation of construction BMPs, reflecting policies contained in 23 CFR 650B and the Department's Supplemental Specifications on Seeding and Erosion Control Measures (Latest Edition). Other measures including seeding, silt fences, sediment basins, etc. as appropriate will be implemented during construction to minimize impacts to Water Quality. (Refer to EA Section 3.10.4, page 3-41)

USTs/Hazardous Materials	Responsibility:	SCDOT

If avoidance of hazardous materials is not a viable alternative and soils that appear to be contaminated are encountered during construction, the South Carolina Department of Health and Environmental Control (SCDHEC) will be informed. Hazardous materials will be tested and removed and/or treated in accordance with the United States Environmental Protection Agency and the SCDHEC requirements, if necessary. (Refer to EA Section 3.9.2, page 3-35)

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Spill Prevention	Responsibility:	Contractor

A spill prevention control countermeasure will be in place to control any accidental releases of fuel or hydraulic fluids from machinery. (Refer to EA Section 3.9.2, page 3-35)

Cultural Resources	Responsibility:	Contractor

The contractor and subcontractors must notify their workers to watch for the presence of any prehistoric or historic remains, including but not limited to arrowheads, pottery, ceramics,flakes, bones, graves, gravestones, or brick concentrations during the construction phase of the project, if any such remains are encountered, the Resident Construction Engineer (RCE) will be immediately notified and all work in the vicinity of the discovered materials and site work shall cease until the SCDOT Archaeologist directs otherwise. (Refer to EA Section 3.3.2, page 3-8)

Essential Fish Habitat	Responsibility:	SCDOT

The selected contractor will be required to minimize impacts of siltation and erosion through implementation of Best Management Practices (BMPs). From October 1 - April 15, the use of a noise reduction technique for impact driving will be required during all in-water work in the Back River. No noise reduction technique will be required for drilled shafts. In the event that SCDOT decides to use bubble curtains for noise reduction, a contained bubble curtain technique will be used to keep the bubbles from being swept out of place by tidal or river currents. Equipment usage and materials for the bridge may not impede 50 percent of the river channel to allow safe passage for the shortnose and Atlantic sturgeon during bridge construction. Finally, the existing undersized culvert at the northern end of the project area will be replaced with a larger twin box culvert. (Refer to EA Section 3.14.2.2, page 3-67)

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Essential Fish Habitat	Responsibility:	SCDOT

SCDOT will account for additional shading impacts that the bridge may cause from being in close proximity to the existing bridge during final design. SCDOT will use these updated calculations when determining the wetland credits needed for mitigation. (Refer to EA Section 3.14.4.1, page 3-82)

Section 7 Consultation - West Indian Manatee	Responsibility:	Contractor

Bridge construction access would be located in upland areas to the maximum extent practicable. No contaminants will be released into the water. Equipment usage and materials for the bridge may not impede 50 percent of the river channel to allow safe passage for the manatee during bridge construction. All contractors involved in the construction will be required to comply with USFWS's Standard Manatee Conditions for In-water Work. (Refer to EA Section 3.14.2.12, page 3-75)

Section 7 Consultation - Red Knot and Kirtland's Warbler	Responsibility:	SCDOT

SCDOT will limit proposed impacts to the existing rights-of-way in order to minimize damage to habitat associated with the red knot and Kirtland's warbler. (Refer to EA Section 3.14.2.2, page 3-64)

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Invasive Species	Responsibility:	Contractor

To meet the intent of EO 13112, the Department will ensure no invasive species shown by the USDA-SC Noxious Weeds list are planted as part of the revegetation and stabilization of the project site. The Contractor will follow the SCDOT Supplemental Technical Specification SC-M-810-3, as amended, in regards to all other aspects of seeding operations. (Refer to EA Section 3.12.4, page 3-49)

Erosion Control	Responsibility:	Contractor

The contractor will be required to install a double row of silt fence (or equivalent BMP) at wetland crossings per SCDHEC requirements. The contractor will also be required to install orange barrier fencing at the outer edge of the permitted wetland impact areas as an indication of the limits of disturbance. (Refer to EA Section 3.13.4, page 3-61)

Section 7 Consultation - Shortnose and Atlantic Sturgeon	Responsibility:	Contractor

The selected contractor will be required to minimize impacts of siltation and erosion through implementation of Best Management Practices (BMPs). From October 1 - April 15, the use of a noise reduction technique for impact driving will be required during in-water work. No noise reduction technique will be required for dilled shafts. In the event that SCDOT decides to use bubble curtains for noise reduction, a contained bubble curtain technique will be used to keep the bubbles from being swept out of place by tidal or river currents. During this period, construction-related equipment or materials will not block more than 50 percent of the river channel. Section 7 consultation with NOAA-NMFS Protected Species Division will be completed prior to a final decision on the project. (Refer to EA Section 3.14.2.2, pages 3-67 - 3-68)

LIST OF ACRONYMS

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ACR	Actual Crash Rate
APE	Area of Potential Effect
APPR	Advanced Project Planning Report
BA	Biological Assessment
BFE	Base Flood Elevation
BG	Block Group
BMPs	Best Management Practices
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESQG	Conditionally Exempt Small Quantity Generators
CFR	United States Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality
CO	Carbon Monoxide
CT	Census Tract
CWA	Clean Water Act

LIST OF ACRONYMS

dB	Decibel
EA	Environmental Assessment
ECHO	Enhanced Compliance History Online
EFH	Essential Fish Habitat
E&S Act	Georgia Erosion and Sedimentation Control Act of 1975
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FPPA	Farmland Protection Policy Act of 1981
FW	Freshwaters
GAPA	Georgia Ports Authority
GDOT	Georgia Department of Transportation
GDNR	Georgia Department of Natural Resources
GHG	Greenhouse gas
HCM	Highway Capacity Manual
HDM	Highway Design Manual
HEI	Health Effects Institute
HUC	Hydrologic Unit Code
ICE	Infrastructure Carbon Estimator
ICI	Indirect and Cumulative Impacts

LIST OF ACRONYMS

IP	Individual Permit
IRIS	Integrated Risk Information System
LATS	Lowcountry Area Transporation Study
LCOG	Lowcountry Council of Governments
L_{eq} (h)	Hourly A-weighted average noise level
LOS	Level of Service
LWCF	Land and Water Conservation Fund Act
MOA	Memorandum of Agreement
MSAT	Mobile Source Air Toxic
MVM	100 Million Vehicle Miles
µm	Micrometers
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NATA	National Air Toxics Assessment
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHS	National Highway System
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration

LIST OF ACRONYMS

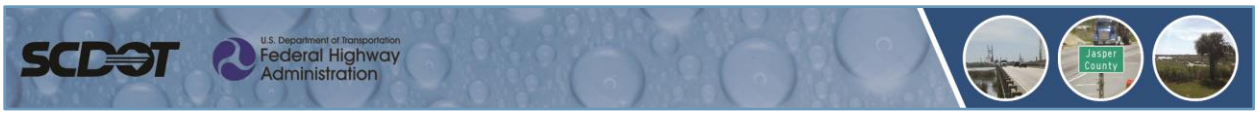
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRPW	Non-relatively Permanent Flow of Water
NWP	Nationwide Permit
O_3	Ozone
OHWM	Ordinary High Water Mark
Pb	Lead
PM	Particulate Matter
RCRA	Resource Conservation and Recovery Act of 1976
RIBITS	Regulatory In-Lieu Fee and Bank Information Tracking System
ROW	Right-of-Way
RPW	Relatively Permanent Water
SARA	Superfund Amendments and Reauthorization Act
SCAD	Savannah College of Art and Design
SCDHEC	South Carolina Department of Health and Environmental Control
SCDHEC-OCRM	South Carolina Department of Health and Environmental Control – Office of Ocean Coastal Resource Management
SCDNR	South Carolina Department of Natural Resources
SCDOT	South Carolina Department of Transportation
SCIAA	South Carolina Institute of Archaeology and Anthropology

LIST OF ACRONYMS

SCPA	South Carolina Ports Authority
SHPO	State Historic Preservation Office
SO_2	Sulfur Dioxide
SPCC	Spill Prevention, Control and Countermeasures
STIP	State Transportation Improvement Program
SWR	Savannah Wildlife Refuge
TIP	Transportation Improvement Program
TMDL	Total Maximum Daily Load
TNM	Traffic Noise Model
TNW	Traditional Navigable Water
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V/C	Ratio of Vehicles to Capacity
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VPD	Vehicles per Day

LIST OF ACRONYMS

WWQA	Watershed Water Quality Assessment



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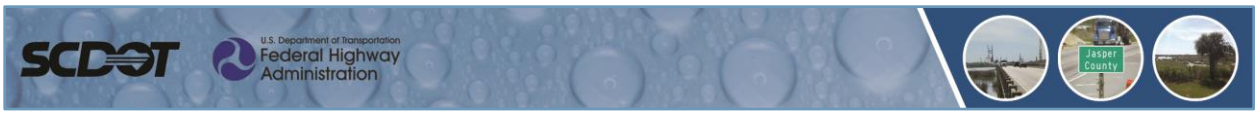

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CHAPTER ONE: PURPOSE AND NEED

1.1 INTRODUCTION

The South Carolina Department of Transportation (SCDOT), in cooperation with the Federal Highway Administration (FHWA), and Georgia Department of Transportation (GDOT) proposes to improve U.S. 17 (Speedway Boulevard) from the I-16 Spur on Hutchinson Island in Chatham County, Georgia, approximately 4.2 miles north to S.C. 315 (South Okatie Highway) in Jasper County, South Carolina (refer to **Figure 1-1**). The proposed improvements include the widening of U.S. 17 from two to four travel lanes, divided by a median, and the construction of a bike lane to support alternate modes of transportation. In addition, a new two-lane bridge structure would be constructed over the Back River to accommodate the additional travel lanes. This document is being submitted as an Environmental Assessment (EA), pursuant to the *National Environmental Policy Act of 1969* (NEPA), as amended, in accordance FHWA regulations in 23 CFR Part 771 and Council on Environmental Quality (CEQ) regulations in 40 CFR Part 1500.

1.1.1 Design Criteria

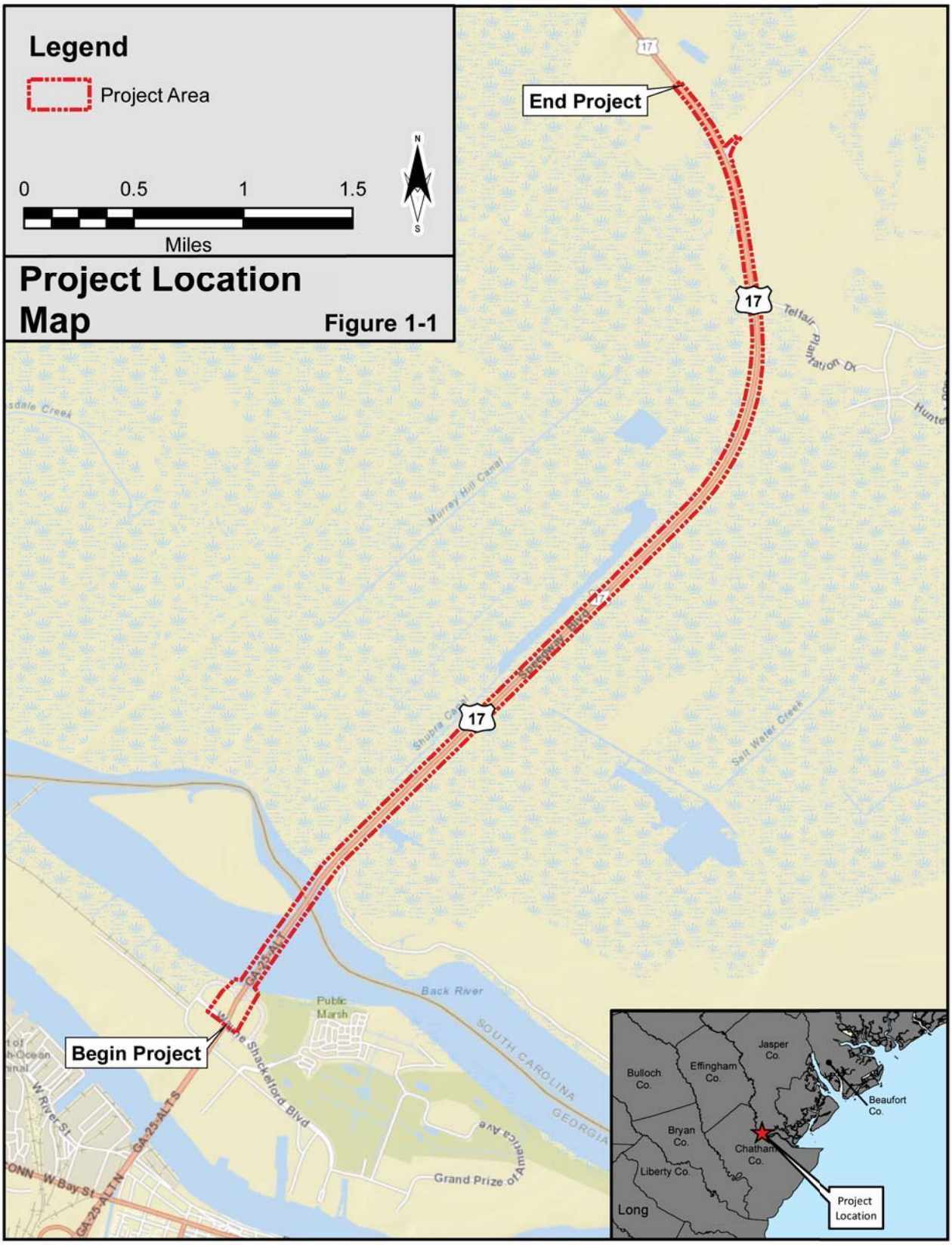
The SCDOT-approved preliminary design criteria for the proposed project can be found in **Appendix A** and are based on the design criteria and policies of SCDOT[1] and the American Association of State Highway and Transportation Officials (AASHTO).[2] These design criteria were used in the preparation of the preliminary design plans.

1.1.2 Logical Termini and Independent Utility

According to 23 CFR §771.111(f), a project shall "connect logical termini…, have independent utility…, and not restrict…other reasonably foreseeable transportation improvements." Logical termini are defined by FHWA as rational endpoints for both the proposed transportation improvement project as well as the evaluation of environmental impacts.[3]

The southern terminus for the proposed project is located at the intersection of Georgia I-16 Spur with U.S. 17. This terminus was selected because the widening and improvements would tie into the existing four-lane U.S. 17 at this intersection. The northern terminus for this project is just north of the intersection of U.S. 17 with S.C. 315. This terminus was selected based on traffic volumes and patterns. As shown in **Table 1.1**, the traffic volumes on U.S. 17 from S.C. 315 south to the Georgia state line are over twice as high as those from S.C. 315 north to S.C. 170. Therefore, over half the traffic traveling north on U.S. 17 along this segment turns northeast onto S.C. 315. Due to this reduction in traffic volume, the proposed widening improvements would end at the S.C. 315 intersection.

[1] SCDOT, *Highway Design Manual*, 2003 ed. with updates.
[2] AASHTO, *A Policy on Geometric Design of Highways and Streets*, (the "Green Book"), 2001 ed.
[3] FHWA, "NEPA and Transportation Decisionmaking: The Development of Logical Project Termini," November 5, 1993, http://environment.fhwa.dot.gov/projdev/tdmtermini.asp (August 22, 2016).



Project Location Map **Figure 1-1**

TABLE 1.1
Traffic Volumes on U.S. 17 Between the Georgia State Line and S.C. 170

YEAR	VOLUMES (AADT)	
	Georgia state line to S.C. 315	S.C. 315 to S.C. 170
2012	13,000	5,700
2013	13,000	6,900
2014	16,300	7,000
2015	17,700	8,100

Source: SCDOT Average Annual Daily Traffic (AADT) for Stations 129 and 131, 2012-2015, http://www.scdot.org/getting/annualTraffic.aspx (July 29, 2016).

Independent utility means that the project "…can be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made and not restrict consideration of alternatives for other reasonable foreseeable transportation improvements."[4] The proposed project satisfies the independent utility criteria in that regardless of whether additional improvements occur to roadways in the surrounding area, improvements to U.S. 17 from the I-16 Spur to S.C. 315 would be usable and would help to reduce traffic congestion and improve safety for those using the roadway. The proposed project would not limit the consideration of alternatives for other reasonably foreseeable transportation improvements that would occur in the study area or roadways intersecting the segment of U.S. 17 from the I-16 Spur to S.C. 315.

1.1.3 Project History and Planning

An Advanced Project Planning Report (APPR) was completed for the proposed project by SCDOT in partnership with the Lowcountry Council of Governments (LCOG) (refer to **Appendix B**). This planning report provides a preliminary evaluation of both the project's potential benefits and the anticipated social, economic, and environmental impacts.

1.2 EXISTING FACILITY

U.S. 17 is a major north-south highway extending from Virginia to Florida. U.S. 17 is a part of the National Highway System (NHS), linking five states and six major cities on the east coast, including: Norfolk, Virginia; Wilmington, North Carolina; Charleston, South Carolina; Savannah, Georgia; and, Jacksonville and Orlando, Florida. The U.S. Department of Transportation (USDOT), in cooperation with state and local officials, designated highways as part of the NHS based on their importance for the country's defense, economy, and mobility. U.S. 17 is also designated as an NHS route due to its freight mobility and connectivity, and as an over dimension/overweight truck route.

[4] 23 CFR §771.111(f).

Traveling north from Savannah, U.S. 17 tapers from four to two 12-foot wide travel lanes at the I-16 Spur, and then traverses north across the Back River into South Carolina. In 2015, GDOT replaced the structurally deficient bridge with a new 3,289-foot long bridge that has two 12-foot wide travel lanes and 8-foot wide shoulders for a curb-to-curb width of 40 feet. The new bridge ties into Georgia on the southern bank of Back River. The two through lanes tie into the existing roadway on Hutchinson Island approximately 500 feet south of the existing bridge. The proposed roadway on the north bank of the Back River in South Carolina continues the two lane facility and ties into the existing roadway north of the bridge. Upon completion of the new bridge by GDOT, the structurally deficient bridge was demolished and removed. Construction and demolition of the bridge by GDOT is not evaluated as part of the Proposed Action; however, it is discussed in the EA as relevant to the proposed project.

As part of the proposed improvements, SCDOT would construct a new two-lane bridge parallel to the bridge constructed by GDOT in order to tie into the four-lane section of the Talmadge Memorial Bridge over the Savannah River. The bridge would consist of a 58.5-foot cross section that features two 12-foot lanes, two 10-foot shoulders, one 10-foot multi-use path, and three 1.5-foot parapets (low walls). Upon completion of the proposed project, the two-lane GDOT bridge would accommodate southbound traffic and the two-lane SCDOT bridge would accommodate northbound traffic.

From the state line entering into South Carolina, U.S. 17 continues as two 12-foot wide travel lanes with 5-foot wide earthen shoulders to each side. There are right-turn lanes on the northbound travel lane at three locations in the project area. At the entrance to the College of Savannah Equestrian Center, there are both right-turn and left-turn lanes into the complex from U.S. 17. The roadway widens at the intersection of S.C. 315, and includes a right turn/merge lane from the northbound travel lane to S.C. 315. On the southbound approach, the roadway widens so that through traffic can pass traffic turning left onto S.C. 315. North of S.C. 315, U.S. 17 narrows to two travel lanes.

Land use along U.S. 17 in this area is primarily undeveloped land with sparse commercial development. The College of Savannah Equestrian Center is located on the east side of U.S. 17, and just north of the equestrian center is a soccer complex. The Savannah National Wildlife Refuge is located to the west of U.S. 17, separated by undeveloped land.

1.3 Purpose and Need

The primary purpose of the proposed project is to increase roadway capacity on U.S. 17 between the I-16 Spur and S.C. 315 and provide a bicycle lane to improve safety for alternative modes of transportation. The project is needed to accommodate existing and future traffic volumes on U.S. 17. The secondary purpose of the proposed project is to improve safety along the highway corridor, specifically in the vicinity of the intersection with S.C. 315.

1.3.1 Increase Roadway Capacity

Congestion results when traffic demand approaches or exceeds the available capacity of a roadway system. There are many factors that contribute to roadway congestion. A large volume of trucks (approximately 10 percent of the overall traffic) utilize the U.S. 17 corridor; this number is anticipated to increase with the construction of the proposed Jasper Ocean Terminal and RiverPort developments in the next decade. Subsequently, delays can occur as a result of inconsistent truck speeds during variations in the roadway grade and as a result of traffic entering/exiting the roadway. Additionally, traffic accidents (i.e., crashes, stalled vehicles, etc.) and intersection/turning delays all contribute to congestion of the roadway. Traffic congestion varies on the route due to increased volume during peak hours.

Level of service (LOS) is a qualitative measure that describes typical congestion conditions along a roadway, ranging from levels A through F (refer to **Figure 1-2**, Level-of-Service Examples). LOS A is the most optimal operating indicator, with free flowing traffic and no delays. LOS F describes substantial delays and very congested traffic.

Figure 1-2: Level-of-Service Examples

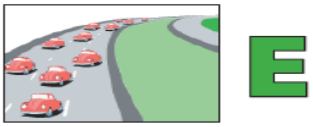
Free Flow operations. Vehicles can move freely within the traffic stream. The ratio of vehicles to capacity (v/C) is <= 0.5

Reasonably free flow operations. The ability to move within the traffic stream is only slightly restricted. The v/C is 0.5 < v/C <= 0.75.

Flow with speeds at or near free flow. Freedom to maneuver within the traffic stream is noticeably restricted and lane changes require more effort on the part of the driver. The v/C is 0.75 < v/C <= 1.00

Speeds decline with increasing traffic. Freedom to maneuver within the traffic stream is noticeably limited. The v/C is 1.00 < v/C <= 1.15

The facility has almost reached its capacity. Operations are unstable because there are virtually no gaps in the traffic stream. The v/C is 1.15 < v/C <= 1.35.



There is little or no room to move. Breakdowns in traffic flow occur. The number of vehicles entering the highway section exceeds the capacity. The v/C is >1.35.

Source: SCDOT

Annual Average Daily Traffic (AADT) values represent the average amount of vehicular traffic which passes a given point over a 24-hour period on a typical day in a year. The actual traffic count values are adjusted to account for several variations such as seasonal conditions and vehicle characteristics. SCDOT's Planning Group has set the total daily roadway volume capacity for each type and classification of roadway. For a 2-lane undivided principal arterial roadway, the capacity is 14,600 vehicles per day (vpd). For a 4-lane undivided principal arterial roadway, the capacity is 29,200 vpd and, likewise, for a 4-lane divided principal arterial roadway, the capacity is 33,600 vpd. As the number of lanes increase and other options such as turning lanes and/or a median are added, the capacity of the roadway increases. As the AADT approaches the roadway capacity, the LOS drops from A to F.

Other factors which can impact LOS are defined in the Transportation Research Board's *Highway Capacity Manual* (HCM).[5] The K-factor is the percentage of the daily traffic that represents the design hour volumes. For example, traffic substantially increases in the early morning and late afternoon as people travel to and from their places of employment. So the design of the roadway should, ideally, meet the demand of these peak travel times. The D-factor is the directional split of the design hour traffic for both two-lane and multi-lane highways. In other words, during peak travel times, most of the traffic will be in one direction as people travel from residential areas to commercial areas to their places of employment and then reverse as people return home at the end of the work day. This imbalance of traffic between the lanes increases congestion on the roadway. For the purposes of this analysis, a typical K-factor of 0.10 and a worst case scenario of a D-factor of 0.65 were used for comparison with the projected AADT for the target years of 2020 (design year), 2030 and 2040 for each roadway design: 2-lane (No-build), 4-lane Undivided and 4-lane Divided (Proposed). **Table 1.2** below shows the current and future (no-build and 2 build scenarios) AADT and LOS along the U.S. 17 corridor. Supporting information for **Table 1.2** is included in **Appendix C.**

TABLE 1.2
AADT and Level-of-Service along U.S. 17

Year	AADT	SCDOT Planning Capacity Principal Arterial			HCM 2010 (k=0.10; D=0.65)	
		2 Lane (No Build)	4 Lane	4 Lane (div)	2 Lane (No Build)	4 Lane
2020	18,700	1.28 (LOS E)	0.64 (LOS B)	0.56 (LOS B)	LOS E	LOS B
2030	21,000	1.44 (LOS F)	0.72 (LOS B)	0.63 (LOS B)	LOS E	LOS B
2040	23,300	1.60 (LOS F)	0.80 (LOS C)	0.69 (LOS B)	LOS F	LOS C

Source: SCDOT, 2016, via email

The existing (2015) AADT along the U.S. 17 corridor is 17,700 vehicles per day at LOS "E". In 2020, traffic volumes are projected to increase to 18,700 vpd in both the build and no-build condition; however, operations would improve from LOS "E" to "B" as a result of the proposed project improvements. In the design year (2040), traffic would increase to 23,300 vpd, a 32

[5] Transportation Research Board, *Highway Capacity Manual*, 2000.

percent increase over existing traffic volumes, which leads to LOS "F" and exceeding roadway capacity. Traffic operations would also improve from LOS "F" to either "C" or "B" as a result of the additional capacity and project improvements.

Since the existing U.S. 17 corridor is a two-lane roadway facility, traffic backs up when motorists stop in the main travel lane as a result of slowing to turn right or waiting to turn left. Vehicles behind the turning motorist must stop or slow, thereby causing congestion and back-up of the mainline traffic associated with intersections and driveways along the corridor. The proposed project would increase capacity of the U.S. 17 facility by adding one additional travel lane in each direction as well as provide dedicated turning lanes at various locations to move turning vehicles out of the main travel lanes and a bicycle lane. As a result, the flow of traffic and capacity along the U.S. 17 corridor would improve operations.

1.3.2 Improve Safety

With an increase in congestion, the number of traffic accidents also increases. A collision analysis was conducted for U.S. 17 from the Georgia-South Carolina border at the Back River to just north of the intersection of S.C. 315 (Okatie Highway). Accident data was obtained from the South Carolina Department of Public Safety from 2012 to 2014[6] to evaluate the type of accidents and the crash rates in the project corridor. A total of 57 accidents occurred from 2012 to 2014 on this segment of roadway, with the majority of the accidents occurring near the intersection at S.C. 315 although accidents occurred along the entire length of the project corridor. A summary of the accidents by year is shown in **Table 1.3**.

TABLE 1.3
Study Corridor Crash History

	Collision Type							
	Fatal Collisions		Injury Collisions		Property Damage Only Collisions		Total Collisions	
Year	#	%	#	%	#	%	#	%
2012	0	0	5	27.8	13	72.2	18	100
2013	2	9	10	45.5	10	45.5	22	100
2014	0	0	6	35.3	11	64.7	17	100
TOTAL	2		21		34		57	

*Data is preliminary and may not be complete.
Source: South Carolina Department of Public Safety, Office of Highway Safety and Justice Programs, via email, August 2016.

[6] Data for 2005 to 2010 is complete, however data from 2011 to 2013 is preliminary and may not include information for collisions that have not been entered into the database as of September 19, 2013 as data entry for those years is ongoing.

The contributing factors to the accidents that occurred on U.S. 17 between 2012 and 2014 were further evaluated to determine what improvements, if any, would improve safety on the roadway. The primary contributing factor for 30.1 percent of the accidents was "Driving Too Fast for Conditions," while "Wrong Side/Wrong Way" was the primary contributing factor for 17.0 percent of the accidents. The majority of the accidents with the primary contributing factor as "Driving Too Fast for Conditions" were due to rear end collisions, which is consistent with heavy traffic congestion. Nearly 95 percent of the accidents occurred in the vicinity of the intersection with S.C. 315 (54 out of 57 total collisions). Both the rear-end collisions and collisions on the wrong side of the road could be minimized through safety improvements such as a center turn lane and/or additional turn lanes at intersections, along with median modifications. The Actual Crash Rate (ACR) per 100 Million Vehicle Miles (MVM) for 2012-2014 was calculated using data gathered from SCDOT's Office of Traffic Engineering (refer to **Table 1.4**).

TABLE 1.4
Actual Crash Rate Along Project Corridor

Year	AADT (vpd)	Number of Crashes	ACR (per 100 MVM)
2012	13,000	18	90
2013	13,000	22	110
2014	16,300	17	68

Source: Michael Baker International, August 2016.

Of the total number of crashes that occurred over the three year period from 2012-2014, there were 2 fatality crashes (resulting in 3 fatalities), 21 injury crashes (resulting in 54 injuries), and 34 crashes involving only property damage. One of the fatal crashes occurred as a result of failure to yield right-of-way at the intersection of U.S. 17 and S.C. 315, while the other accident occurred as a result of a car driving on the wrong side of the road. Safety improvements such as reducing the speed limit with appropriate signage, adding a bike/pedestrian pathway to the road shoulder, and the installing a signalized control at this intersection could help improve cyclist/pedestrian safety. Overall, increasing congestion, lack of center turn lane and/or additional turn lanes along with median modifications, and lack of signalized controls have contributed to safety issues along the U.S. Highway 17 project corridor.

1.4 Reasonable Availability of Funding

The proposed project is anticipated to cost $68.5 million to complete, including approximately $53.5 million for the widening of U.S. 17 and $15 million for the construction of the new bridge over Back River. The project is currently listed in the Statewide Transportation Improvement Program (STIP) for widening between the Georgia State Line to S.C. 315; the STIP is the State's six-year transportation improvement program for all federally funded improvements for which funding has been approved and are expected to be undertaken during the upcoming six-year period. The project is also listed in the Lowcountry Area Transportation Study (LATS) Transportation Improvement Program (TIP) for the construction of the bridge. Money is allocated for planning, right-of-way, and construction through FY 2019. Approximately $10.4 million in funding will be supplied from LATS System Upgrade (Guideshare) funds and an additional $6.7 million will come

from the LCOG System Upgrade (Guideshare) funds. SCDOT and GDOT are currently discussing the path forward for funding for the construction of the new bridge over Back River. Funding for the new bridge is expected to be in place prior to FHWA making a final NEPA decision.

CHAPTER TWO: ALTERNATIVES ANALYSIS

This chapter discusses how alternatives were developed for the proposed project, including the evaluation of the typical sections for each alternative, comparison of Preliminary Alternatives, and identification of the Preferred Alternative. In addition, it discusses the No-build Alternative for the proposed project. The newly developed alternatives are evaluated relative to the stated Purpose and Need for the proposed project and compared to the No-build Alternative.

In addition to the four Preliminary Alternatives for the widening of U.S. 17 and intersection improvements at S.C. 315, two Preliminary Alternatives for the construction of the new bridge over Back River were also evaluated. After performing preliminary analysis for each alternative, a Preferred Alternative for both the widening and the bridge was selected.

2.1 ALTERNATIVES DEVELOPMENT

AASHTO's *A Policy on Geometric Design of Highways and Streets, 2011* and the SCDOT 2003 Highway Design Manual (HDM, revised 2009) were used as references to determine the appropriate design criteria and typical sections for each functional classification of roadway. The portion of U.S. 17 within the project corridor is classified as Rural Arterial. For rural arterials the criteria and specified typical section indicates the use of a divided highway section with a 48-foot wide median.[11] Other components of the typical section include travel lane widths and shoulder widths. Design criterion specifies that 12-foot lanes and 10-foot shoulders (inside and outside) are required for this roadway functional classification.[12] These values have been established based on safety and functionality of the highway facility. Lastly, per SCDOT standards 6:1 side slopes are specified adjacent to the inside and outside shoulders.[13] These slopes provide the most desirable cross slope to provide a recovery area for motorists who run off the road at high speeds.

Although the criteria and specified typical section indicates specific design standards for a Rural Arterial road, variations in design standards were applied to other typical sections in order to evaluate and compare the potential impacts to resources within the project corridor. Three main build alternatives exist for the highway widening: widening to the eastern side of U.S. 17, widening to the western side of U.S. 17, and widening symmetrically along the center line. Because the project requires geotechnical ground modifications and that the new two-lane section be constructed without influencing the existing roadway, asymmetrical widening solutions were not considered. An asymmetrical widening would create a constructability and safety issue due to the proximity of the existing roadway to the required geotechnical ground modifications and would prevent SCDOT from meeting existing design standards. Additionally, impacts to wetlands on each side of the roadway

[11] South Carolina Department of Transportation, *SCDOT 2003 Highway Design Manual*, revised 2009, p. 20.2(3)
[12] *Ibid.*
[13] *Ibid.*

were minimized by a symmetrical alignment shift. Two additional alternatives, one of which represents the optimum design for safety on a Rural Arterial roadway and the other of which represents the smallest possible impact footprint, were evaluated and included for baseline comparison only. Because wetlands are present along both sides of U.S. 17 throughout the study corridor, combinations of widening to both the east and west were not evaluated. Common components of each build alternative consist of intersection improvements at S.C. 315 and I-16 Spur, a paved bicycle lane, and a new two-lane bridge constructed over Back River to accommodate the two additional travel lanes on U.S. 17. All alternatives evaluated utilize a design speed of 60 miles per hour (mph) and a posted speed of 55 mph, which are the existing conditions on the roadway.

A paved bicycle lane is proposed for construction as part of each of the widening alternatives except the No-build Alternative. The paved bicycle lane, which will be incorporated into the paved shoulder of the widened U.S. 17, will not increase the footprint of the alternatives and therefore will not cause any additional impacts to natural resources. The SCDOT bridge alternatives will include two 12-foot lanes, two 10-foot shoulders, one 10-foot multi-use path, and three 1.5-foot parapets (low walls) for a total width of 58.5 feet.

While the paved bicycle lane will be incorporated on both sides of U.S. 17, the multi-use path will only cross the SCDOT bridge in the eastbound direction. Cyclists riding in the westbound bike lane will cross the GDOT bridge, which is not wide enough to include a multi-use path. According to SCDOT Engineering Directive Memorandum 22, *Considerations for Bicycle Facilities*, in order to ensure safety, "bridge widths should match the approach roadway widths (travelway plus bike lanes/paved shoulder)."[14] The current GDOT bridge has 12-foot lanes and 8-foot shoulders for a curb to curb width of 40 feet. The proposed roadway will have two 12-foot lanes, a 4-foot inside paved shoulder, a 6-foot bike lane, for a total paved width of 34 feet in each direction. Therefore, the GDOT bridge could be restriped to accommodate the bike lane in the existing shoulder, preventing westbound cyclists from needing to cross the entire roadway to reach the multi-use path on the opposite side. GDOT will need to approve any changes prior to restriping the bridge.

The proposed multi-use path and bicycle lane will tie into the Coastal Georgia Greenway, an envisioned 155-mile trail network that connects coastal Georgia from South Carolina to Florida.[15] The Coastal Region Metropolitan Planning Organization (MPO), which plans for transportation uses in the Savannah area, has identified the connection from U.S. 17 to Hutchison Island and onward into Savannah as an important segment of its Non-Motorized Transportation Plan, which consists of a network of existing and planned bicycle lanes and multi-use paths that extend throughout the city of Savannah and the surrounding area. [16]

[14] SCDOT, *Engineering Directive Memorandum 22: Considerations for Bicycle Facilities.* http://info.scdot.org/Construction_D/Engineering%20Directives/ED-22.pdf, December 16, 2009.
[15] Coastal Georgia Greenway, "155 Mile Trail System," http://coastalgeorgiagreenway.org/450-mile-trail-system-coastal-georgia/, 2016, (Accessed September 7, 2016)
[16] Coastal Region MPO, *CORE MPO Non-motorized Transportation Plan*, "Existing Bicycle Facilities and Signed Routes," http://www.thempc.org/docs/lit/corempo/plans/nonmotorizedtransportation/2014/oct/plan.pdf, October 29, 2014.

The proposed bicycle lane will increase non-motorized connectivity and improve alternative modes of transportation in the vicinity of the project area while also improving safety along the roadway.

2.2 ALTERNATIVES

2.2.1 No-build Alternative

Under the No-build Alternative, no roadway improvements would occur within the project area, which spans approximately 4.2 miles of U.S. 17 from the I-16 Spur on Hutchinson Island in Chatham County, Georgia to S.C. 315 in Jasper County, South Carolina. The existing roadway would remain as is with two 11-foot travel lanes. Additionally, a bicycle lane and a new bridge over Back River would not be constructed to accommodate additional roadway capacity as a result of the improvements.

As noted in **Section 1.3.1**, traffic congestion is anticipated to continue to increase within the project corridor as a result of economic development that is occurring within the vicinity of the project area. Because no improvements to the roadway would occur under the No-build Alternative, U.S. 17 would experience ongoing and increasing congestion and safety concerns would not be addressed. By 2040, traffic volumes would increase to such a level that the roadway within the project corridor would operate at a failing LOS. Because the No-build Alternative would not increase roadway capacity or improve safety along U.S. 17, it would not meet the Purpose and Need of the proposed project. However, the No-build Alternative is evaluated in Chapter Three as a baseline comparison for the Build Alternatives and in accordance with CEQ regulations for NEPA.

2.2.2 Alternative 1 *(36-foot wide median, widening along the western side of the roadway)*

The roadway in Alternative 1 would be widened from two 11-foot lanes to four 12-foot lanes on the western side of the existing centerline. As shown in the typical section for a roadway with a 36-foot median (refer to **Figure 2-1**), the improved roadway would consist of a 36-foot wide depressed grass median, 10-foot wide inside and outside shoulders, 4:1 side slopes, and a 6-foot wide paved bicycle lane incorporated into the outside shoulder. Intersection improvements would be made at S.C. 315 and I-16 Spur, and a new bridge would be constructed over Back River to accommodate the two additional lanes.

2.2.3 Alternative 2 *(36-foot wide median, symmetrical widening along the existing centerline)*

In Alternative 2, the roadway would be widened from the existing two 11-foot lanes to four 12-foot lanes symmetrically along the existing centerline. As shown in the typical section for a roadway with a 36-foot median (refer to **Figure 2-1),** the roadway would consist of a 36-foot wide depressed grass median, 10-foot wide inside and outside

Legend

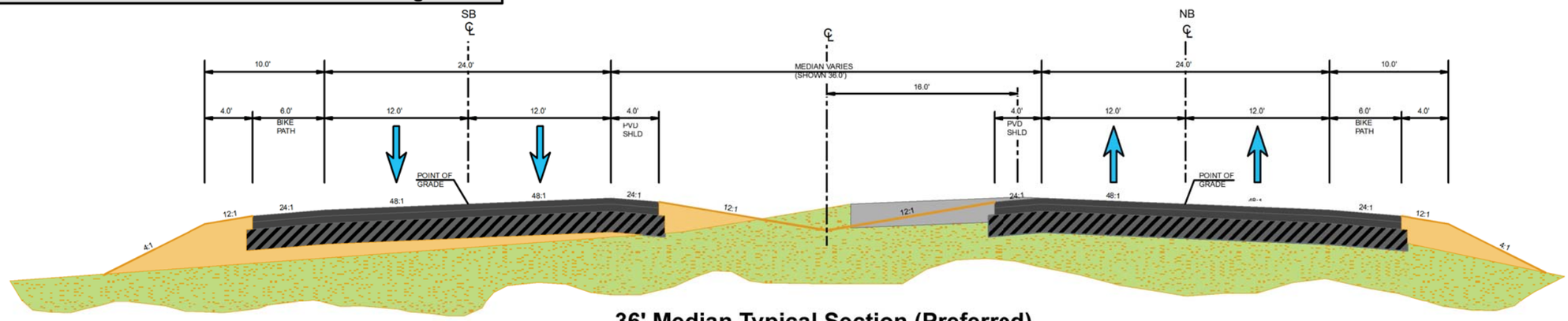
- Existing Ground
- Existing Pavement
- Traffic Direction
- Fill
- Proposed Grading
- Proposed Pavement
- Proposed Base Course

0 10 20 30

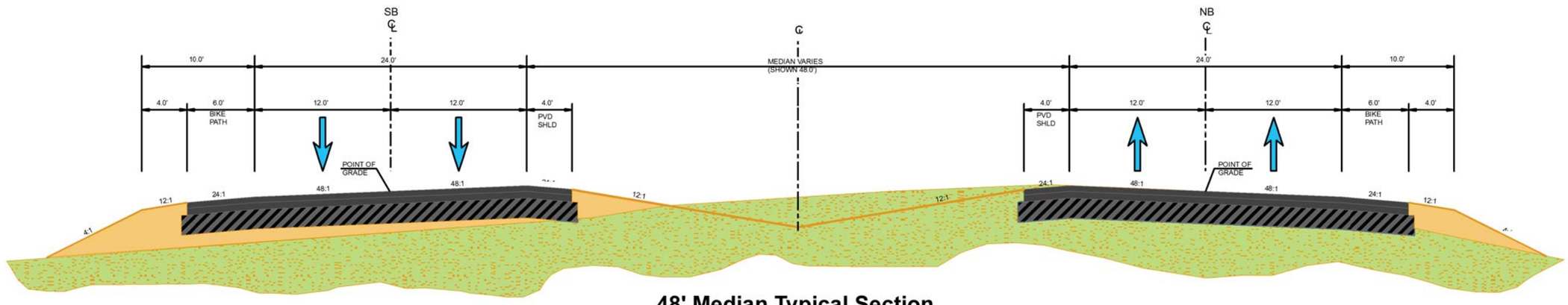
Scale in Feet

Typical Sections

Figure 2-1



36' Median Typical Section (Preferred)



48' Median Typical Section

Legend

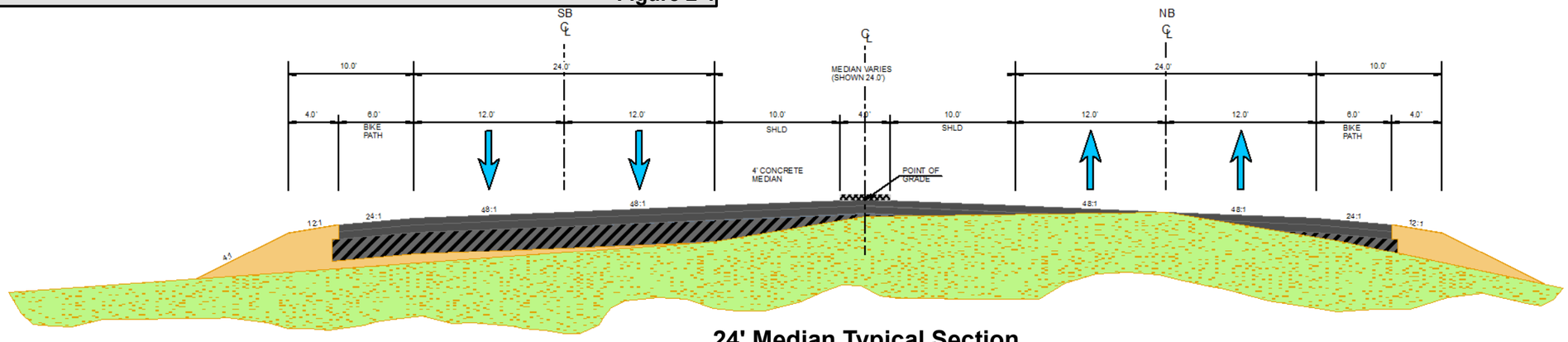
- Existing Ground
- Existing Pavement
- Traffic Direction
- Fill
- Proposed Grading
- Proposed Concrete Median
- Proposed Pavement
- Proposed Base Course
- Proposed Downspouts
- Proposed Deck
- Proposed Beam

0 10 20 30

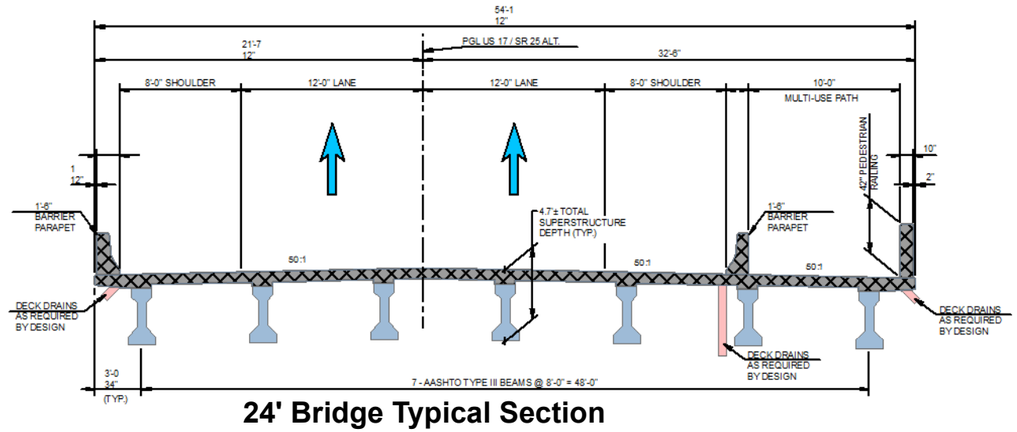
Scale in Feet

Typical Sections

Figure 2-1



24' Median Typical Section



24' Bridge Typical Section

shoulders, 4:1 side slopes, and a 6-foot wide paved bicycle lane incorporated into the outside shoulder. Intersection improvements would be made at S.C. 315 and I-16 Spur, and a new bridge would be constructed over Back River to accommodate the two additional lanes.

2.2.4 Alternative 3 *(36-foot wide median, widening along the eastern side of the roadway)*

In Alternative 3, the roadway would be widened from two 11-foot lanes to four 12-foot lanes primarily to the east of the existing centerline. As demonstrated in **Figure 2-1** (refer to page 2-4)**,** the roadway would consist of a 36-foot wide depressed grass median, 10-foot wide inside and outside shoulders, 4:1 side slopes, and a 6-foot wide paved bicycle lane incorporated into the outside shoulder. Intersection improvements would be made at S.C. 315 and I-16 Spur, and a new bridge would be constructed over Back River to accommodate the two additional lanes.

2.2.5 Alternative 4 *(48-foot wide median, symmetrical widening along the existing centerline)*

As shown in the conceptual typical section for a roadway with a 48-foot median (refer to **Figure 2-1,** page 2-4), the roadway would be widened from two lanes to four 12-foot lanes symmetrical from the centerline and would consist of a 48-foot depressed grass median, 10-foot wide inside and outside shoulders, and 6:1 side slopes. Intersection improvements would be made at S.C. 315 and I-16 Spur, and a new bridge would be constructed over Back River to accommodate the two additional lanes.

2.2.6 Alternative 5 *(24-foot wide median with jersey barrier, symmetrical widening along the existing centerline)*

As shown in the conceptual typical section for a roadway with a 24-foot median (refer to **Figure 2-1**, page 2-4), the roadway would be widened from two lanes to four 12-foot lanes symmetrical from the centerline and would consist of a 24-foot median with a concrete jersey barrier, 10-foot wide inside and outside shoulders, and 6:1 side slopes. The 24-foot median provides for the two 10-foot inside shoulders (the minimum width allowed) and four feet for the concrete jersey barrier.

Because the median barrier does not allow for an unobstructed clear recovery area for motorists who leave the roadway, it is considered a hazard. The concrete jersey barrier also provides logistical challenges, as these barriers require specialized end treatment where they open at intersections and where they begin and end within the project limits, if they are located within the clearzone. Median barriers may also restrict intersection and stopping sight distance which could result in a higher crash rate. These factors significantly reduce safety for the motorist and would likely increase accidents along the corridor. While this alternative provides the least invasive footprint and minimizes impacts to wetlands, it is not considered feasible due to the significantly reduced safety

along the high-volume, high-speed corridor. As a result, Alternative 5 was removed from consideration and impacts were not quantified.

2.2.7 Back River Bridge Alternatives

The crossing of U.S. 17 over the Back River consists of a single two-lane bridge constructed in 2015 by GDOT. As part of the 2015 project, the previously existing bridge, which was located to the east of the new structure with a varying offset of 50 feet to 120 feet, was demolished upon completion of the new structure. A new two-lane bridge over Back River would be constructed downstream of the new bridge constructed by GDOT to tie the four lanes on U.S.17 to the existing four lane section on Hutchinson Island. In order to provide continuity for the four lane widening of U.S. 17 in South Carolina, this project proposes to construct a "parallel" two-lane structure across the Back River in order to tie into the four lane section of the Talmadge Memorial Bridge. For this "parallel" structure, two alignment alternatives were considered.

2.2.7.1 Bridge Alternative 1

The first bridge alternative consists of a true parallel alignment which holds a constant offset east of the existing GDOT structure. This alternative consists of a 58.5-foot cross section that features two 12-foot lanes, two 10-foot shoulders, one 10-foot multi-use path, and three 1.5-foot parapets (low walls).

2.2.7.2 Bridge Alternative 2

The second bridge alternative would shift the bridge towards the GDOT bridge to the west and align the centerline of the new bridge with the previously demolished bridge's centerline. The dimensions of this bridge alternative are the same as the first alternative and feature a 58.5-foot cross section that features two 12-foot lanes, two 10-foot shoulders, one 10-foot multi-use path, and three 1.5-foot parapets.

2.2.8 Preliminary Widening Alternatives Summary

Table 2.1 summarizes the major design features of each build alternative developed for the widening of U.S. 17.

TABLE 2.1 Alternative Roadway Typical Section Design Comparison			
Alternative	**Direction of Widening**	**Median**	**Shoulders**
1	Primarily west of existing roadway (to S.C. 315)	36-foot wide depressed grass median	10-foot wide inside and outside shoulders with 4:1 side slopes
2	Symmetrical from centerline (to S.C. 315)	36-foot wide depressed grass median	10-foot wide inside and outside shoulders with 4:1 side slopes
3	Primarily east of existing roadway (to S.C. 315)	36-foot wide depressed grass median	10-foot wide inside and outside shoulders with 4:1 side slopes
4	Symmetrical from centerline	48-foot wide depressed grass median	10-foot wide inside and outside shoulders with 6:1 side slopes
5	Symmetrical from centerline	24-foot wide concrete median with barrier	10-foot wide inside and outside shoulders with 6:1 side slopes

2.3 ALTERNATIVES EVALUATION

Prior to the development of the alternatives, field studies were conducted to identify wetlands, federally protected species, and cultural resources within the study area. Existing GIS data layers were collected and a regulatory list search was conducted for the presence of hazardous materials. Following the development of the preliminary alternatives, potential impacts were calculated based on the anticipated construction limits of each alternative. Alternatives 4 and 5 are included for baseline comparison only. **Table 2.2** (refer to page 2-8) summarizes the anticipated impacts for each alternative evaluated.

2.4 PREFERRED ALTERNATIVE

While the No-build Alternative would not meet the Purpose and Need of the project, it has been evaluated in Chapter 3, Existing Conditions and Environmental Consequences, as a baseline and in accordance with CEQ regulations for NEPA. Four of the Build Alternatives (Alternatives 1, 2, 3, and 4) satisfy the Purpose and Need of the project, which is to improve traffic flow and safety on U.S. 17 and to provide bicycle facilities (refer to **Section 1.2**). Alternative 5 does not meet the Purpose and Need of the proposed project because the concrete barrier and smaller median size reduce safety along the corridor to unacceptable levels.

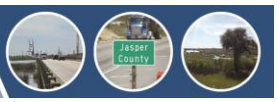
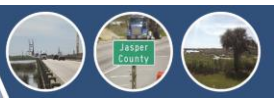


TABLE 2.2
Reasonable Alternatives Corridors and Bridge Impact Matrix

Categories	No Build	Alternative 1 (West, Preferred)	Alternative 2 (Center)	Alternative 3 (East)	Alternative 4 (Center, 48-ft Median)
Private Property Acquisition (acres)	N/A	0.63 (2 parcels, commercial zoning)	0.69 (2 parcels, commercial zoning)	0.81 (2 parcels, commercial zoning)	0.70 (2 parcels, commercial zoning)
Wetland Impacts (acres)	N/A	30.8	31.9	33.6	38.7
100-year Floodplain Impacts (acres)	N/A	91.6	91.6	91.6	102.6
Essential Fish Habitat Impacts (acres)	N/A	28.2	28.8	30.8	39.6
Cultural Resources	N/A	None	None	None	None
Section 4(f) Resources	N/A	None	None	None	None
Federally Protected Species	N/A	None	None	None	None
Potential Hazardous Material Sites	N/A	None	None	None	None
Noise Impacts	N/A	None	None	None	None

Alternatives 1, 2, 3, and 4 all satisfy the Purpose and Need of the project and comply with SCDOT safety requirements. The SCDOT 2003 Highway Design Manual (revised 2009) states that a median width of 48 feet is preferred for Rural Arterial highways such as U.S. 17; however, a median of 36 feet is acceptable and would indicate a design variance. Alternatives 1, 2, 3, and 4 all meet this requirement, and no design exception would be required for implementation of any of these alternatives. While a median width of 48 feet represents the optimum design for a Rural Arterial, as represented by Alternative 4, the environmental sensitivity of the area and large number of potential impacts to wetlands required that SCDOT examine other alternatives within the acceptable range. A 36-foot median width, as reflected in Alternatives 1, 2, and 3, is acceptable per the HDM with a design variance and would substantially reduce the number of impacts to the surrounding environment. As noted in **Table 2.2**, a median width of 48 feet, as demonstrated by Alternative 4, would result in 38.7 acres of wetland impacts. By contrast, a median width of 36 feet, as reflected in Alternatives 1, 2, and 3, would impact anywhere from 30.8 to 33.6 acres, depending on the alignment. Due to the increased environmental impacts that



would result from a 48-foot median width, Alternative 4 was eliminated from consideration.

When considered amongst the four alternatives that meet the Purpose and Need, Alternative 1 would have the least environmental impacts (refer to **Table 2.2**, page 2-8) while still meeting the Purpose and Need and HDM requirements. Therefore, Alternative 1 was selected as the Preferred Alternative and will be evaluated further in Chapter 3, Existing Conditions and Environmental Consequences. Alternatives 2, 3, 4, and 5 have been eliminated from further consideration.

CHAPTER THREE: EXISTING CONDITIONS AND ENVIRONMENTAL CONSEQUENCES

3.1 LAND USE

U.S. 17 (Speedway Boulevard) is located in the southeast corner of Jasper County, SC and in the northeastern corner of Chatham County, GA, which historically has been dominated by agriculture and/or forestry activities although commercial and residential development has significantly increased in the last thirty years due to the development of the U.S. Highway 278 corridor and close proximity to Savannah, Georgia.[1]

3.1.1 Land Use Types

Land uses in the vicinity of the project are mostly rural in nature. Much of the surrounding area has historically been used for agriculture or forestry and was unavailable for development. However, recently large tracts held by timber interests and local families have been released for development due to increasing land values.[2]

There are several existing commercial facilities, two bar/nightclubs and a small roadside market within the study area. The two bar/nightclubs operate mainly at night, and the roadside market opens only during the summer tourist season.

The Savannah College of Arts and Design (SCAD) has a multi-purpose recreational facility near the northern terminus of the study area. This facility consists of an equestrian center with a barn, several paddocks and an arena. There are also several fields used for lacrosse and field hockey. This facility is used during the week for team practices and on weekends for competitions and games. The facilities are located outside of the study area.

The SCAD facility shares an entrance road with the Telfair residential development. This development is located southeast of the SCAD facility and is also outside of the study area.

The Savannah Wildlife Refuge (SWR) is a large undeveloped property adjacent to U.S. 17 north of the intersection with S.C. 315. It has a ranger station, rest rooms, parking area, visitor center and numerous trails for hiking and nature viewing. It does not directly abut the project area. It is buffered from the study area by a wetland mitigation bank. The Clydesdale Mitigation Bank was approved in August 2013 and the Murray Hill Mitigation Bank was recently submitted for approval. Both are located along U.S. 17 on the north and western side. When completed, both banks will restore salt marsh from previously converted rice fields and be protected in perpetuity by conservation easement.

[1] Low Country Council of Governments, *Low Country Development District: Comprehensive Economic Development Strategy*, September 2011, page 5.
[2] *Ibid*, page 21.

The Georgia Ports Authority (GAPA) and the South Carolina Ports Authority (SCPA) are currently in the process of developing plans for a new international shipping terminal, the Jasper Ocean Terminal. Access to the location of the proposed new terminal is currently off of U.S. 17 near the roadside market and the existing bridge over the Back River. Future access is planned utilizing a new roadway and rail alignment. The proposed Jasper Ocean Terminal is discussed in greater detail in **Section 3.15** (Indirect and Cumulative Impacts).

In the GA portion of the study area on Hutchinson Island, existing land uses consist of a mixed use community (The Club at Savannah Harbor, industrial areas, and undeveloped areas consisting mostly of wetland areas. Wetland areas within the loops of the U.S. 17 and Wayne Shackleford Boulevard are identified as wetland mitigation areas owned by the CSX Realty Corporation.

3.1.2 Zoning Regulations

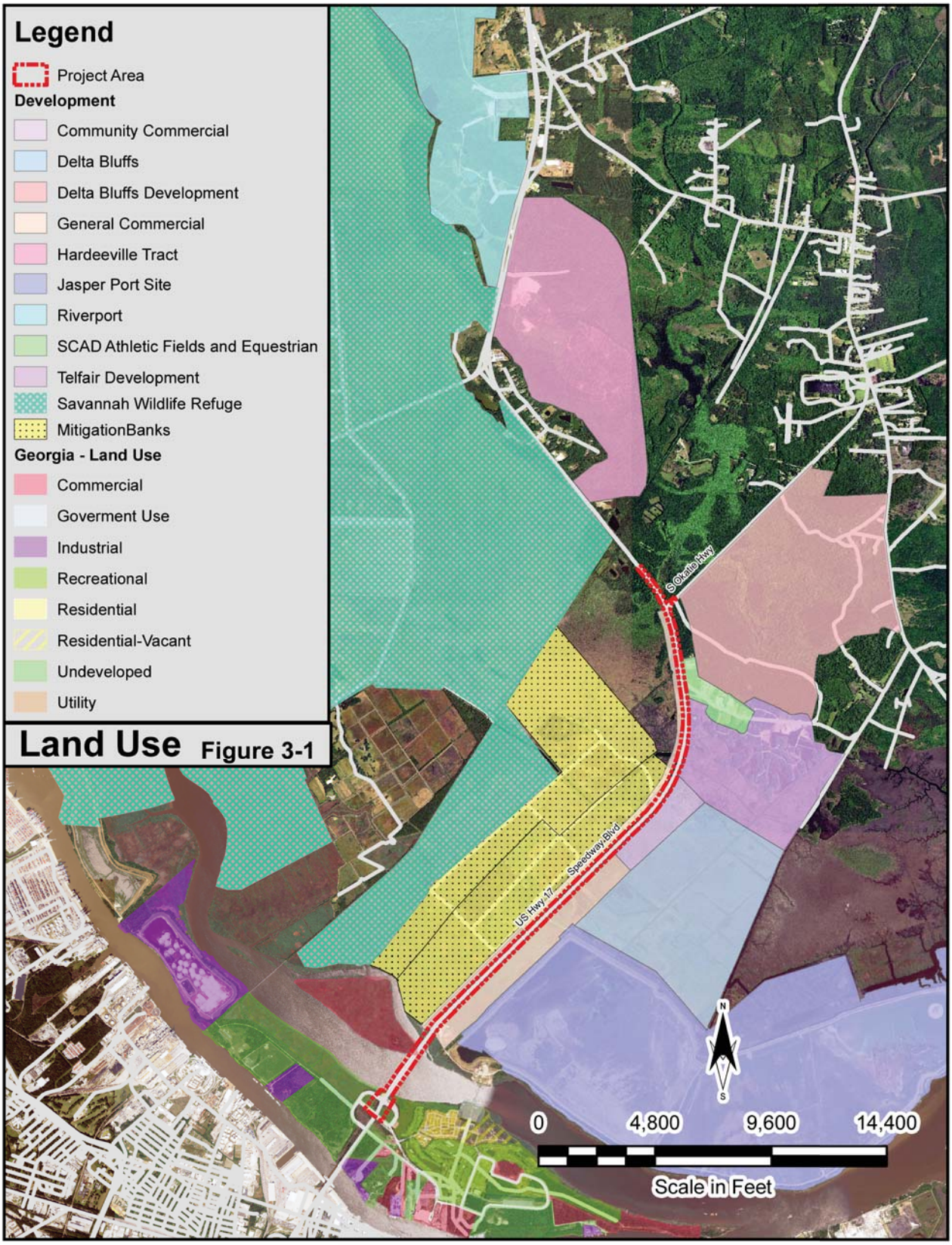
The study area falls within the zoning jurisdiction of the City of Savannah and Jasper County, SC. Zoning within and immediately adjacent to the study area includes Industrial, General Commercial, Community Commercial, Planned Development, and Rural Preservation (refer to **Figure 3-1**, page 3-3).

Industrial Development zoning in Jasper County is to accommodate certain industrial uses that are incompatible with residential, social, medical and commercial areas and are to be located away from or buffered from other such areas.[3] The City of Savannah identifies industrial areas adjacent to the study area as heavy industrial areas, which allows for heavy industrial uses not permitted in other light industrial areas, such as salvage yards and heavy manufacturing.[4]

General Commercial zoning in Jasper County is to support large planned commercial developments within unincorporated areas and will have most public facilities and infrastructure to support such new development.[5] Community Commercial zoning in Jasper County is to provide commercial centers in locations to meet community needs and encourage commercial clustering, thus preventing commercial sprawl.[6]

Planned Development zoning in Jasper County is a special district for encouraging flexibility in the development of land to its most appropriate use through the use of regulations adapted to planning and development to a higher degree.[7] The City of Savannah defines its Planned Development Zoning as large planned unit developments comprising detached, semidetached, single-storied or multistoried dwellings which may include a mixture of residential,

[3] Jasper County, *Zoning District Regulations, Article 5: Zoning District Regulations*, http://www.jaspercountysc.org/_fileUploads/File/Article%205.Zoning%20District%20Regulations.Revised%206.28.12.doc, July 25, 2016, page 5-3.
[4] City of Savannah, Zoning District Information Sheets, http://www.savannahga.gov/DocumentCenter/View/2606 (August 24, 2016).
[5] Jasper County, *Zoning District Regulations, Article 5: Zoning District Regulations*, http://www.jaspercountysc.org/_fileUploads/File/Article%205.Zoning%20District%20Regulations.Revised%206.28.12.doc, July 25, 2016, page 5-3.
[6] *Ibid*.
[7] *Ibid*., page 5-4


Legend
Project Area
Development
Community Commercial
Delta Bluffs
Delta Bluffs Development
General Commercial
Hardeeville Tract
Jasper Port Site
Riverport
SCAD Athletic Fields and Equestrian
Telfair Development
Savannah Wildlife Refuge
MitigationBanks
Georgia - Land Use
Commercial
Goverment Use
Industrial
Recreational
Residential
Residential-Vacant
Undeveloped
Utility
Land Use Figure 3-1
S Okatie Hwy
US Hwy 17 - Speedway Blvd
N
S
0
4,800
9,600
14,400
Scale in Feet

recreational, cultural, educational and commercial uses, and common greens or common open spaces.[8] Rural Preservation zoning in Jasper County is intended to preserve, sustain and protect rural areas and to balance rural and urban environments.[9] It is also necessary to protect agriculture and forestry operations.

3.1.3 Land Use Impact Minimization

Existing land use was taken into consideration during design of the Preferred Alternative. A number of areas adjacent to the existing roadway such as businesses, residences and environmentally sensitive areas (i.e. wetlands) were designated as sensitive areas and were avoided to the extent practicable. The proposed construction would be limited to the existing right-of-way with the exception of the intersection with S.C. 315 (Okatie Highway) which would require acquisition of 1.66 acres of additional right-of-way (ROW), including 0.63-acre of private property and 1.03 acres of right-of-way currently owned and maintained by Jasper County, to accommodate the widening and a new turning lane. The existing commercial facilities along the U.S. 17 are located outside of the ROW/project corridor and would not be impacted by the proposed widening except for the relocation of turning lanes and entranceways to/from the r roadway.

3.1.4 Land Use Direct Impacts

No impacts to land use would occur under the No-build Alternative. The Preferred Alternative would result in the acquisition of 1.66 acres of additional ROW. The new ROW is currently undeveloped land (consisting of wetlands and forested areas) and no residential and/or commercial relocations would occur with the implementation of the Preferred Alternative. The Preferred Alternative is not anticipated to result in a direct impact to land use. Potential indirect impacts to land use resulting from future development is discussed in **Section 3.15**.

The proposed improvements to U.S. 17 would serve two primary purposes: to reduce traffic congestion and to improve safety. Since this is a proposed widening project, the improvements would not provide new access and are not anticipated to cause a direct change in adjacent land uses. However, widening the roadway would accommodate the anticipated increase in traffic from the proposed Jasper Ocean Terminal as well as the increased population in both southern Jasper County, northern Chatham County, and the Bluffton-Hilton Head area in southern Beaufort County.

3.2 PROTECTED FARMLAND

The *Farmland Protection Policy Act of 1981* (FPPA) was enacted by Congress to minimize the unnecessary and irreversible conversion of farmland soils to nonagricultural uses, and to assure, to the extent practicable, that federal, state, and local policies are used to protect farmland soils. Farmland soils can be prime farmland soils, unique farmland soils, or farmland soils of statewide

[8] City of Savannah, Zoning District Information Sheets, http://www.savannahga.gov/DocumentCenter/View/2848 (August 24, 2016).
[9] Jasper County, *Zoning District Regulations, Article 5: Zoning District Regulations*, http://www.jaspercountysc.org/_fileUploads/File/Article%205.Zoning%20District%20Regulations.Revised%206.28.12.doc, July 25, 2016, page 5-2.

or local importance. Prime farmland soils are defined as soils that consistently produce the greatest yields with minimal inputs of energy and economic resources, and farming these soils involves the least environmental impact.[10] These soils may or may not be presently used as cropland. Conversely, land that is presently used as cropland may or may not be prime farmland. Unique farmland is land other than prime farmland that is used for the production of specific high-value food or fiber crops.[11] Statewide and locally important farmland soils are soils designated by coordination with state and local agencies as important farming areas for food, fiber, forage, and/or oilseed crops.[12] Land that is already in or committed to urban development or water storage is not considered farmland.[13]

3.2.1 Protected Farmland Resources

Jasper County has forty-two soil series designated as prime farmland soils or soils of statewide importance, three of which are found within the study area. These include Argent fine sandy loam, Cape Fear loam, and Nemours fine sandy loam.[14] Chatham County has four soil series designated as prime farmland soils or soils of statewide importance, none of which are found within the study area.[15] No soil series in the study area are designated as unique farmland soils. Potential protected farmlands were evaluated based on the ROW limits for the Preferred Alternative, which include approximately 220 acres of existing ROW. As a result of this evaluation process, 30.8 acres of prime or statewide important farmland was identified within the existing ROW that is both zoned rural and has not been previously converted to non-agricultural use. **Table 3.1** lists each protected farmland soil type that meets these criteria, its status, and its acreage.

TABLE 3.1
Prime and Statewide or Locally Important Farmland Soil Types within the ROW

Soil Type	Status	Acreage
Argent fine sandy loam	Farmland of statewide importance	29.1
Cape Fear loam	Farmland of statewide importance	1.5
Nemours fine sandy loam	Prime Farmland	0.24
	Total Acreage	**30.84**

SOURCE: NRCS Soil Data Mart Website, *Jasper County, South Carolina,* http://websoilsurvey.sc.egov.usda.gov/DSD/Download/Cache/SSA/wss_SSA_SC053_soildb_US_2003_[2013-12-23].zip (July 27, 2016).

[10] 7 U.S.C. §4201(c)(1)(A).
[11] 7 U.S.C. §4201(c)(1)(B).
[12] 7 U.S.C. §4201(c)(1)(C).
[13] 7 CFR §658.2
[14] USDA, Soil Conservation Service, *Soil Survey of Jasper County*, 2016. Available online at http://websoilsurvey.nrcs.usda.gov/. (July 25, 2016).
[15] USDA, Soil Conservation Service, *Soil Survey of Bryan and Chatham Counties, Georgia*, March 1974. Available online at: http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/georgia/bryan_chathamGA1974/BC.pdf (July 26, 2016).

3.2.2 Impacts to Farmlands

A Farmland Conversion Impact Rating for Corridor Type Projects, Form NRCS-CPA-106, was completed for the proposed project. This form provides a site assessment scoring system with criteria for evaluating adverse effects of projects on the protection of farmland. Sites receiving high scores (up to a maximum of 260) are considered most suitable for protection, while those with low scores are considered least suitable. Sites receiving scores less than 160 are to be given minimal consideration for protection. Based on the NRCS CPA-106 form, the total point value on the Preferred Alternative is 151. No impacts to farmland would occur under the No-build Alternative. Since the total point score is less than 160, neither consideration of alternative corridors nor additional studies are required under the Act. A copy of the CPA-106 form and a figure depicting the soil series designated as prime and statewide important farmland relative to the rural zoned areas within the proposed ROW can be found in **Appendix D**.

3.3 CULTURAL RESOURCES

The *National Historic Preservation Act of 1966* requires federal agencies to review the effects of any proposed projects on historic properties. Historic resources include districts, buildings, sites, structures, or objects that are significant in American history, architecture, archaeology, engineering, and/or culture.[16] Prior to undertaking a project, a federal agency must determine if any resources exist in the study area through detailed literature searches and field surveys. If resources exist, then the federal agency will consult with the State Historic Preservation Office (SHPO) to determine whether the resource is eligible for listing on the National Register of Historic Places (NRHP) and how the proposed project would impact the resource.

In addition to the above, federal agencies must consult with any federally recognized Indian Tribes with a potential interest in any resources that may be impacted by the proposed project. Specifically, Sections 101(d)(6)(A) and Section 101(d)(6)(B), of the *National Historic Preservation Act of 1966.*, as amended, provides for the inclusion of resources of a cultural or religious significance to American Indian tribes as eligible for the NRHP and requires the consultation with those tribes as part of the Section 106 review process.[17]

3.3.1 Identification of Potential Cultural Resources

3.3.1.1 South Carolina Portion

Architectural and archaeological surveys were completed for the proposed project utilizing a background literature review and records search in addition to intensive field surveys. The background research was conducted at the South Carolina Institute of Archaeology and Anthropology (SCIAA) and included a review of ArchSite, state archaeological site files, associated archaeological reports, and the Delta Plantation development survey. Four

[16] 16 U.S.C. §470(a)(1).
[17] Advisory Council on Historic Preservation, Native American Program, *Consultation with Indian Tribes in the Section 106 Review Process: A Handbook*, 2008, Page 3. Available online at http://www.achp.gov/regs-tribes2008.pdf. (July 26, 2016)

previously recorded archaeological sites were listed as being within or in close proximity (0.25 mile) to the study area, while no known aboveground historic resources were identified within a 0.5-mile search radius.

New South Associates, Inc. conducted an intensive cultural resources survey with shovel testing within the study area in October, 2008. Three new sites and two isolated finds were identified in this survey. Due to the disturbance to all of the sites from roadway maintenance and adjacent utility corridor construction, all three sites were determined to be not eligible for listing on the National Register of Historic Places. A copy of the SHPO concurrence is included in **Appendix E**.

3.3.1.2 Georgia Portion

Georgia Department of Transportation's initial consultation with the Georgia SHPO concerned evaluation for NRHP eligibility, dated March 7, 2005, of the existing bridge and adjacent area for historic resources. The bridge itself was determined as ineligible for listing and no other historic structures were identified in the proposed bridge replacement project's Area of Potential Effect (APE). The Georgia SHPO concurred with the finding of "no affect to historic resources" on March 10, 2005.

GDOT conducted a terrestrial archaeological survey of Georgia's proposed bridge replacement in 2007.[18] The survey resulted in the identification of no terrestrial archaeological sites within the project's APE. A historic structures survey of the project had been previously completed in 2005 and no historic properties were identified within the APE.[19]

Previous investigations resulted in the identification of a submerged archaeological site in the vicinity of the existing U.S. 17 bridge. Archaeological site 9CH800 is described as a 19th-century "heavily built wooden sailing vessel" on the Georgia Archaeological Site Form. The site was recommended as eligible for listing in the NRHP. During the preliminary engineering phase for GDOT's bridge replacement project, it was determined that the site could not be avoided by the project and archaeological mitigation would be necessary. Archaeological mitigation activities for the proposed impacts to site 9CH800 were completed in 2008.[20] Those investigations recorded sufficient information from the site to mitigate any adverse effects to the vessel that would occur as a result of constructing a new bridge to the northwest or footprint of the existing bridge. Seventeen previously-recorded archaeological sites were identified within 0.62-mile of the project.[21] The majority of these sites relate to the maritime heritage of the area and include submerged and waterfront sites located along the Back River and Savannah River. Archaeological site 9CH800 is the only eligible site located within proximity

[18] Pomfret, James, 2007 Interdepartmental Correspondence: Archaeological Survey of Project NH-009-2(93), Chatham County.
[19] Georgia Department of Transportation, Finding of No Historic Properties Affected, GDOT Project NH-009-2 (93), Chatham County, P.I. #522920, H.P. #050120-010, March 7, 2005.
[20] Watts, Gordon P., 2008 Archaeological Mitigation at the 17A Derelict Vessel Site on Back River, Chatham County,
Georgia.
[21] South Carolina Department of Transportation, Section 106 Identification Efforts, Proposed Road U.S. Route 17 Widening Activities in Chatham County, GA, SCDOT Project ID: 39168, February 20, 2014.

(50 feet) to the proposed project's direct impact area. As mentioned earlier, this site was subjected to archaeological mitigation in 2008. Those investigations recorded sufficient information from the site to mitigate any adverse effects to the vessel that would occur as a result of constructing a new bridge to the northwest of the existing bridge.

3.3.2 Impacts to Cultural Resources

No NRHP-eligible structures were identified in the project area; therefore, based on background research and reconnaissance survey, a finding of no historic properties affected has been determined. The South Carolina SHPO concurred by letter dated October 26, 2010 (see **Appendix E**). No impacts would also occur under the No-build Alternative.

A number of archeological resources were identified within the project's APE; however, all of these resources were previously determined to be ineligible for NRHP listing. In addition, all impacts from the proposed project would be within the existing SCDOT right-or-way and would not impact any of the previously identified sites. Concurrence has been received for the ineligible archaeological sites and no historic properties affected determination via letter signed by SHPO on October 26, 2010 (see **Appendix E**).[22] SCDOT requested updated concurrence of no effect via letter to the South Carolina and Georgia SHPOs dated February 24, 2014. The Georgia SHPO concurred by letter dated March 10, 2014.

As part of GDOT Project NH-009-2(93), the replacement of the I-16/U.S. 17 bridge over the Back River, a cultural resources survey was performed. The results of this survey identified one eligible historic property, Site 9CH800, that was originally located and determined to be eligible for listing in 1992. The Georgia SHPO determined GDOT Project NH-009-2(93) to have an adverse effect on Site 9CH800 due to the potential damage to the remains of Vessel 17A as a result of project construction. To ensure that design and construction data associated with Vessel 17A would not be destroyed by the bridge replacement project, GDOT conducted a Phase III investigation of the wreck site as part of the Memorandum of Agreement (MOA) to mitigate the adverse effect. A final report was issued dated October 12, 2008.[23] The Georgia SHPO approved the report and indicated compliance with the requirements of the MOA by letter dated November 24, 2008.

GDOT completed a reevaluation of the project in March 2010 due to the age of the previous survey. No new resources were identified by the reevaluation and therefore, GDOT found no affect to historic resources due to a lack of historic resources in the project's APE. This was documented by memorandum to the project file dated March 9, 2010.

GDOT completed another reevaluation of the project by memorandum to file dated January 18, 2011, regarding a discrepancy in the project terminus. An additional 725 feet of roadway was added to the project terminus to provide access to an unnamed road to the southeast of U.S. 17 in South Carolina. The additional 725 feet of roadway corridor was evaluated for

[22]SCDOT, *Draft Environmental Assessment, Widening and Improvements of U.S. Highway 17 from Hutchinson Island in Chatham County, Georgia to S.C. 170 in Jasper County, South Carolina, PIN: 25999, File No. 27.480,* January 2013, page 43.
[23]*Ibid*., pages 43-44.

historical and/or archeological resources in April 2010, with a determination of no affect and therefore, GDOT determined that no additional work was required. SCDOT also conducted a survey on the Georgia side and identified its results in a report dated February 20, 2014.

Due to the inter-state nature of the project (since the project crosses the GA-SC state line) the FHWA contacted the following tribes, by letter, dated March 5, 2014, regarding their interest in any resources within the study area:

- Abesentee-Shawnee Tribe of Oklahoma
- The Catawba Indian Nation
- The Chickasaw Nation
- Eastern Shawnee Tribe of Oklahoma
- Muscogee (Creek) Nation
- Poarch Band of Creek Indians
- Seminole Tribe of Florida
- The Shawnee Tribe
- Thlopthlocco Tribal Town

The Catawba Indian Nation responded by letter dated March 31, 2014, and indicated that the tribe has no immediate concerns regarding any culturally significant resources within the study area. The tribe requested to be notified if Native American artifacts and/or human remains are located during the ground disturbance phase of the proposed project. The Shawnee Tribe sent concurrence via email on June 3, 2014 and agreed that no known historic resources will be impacted by the proposed project. Like the Catawba Indian Nation, they requested to be notified if Native American artifacts and/or human remains are discovered. The Muscogee (Creek) Nation responded by email on April 3, 2014 and concurred that they have no concerns about the proposed project while also requesting to be notified if remains or artifacts are discovered. No other tribes have responded at this time. Copies of all the correspondence are included in **Appendix E**.

3.4 SECTION 4(F) RESOURCES AND SECTION 6(F) RESOURCES

Section 4(f) of the *Department of Transportation Act of 1966* provides protection to publicly owned parks, recreation areas, wildlife and waterfowl refuges, and historic sites. Under Section 4(f), properties must not be impacted unless no prudent and feasible alternative exists and efforts to minimize impacts to the property are completed. The Savannah National Wildlife Refuge is in the vicinity of the project area; however, the project would not impact this resource. The construction would not be within the view shed of the refuge nor would there be noise impacts to the refuge. Therefore, additional Section 4(f) analysis is not warranted.

Section 6(f) resources are places such as public parks, trails, courts, and other recreational areas that were purchased in part through grants from the *Land and Water Conservation Fund Act of 1965* (LWCF=). The properties are protected by the LWCF from conversion to non-public recreational uses. No Section 6(f) resources are known to exist within the study area.[24] Since no

[24] National Park Service, Land and Water Conservation Fund, "Detailed Listing of Grants by County," http://waso-lwcf.ncrc.nps.gov/public/index.cfm (July 26, 2016).

property would be acquired from any Section 6(f) resources, compliance with the LWCF Act is not required. No impacts to Section 4(f) and/or 6(f) properties would occur under the No-build Alternative.

3.5 WILD AND SCENIC RIVERS

The National *Wild and Scenic Rivers Act of 1968* (16 U.S.C. §§1271-1287) protects rivers that are listed as significant resources for their wild, scenic, or recreational values, along with those that are under consideration for inclusion on the list. In addition, under a 1979 Presidential Directive, federal agencies are required "to take care to avoid or mitigate adverse effects on rivers identified in the Nationwide Inventory."[25] There are no federally protected wild, scenic, or recreational rivers, nor are there any rivers listed on the Nationwide River Inventory in the study area.[26] A portion of the Savannah River is included on the Nationwide River Inventory but the portion listed is from River Mile 20, King's Island, to River Mile 190, Bush Field near Augusta, which is approximately 3.0 miles upstream from the study area. Therefore, the proposed project would not require compliance with this Act. No impacts would occur under the No-build Alternative.

The State of South Carolina also designates some state rivers for their cultural or natural resources value under the *South Carolina Scenic Rivers Act*[27]or the *Georgia Scenic Rivers Act*.[28] There are no state-designated scenic rivers in the study area; therefore, these resources were not further considered in the EA.

3.6 SOCIOECONOMICS AND DEMOGRAPHICS OF THE STUDY AREA

The proposed project is located in two coastal counties in the southeastern United States; 3.6 miles of proposed widening are located in Jasper County, South Carolina, with the southernmost 0.6 mile of the project terminating at Hutchinson Island south of the Back River Bridge in Chatham County, Georgia. As a region, the Southeast has experienced rapid growth since 1970. Georgia ranks fourth and South Carolina ranks tenth out of the fastest growing states in the country.[29] This growth is anticipated to continue over the next ten years.

In South Carolina, Jasper County is located between the two rapidly growing areas of Savannah, Georgia, and Southern Beaufort County, South Carolina, including Hilton Head-Bluffton.[30] Based on U.S. Census data, the population of Jasper County grew by 19.8 percent between 2000 and 2010, from 20,678 to 24,777 residents, respectively. The S.C. Data Center projects an additional

[25] U.S. Executive Office, "1979 Presidential Memorandum on Wild and Scenic Rivers and National Trails," https://ceq.doe.gov/nepa/regs/scenicrivers.html July 26, 2016).
[26] National Park Service, National Center for Recreation & Conservation, "Nationwide Rivers Inventory," http://www.nps.gov/ncrc/programs/rtca/nri/states/sc.html (July 26, 2016).
[27] SCDNR, *South Carolina Scenic Rivers Act*, http://www.dnr.sc.gov/water/river/act.html (July 26, 2016).
[28] GADNR, *Georgia Scenic Rivers Act*, O.C.G.A. §§ 12-5-350.
[29] State of Georgia, Office of Planning and Budget, *Georgia 2030, Population Projections*, March 12, 2010, p. 2.
[30] Jasper County, Draft Jasper County Comprehensive Plan Update 2013, http://www.jaspercountysc.org/_fileUploads/File/Comprehensive%20Plan/Jasper%20County-%20Format%20and%20Population%202-3.pdf (August 21, 2016).

12 percent growth in the population by 2025, with an anticipated 27,680 people residing in Jasper County.[31]

Chatham County, Georgia, is located just south of Jasper County. Savannah is the largest city within Chatham County. Based on U.S. Census data, the population of Chatham County grew by 14.3 percent between 2000 and 2010, from 232,048 to 265,128 residents, respectively. Georgia's Office of Planning and Budget projects an additional 16 percent growth in the population by 2025, with an anticipated 307,576 people residing in Chatham County.[32]

3.6.1 Demographics, Economics, and Housing Characteristics

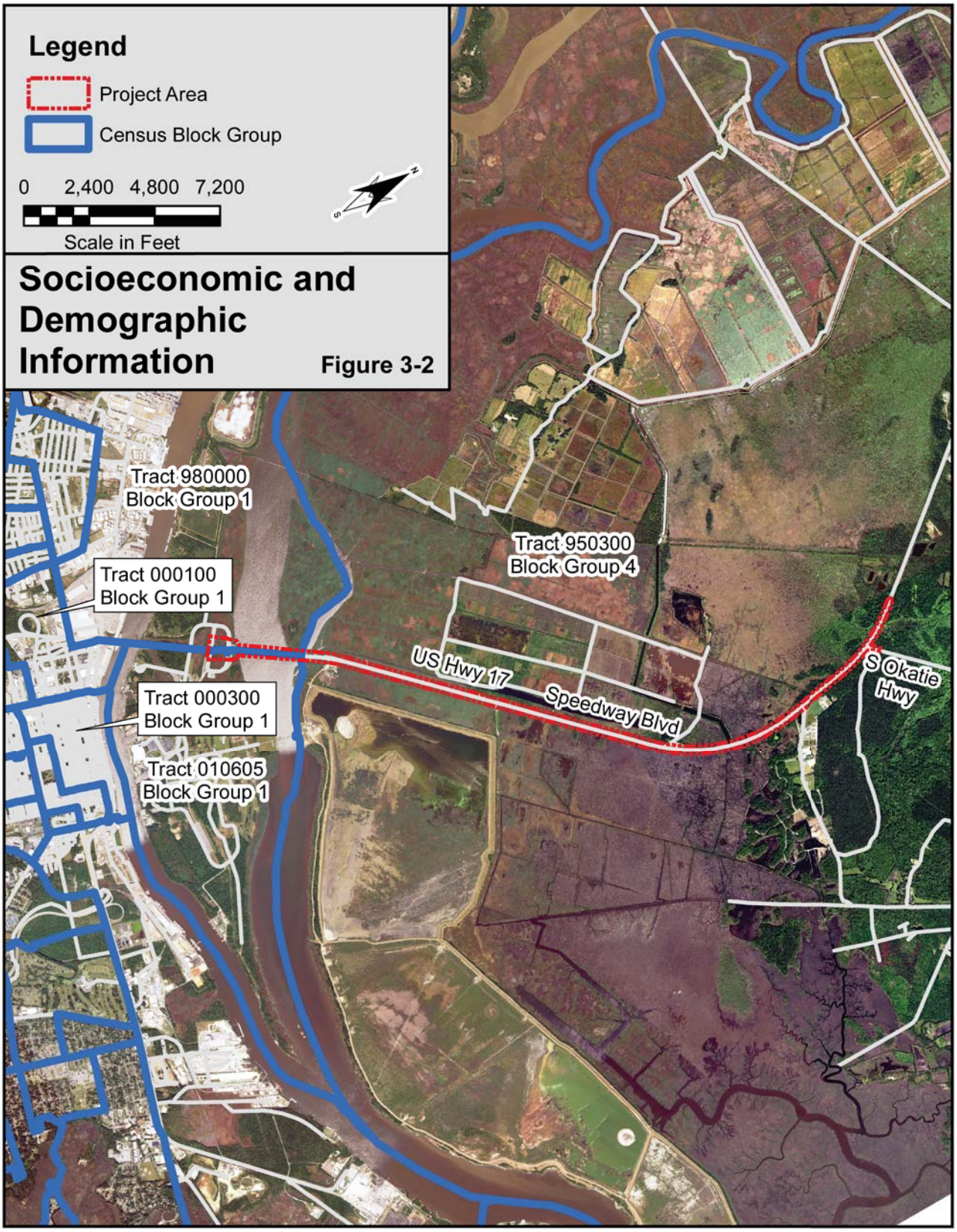
The 2010 United States Census data (American Community Survey, 2010-2014/5-Year Summary File) was used at the Block Group (BG) level for determining population and housing characteristics within the project area. A BG is the smallest geographic division that is used by the United States Census Bureau to categorize data.[33] The project area is encompassed by CT 9503.00 BG 4 in Jasper County, South Carolina and CT 106.05 BG 1 and CT 9800 BG 1 in Chatham County, Georgia (refer to **Figure 3-2**). **Table 3.2** provides select demographic and economic characteristics of these BGs, as compared to Jasper and Chatham Counties, South Carolina, and Georgia. CT 106.05 BG 1 and CT 9800 BG 1 in Chatham County are essentially void of residences and were therefore not assessed further in this section.

TABLE 3.2
Select Demographic and Economic Characteristics

Area	CHARACTERISTIC					
	Total Population	Percent Minorities	Median Age	Average Household Size	Median Household Income (in 2014 dollars)	Percent Below Poverty Level
South Carolina	4,896,146	32.9	39	3	45,033	18.3
Jasper County	27,824	52.9	39	3	37,801	23.5
CT 9503.00 BG 4	2,358	57.4	33	3	38,320	20
Georgia	10,214,860	39.7	36	3	49,342	18.1
Chatham County	286,956	46.1	35	3	46,987	19.2
CT 106.05 BG 1	10	0	-	-	-	0
CT 9800 BG 1	0	0	-	-	-	0

SOURCE: U.S. Census Bureau, 2010 - 2014 American Community Survey 5-year Estimates.

[31] Jasper County, Draft Jasper County Comprehensive Plan Update 2013, http://www.jaspercountysc.org/_fileUploads/File/Comprehensive%20Plan/Jasper%20County-%20Format%20and%20Population%202-3.pdf (August 21, 2016).
[32] State of Georgia, Office of Planning and Budget, *Georgia 2030, Population Projections*, "State of Georgia Population Projections 2010 to 2030," March 12, 2010, p. 7.
[33] United States Census Bureau, "Glossary," http://factfinder.census.gov/home/en/epss/glossary_a.html (August 30, 2012).


Legend
Project Area
Census Block Group
0 2,400 4,800 7,200
Scale in Feet
Socioeconomic and Demographic Information
Figure 3-2
Tract 980000 Block Group 1
Tract 000100 Block Group 1
Tract 000300 Block Group 1
Tract 010605 Block Group 1
Tract 950300 Block Group 4
US Hwy 17
Speedway Blvd
S Okatie Hwy

As shown in **Table 3.2**, the minority population in the vicinity of the study area comprises approximately 52.5 percent of the total population in CT 9503.00 BG 4. In comparison to the 32.9 percent minority population of the state, the minority percentage for Jasper County is much higher at 52.9 percent. At 57.4 percent, the minority population residing in the vicinity of the study area (CT 9503.00 BG 4) is slightly higher than that of the county (52.9 percent) and larger than the state minority population (32.9 percent).

The median age in the vicinity of the study area is 33 years and the average household size is 3 persons. This median age is lower than that of Jasper (39 years) and Chatham (35 years) Counties and Georgia (36 years), but slightly younger than that of South Carolina (39 years).

The population surrounding the study area has a median household income that exceeds that of Jasper County by $-519, but is $6,713 less than that of the overall population of South Carolina. CT 9503.00 BG 4 has a percentage of the population living below the poverty level (20 percent) that is smaller than that of Jasper County (23.5 percent), but slightly larger than that of South Carolina (18.3 percent).

3.6.2 Employment

The top 10 employers in Jasper County in 2015 are provided in **Table 3.3**. The local school district and area health care providers are included among these top employers.

TABLE 3.3
Jasper County Principal Employers in 2015

Employer	Total Employees
Jasper County School District	415
New River Auto Mall	377
Wal-Mart	288
Beaufort-Jasper Comprehensive Health	250
Jasper County	248
Ridgeland Correctional Institute	197
Cleland Construction Company	187
Coastal Carolina Medical Center	174
J.C. Board of Disabilities & Special Needs	115
Ridgeland Nursing Center	95

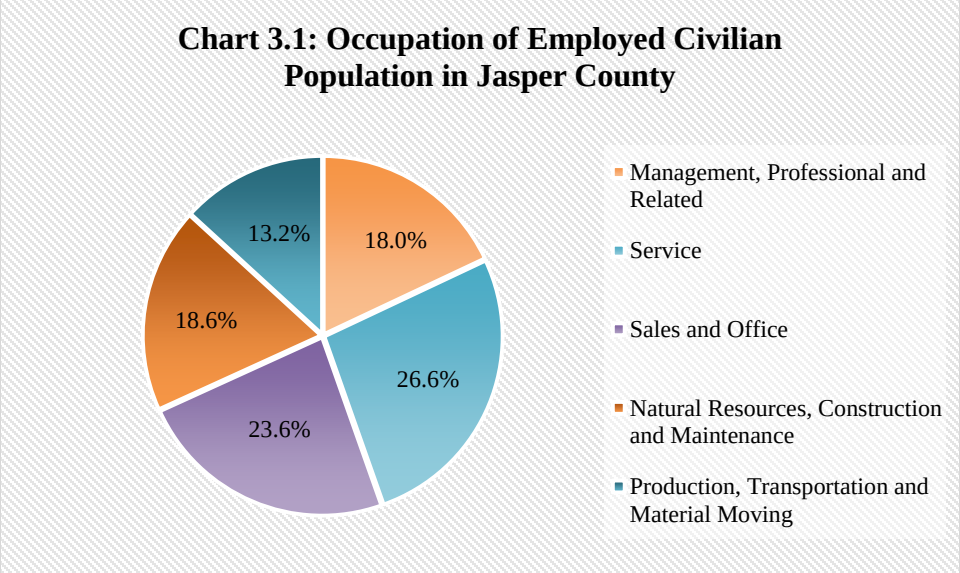
SOURCE: Jasper County, South Carolina, Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2015, "Principal Employers," p. 80.

The unemployment rate for Jasper County was 4.7 percent in July 2016, which is lower than South Carolina's rate of 5.2 percent unemployment and one of the lowest unemployment rates in the state.[34] Jasper County has seen a strong recovery from the economic recession in recent

[34] South Carolina Department of Employment and Workforce, "South Carolina's Employment Situation, July 2016," https://dew.sc.gov/news-details-page/2016/08/19/employment-situation-for-july-2016 August 19, 2016, (August 24, 2016)

years and has continued to reduce its unemployment rating. The July 2016 unemployment rate of 4.7 percent is a full percentage point lower than the July 2015 rate of 5.7 percent.[35]

As depicted by **Chart 3.1**, the types of employment in Jasper County are fairly balanced with Management/Professional; Service; Sales and Office; Construction, Extraction and Maintenance; and Production, Transportation, and Material Moving all comprising between 13 and 27 percent of the total occupations of the employed civilian population 16 years and older.[36] Despite Jasper County's strong agricultural tradition, the agriculture industry employed just 2.1 percent of the County's population in 2014.[37]



3.6.3 Preferred Alternative Impacts

The Preferred Alternative was analyzed for its potential social impacts in terms of residential and business relocations, alteration of transportation patterns, disruption of planned or established communities, disruption of development, and changes in employment.

The Preferred Alternative is located primarily within the existing 200-foot ROW currently owned by SCDOT. Following the preliminary alternatives analysis described in Chapter Two, a more detailed design of the Preferred Alternative was developed. Based on this preliminary design, it is anticipated that acquisition of 1.22 acres of additional right-of-way (ROW) would be required at the intersection with S.C. 315 (Okatie Highway) to accommodate the widening and a new turning lane. However, no residences or businesses would be relocated for construction of the Preferred Alternative.

[35] South Carolina Department of Employment and Workforce, "South Carolina's Employment Situation, July 2015," http://lmi.dew.sc.gov/lmi%20site/Documents/PressReleases/PR1_July_2015.pdf, August 21, 2015 (August 24, 2016)

[36] U.S. Census Bureau, *2014 American Community Survey*, http://www.factfinder.census.gov, (August 24, 2016)
[37] *Ibid.*

Property owners would be compensated for the ROW acquisition and any damages to remaining property, in accordance with SCDOT policy and the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (*Uniform Act*). It is important to note that although no relocations have been identified based on the proposed construction limits of the Preferred Alternative, if residential or business relocations were identified during final design, those being relocated would receive the full benefits entitled under the *Uniform Act*. These benefits include fair market value compensation for the acquired property as well as equitable compensation normally associated with relocating.

The addition of through travel lanes in each direction on U.S. 17 would result in better LOS within the study area. Thus, these improvements are anticipated to be beneficial by reducing congestion and improving safety and are not likely to cause significant adverse impacts to the community. The proposed project is not anticipated to have an adverse impact on accessibility to community facilities or services. It is anticipated that the minimal ROW acquisition impacts would be offset by the improved traffic flow and safety along the corridor.

Planned and established communities and other development are not likely to be adversely impacted by the Preferred Alternative. Additionally, the Preferred Alternative is not anticipated to have long-term impacts to employment in the project area. As mentioned previously, future residential and business development is anticipated to occur along U.S. 17 under both the No-build and the Preferred Alternative.

Construction of the proposed project would have short-term impacts on the local economy, including construction employment and purchases of goods and services related to construction activities. The proposed project would create temporary employment opportunities for laborers, equipment operators, and other construction-type employees. In addition, although the inconvenience of construction activities may deter local residents from using businesses located within the study area, retail and service facilities near the proposed project could experience an increase in sales from construction employees.

The No-build Alternative would not have an immediate impact on the local population. Local residents would continue to travel in the study area as they currently do. Without the construction of the widening of U.S. 17, congestion would continue to increase, which would result in longer travel times and lower levels of service. It would be expected that there also would be an increased number of accidents.

3.6.4 Potential Impacts to Environmental Justice Communities

The United States Environmental Protection Agency (USEPA) defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."[38] The three fundamental principles of environmental justice are:

[38] USEPA, "Environmental Justice," https://www.epa.gov/environmentaljustice (Accessed April 22, 2016)

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations;
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and,
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.[39]

Federal regulations pertaining to environmental justice are outlined in Title VI of the *Civil Rights Act of 1964* in addition to *Executive Order* (EO) *12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.* EO 12898 requires that

> *Each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.*[40]

USEPA states that the goals of environmental justice will be achieved when:

- All people and communities across the nation have the same degree of protection from environmental and health hazards; and,
- All people and communities enjoy equal access to the decision-making process to have a healthy environment in which to live, learn, and work.[41]

Environmental justice communities were identified in compliance with NEPA as part of this study. As demonstrated in **Table 3.2** (refer to page 3-11), one potential environmental justice community is located within the study area. CT 9503.00 BG 4 reports 20 percent of its population living below the poverty level, and 57.4 percent of the population as a minority.[42]

While minority populations are present within the study area, no notably adverse community impacts are anticipated with this project; thus, impacts to minority and low-income populations do not appear to be disproportionality high and adverse. No disproportionate impacts are anticipated to occur to environmental justice communities. The proposed project takes place along an existing corridor with minimal residential development and limited right-of-way acquisition. No relocations are anticipated as part of the proposed improvements. The limited residential development in the vicinity of the project corridor minimizes the potential for impacts resulting from noise or construction.

[39] Federal Highway Administration, "Environmental Justice Overview," http://www.fhwa.dot.gov/environment/environmental_justice/overview/, Updated December 12, 2012 (Accessed April 25, 2016)
[40] Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 1994
[41] USEPA, "Environmental Justice," https://www.epa.gov/environmentaljustice, (Accessed April 22, 2016)
[42] U.S. Census Bureau, *2014 American Community Survey*, http://www.factfinder.census.gov, (August 24, 2016)

3.7 NOISE

Noise or sound is a pressure on the ear drum that is measured on a scale from one to one billion. To simplify this scale, engineers and scientists have established a decibel scale (dB) of 1 to 180. The scale of 1 to 180 dB provides a range for the sound levels that fall within a human's normal range of hearing for various types of noises.

In accordance with the United States Code of Federal Regulations (CFR) 23 CFR Part 772, a traffic noise analysis was completed for the proposed Type I Federal-aid highway project to determine existing noise levels, and to evaluate potential future noise levels, their associated impacts, and the feasibility of noise mitigation measures associated with the Preferred Alternative. The FHWA Traffic Noise Model (TNM version 2.5, released April 2004) was used in the analysis to compare existing and future noise levels. The analysis was performed in accordance with the procedures outlined in 23 CFR Part 772, *Procedures for Noise Abatement of Highway Traffic Noise and Construction Noise* and the *SCDOT Noise Abatement Policy* (September, 2014). The Noise Impact Analysis is included in **Appendix F**.

3.7.1 Noise Measurements and Model Validation

Ambient noise field measurements were collected in the field in January 2014 to determine noise levels and used to validate the TNM. Field measurements were taken at two representative locations in the study area during the peak afternoon hours (refer to noise measurement data sheets in Noise Impact Analysis, **Appendix F**). The modeled noise levels at these sites were within criteria stated in the *SCDOT Noise Abatement Policy*; therefore, the model was considered valid. For further information, please refer to **Appendix F.**

3.7.2 Modeling Assumptions and Identification of Potential Receptors and/or Land Use Types

The environmental traffic data was developed by Michael Baker International with data provided from SCDOT count data. A "K factor" of 10 percent was used to simulate design hourly volumes. A truck factor of ten percent (three percent medium trucks and seven percent heavy trucks) was used, based on input provided by SCDOT. The posted speed limit of 55 mph was used for all the alternatives in the analysis. Sensitive receivers and/or land use types were identified using aerial photography and street level views from http://maps.live.com and http://maps.google.com and field verified when noise measurements were taken. **Figure 3-3** depicts the location of these receivers. Receptor land use categories that are within the study area include open land, retail/commercial, restaurant/bar and the SCAD recreational fields.

In order to determine if highway noise levels were compatible with various land use activities, the FHWA-developed Noise Abatement Criteria (NAC) and procedures to be used in the planning and design of highways. **Table 3.4** contains the various NAC categories and a description for each. Receptor land use categories that are found within the project study area include open land, retail/commercial, restaurant/bar and the SCAD recreational fields.

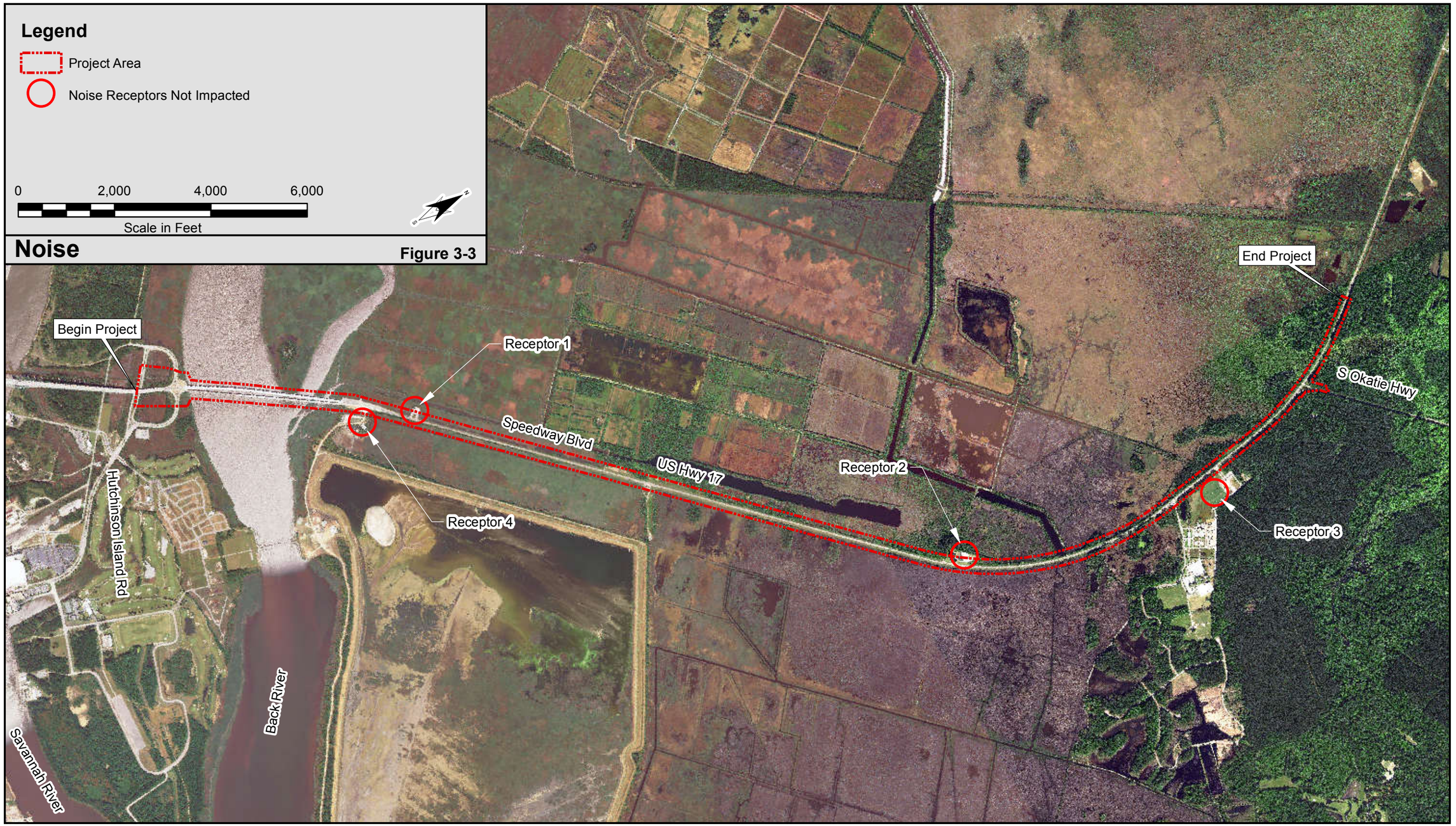

Legend
Project Area
Noise Receptors Not Impacted
0
2,000
4,000
6,000
Scale in Feet
Noise
Figure 3-3
Begin Project
Receptor 1
End Project
S Okatie Hwy
Speedway Blvd
US Hwy 17
Receptor 2
Receptor 3
Receptor 4
Hutchinson Island Rd
Back River
Savannah River

TABLE 3.4
23 CFR 772 (Table 1) Noise Abatement Criteria (NAC)

Activity Category	L_{eq} (h)\1,2\	L_{10} (h) \1,2\	Evaluation Location	Description of Activity Category
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B\3\	67	70	Exterior	Residential.
C\3\	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E\3\	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	--	Undeveloped lands that are not permitted.

SOURCE: 23 CFR Part 772
\1\ Either Leq(h) or L10(h) (but not both) may be used on a project.
\2\ The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
\3\ Includes undeveloped lands permitted for this activity category.

3.7.3 Existing and Modeled Future Noise Levels

The FHWA has developed noise abatement criteria and procedures in 23 CFR Part 772, as shown in **Table 3.4** (refer to page 3-19), that states that traffic noise impacts occur when either:

1) the predicted traffic noise levels approach or exceed the NAC for the applicable activity category shown below; or,
2) the predicted traffic noise levels substantially exceed the existing noise levels by ≥15 dBA.

The modeling results for the existing condition (using 2020 traffic data), the No-build Alternative (using 2040 traffic data), and the Build Alternatives using 2040 traffic data can be found in below in **Table 3.5**. Overall, there are no receivers that exceed the criteria in the 2040 build condition for any alternative, which is represented by the NAC Impact column and the Substantial Increase Impact column.

TABLE 3.5
Existing and Design Sound Year Levels

Receptor	Receptor Type	Existing 2020	2040 No-build	2040 Preferred	Increase Over Existing				NAC Impact?	Substantial Increase Impact?	NAC
					Alt 1	Alt 2	Alt 3	Alt 4			
1	Commercial	63.8	65.0	68.5	4.7	4.5	3.5	4.9	No	No	E
2	Commercial	62.6	63.8	67.0	4.4	3.6	3.1	4.0	No	No	E
3	Recreational	58.9	60.1	61.3	2.4	2.8	3.3	2.9	No	No	C
4	Commercial	-	-	-	-	-	-	-	-	-	F

Based on the current SCDOT Noise Abatement Policy, SCDOT considers a predicted noise level within 1 dBA as "approaching" the NAC. A predicted increase of 15 dBA or more is also considered by SCDOT to substantially exceed the existing noise level. The Preferred Alternative would not result in substantial increase impacts in noise and therefore, no noise impacts are anticipated. As a result, noise abatement consideration is not required based on the detailed analysis according to SCDOT *Traffic Noise Abatement Policy*. Under the No-build Alternative, the proposed widening would not occur and there would be no change in current noise conditions.

There are no noise-sensitive receivers on Hutchinson Island close enough to be studied for noise impacts. The nearest potential receivers were located at The Club At Savannah Harbor. However, the distance to U.S. 17 from the golf course is about 1,400 feet and the distance to the U.S. 17 ramps is approximately 700 feet. Residential receptors (unbuilt house lots) are located approximately 1,800 and 1,100 feet, respectively. These are too far away to be impacted and were not analyzed. (According to the current GDOT Noise Abatement Policy, the actual limits of a noise study area usually does not extend beyond 500 feet from a project's proposed edge of pavement unless impacts are shown beyond that distance.

Overall, subsequent project design changes and/or revised data may require a reevaluation of the abatement analysis. If this condition were to occur, the new future build alternative scenario would be analyzed for noise impacts and mitigation as reasonable, (i.e, if the proposed action were to be significantly modified in such a way as to change the predicted sound level environment and/or clearly indicate a possibility for reasonable and feasible mitigation).

3.7.4 Construction Noise

If the Preferred Alternative is chosen, temporary increases in noise levels would occur during the time period that construction takes place. Noise levels due to construction, although temporary, can impact areas adjacent to the project. The major noise sources from construction would be the heavy equipment operated at the site. However, other construction site noise sources would include hand tools and trucks supplying and removing materials. Typical noise levels generated by different types of construction equipment are presented in **Table 3.6**. Construction operations are typically broken down into several phases including clearing and grubbing, earthwork, erection, paving and finishing. Although these phases can overlap, each has their own noise characteristics and objective.

TABLE 3.6
Leq Noise Level (dBA) at 50 Feet for Construction Equipment

Equipment	dBA Leq @ 50 feet
Earth Moving:	
Front Loader	79
Back Hoe	85
Dozer	80
Tractor	80
Scraper	88
Grader	85
Truck	91
Paver	89
Materials Handling:	
Concrete Mixer	85
Concrete Pump	82
Crane	83
Derrick	88
Stationary:	
Pump	76
Generator	78
Compressor	81
Impact:	
Pile Driver	100
Jackhammer	88
Rock Drill	98
Other:	
Saw	78
Vibrator	76

SOURCE: Grant, Charles A. and Reagan, Jerry, A., Highway Construction Noise: Measurement, Prediction and Mitigation.

SCDOT's "2007 Standard Specifications for Highway Construction" includes various references to construction noise, including Sections 107.6-paragraph 3, 606.3.1.6.3-paragraph 1, 607.3.1.6.3-paragraph 1, 607.3.2.6.3-paragraph 1, and 702.4.15-paragraph 3. The SCDOT specifications cited above are generalized for nuisance noise avoidance. Detailed specifications suggested for consideration for inclusion in the proposed project's construction documents may consist of the following:

- Construction equipment powered by an internal combustion engine shall be equipped with a properly maintained muffler.
- Air compressors shall meet current United States Environmental Protection Agency (USEPA) noise emission exhaust standards.
- Air powered equipment shall be fitted with pneumatic exhaust silencers.
- Stationary equipment powered by an internal combustion engine shall not be operated within 150 feet of noise sensitive areas without portable noise barriers placed between the equipment and noise sensitive sites. Noise sensitive sites include residential buildings, motels, hotels, schools, churches, hospitals, nursing homes, libraries and public recreation areas.
- Portable noise barriers shall be constructed of plywood or tongue and groove boards with a noise absorbent treatment on the interior surface (facing the equipment).
- Powered construction equipment shall not be operated during the traditional evening and/or sleeping hours within 150 feet of a noise sensitive site, to be decided either by local ordinances and/or agreement with SCDOT.

3.7.5 Coordination with Local Officials

SCDOT and GDOT has no authority over local land use planning and development. SCDOT and GDOT can only encourage local officials and developers to consider highway traffic noise in the planning, zoning and development of property near existing and proposed highway corridors. The lack of consideration of highway traffic noise in land use planning at the local level has added to the highway traffic noise problem which will continue to grow as development continues adjacent to major highway long after these highways were proposed and/or constructed. In order to help local officials and developers consider highway traffic noise in the vicinity of proposed Type I project, SCDOT and GDOT would inform them of the predicted future noise levels and the required distance from such projects needed to ensure that noise levels remain below the NAC for each type of land use. The detailed noise analysis will be made available during the public availability period for the proposed project. Additionally, the following 66 and 71 dBA contour distances, which indicate a possible impact to specific land uses, are shown in **Table 3.7** and will be provided to local officials with Jasper County and Chatham County for planning purposes, per the requirements in 23 CFR Part 772.

TABLE 3.7
Noise Planning Contour Distances for U.S. 17 (Speedway Boulevard)

Undeveloped Areas	Land Use	Impact Contour	Approximate Distance from Edge of Nearest Travel Lane
U.S. 17	Residential	66 dBA	160 feet
	Commercial	71 dBA	75 feet

SOURCE: Michael Baker International, 2016.

3.8 AIR QUALITY

3.8.1 National Ambient Air Quality Standards and Attainment

The National Ambient Air Quality Standards (NAAQS) were established by USEPA under the *Clean Air Act* (CAA), as amended, to protect public health, the environment, and the quality of life from the detrimental effects of air pollution. The NAAQS have been set for the following criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2). The NAAQS primary standards to protect human health and secondary standards to protect human welfare are listed in **Table 3.8**. Mobile sources from on-road vehicles contribute to four of the six criteria pollutants: CO, NO_2, O_3, and PM.[43] Recently, EPA issued new standards for motor vehicle emissions referred to as "Tier 3" to be phased in by year 2017.[44] These pollutants are discussed in further detail below.

TABLE 3.8
National Ambient Air Quality Standards

Pollutant	Standard†		
	Averaging Time	Level	Type of Standard[a]
Carbon monoxide (CO)	1-hour	35 ppm	Primary
	8-hour	9 ppm	Primary
Lead (Pb)	Rolling 3-month average	0.15 µg/m^3	Primary & Secondary
Nitrogen dioxide (NO_2)	Annual mean	53 ppb	Primary & Secondary
	1-hour	100 ppb	Primary
Ozone (O_3)[d]	8-hour	0.070 ppm	Primary & Secondary
Particle pollution (diameter less than/equal to 10 µm, PM_{10})	24-hour	150 µg/m^3	Primary & Secondary
Particle pollution (diameter less than/equal to 2.5 µm, $PM_{2.5}$)	Annual mean	12.0 µg/m^3	Primary
	Annual mean	15.0 µg/m^3	Secondary
	24-hour	35.0 µg/m^3	Primary & Secondary
Sulfur oxides (SO_x)	1-hour	75 ppb	Primary
	3 hours	0.5 ppm	Secondary

SOURCE: USEPA, https://www.epa.gov/criteria-air-pollutants/naaqs-table (August 17, 2016).
† Standards shown here are current from present to 2017.[a]ppm = parts per million.
ppb = parts per billion.
[c]µG/M^3 = micrograms per cubic meter.
[a]Primary standards are set to protect public health. Secondary standards are designed to protect public welfare.
[d] USEPA is currently reconsidering the standards for ozone. Until a decision is reached, the 1997 standard remains in place.

[43] USEPA, "Mobile Source Air Toxics," http://www.fhwa.dot.gov/ENVIRonment/air_quality/conformity/guide/guide04.cfm (August 22, 2016).
[44] USEPA, "Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards", https://www3.epa.gov/otaq/tier3.htm (August 21, 2016).

3.8.1.1 Carbon Monoxide

Carbon monoxide forms when carbon is not completely burned in fuel. It is an odorless and colorless gas that can temporarily accumulate at harmful levels in areas with heavy traffic congestion or areas that experience inversions during the winter months.[45] In addition, CO aids in the formation of ground-level ozone. CO can be generated by natural sources, such as forest fires, and from anthropogenic sources including vehicle exhaust, industrial processes, indoor heating, and open burning.[46]

According to 2011 CO emissions data, Jasper County emitted between 38 – 103 tons of CO per square mile.[47] Mobile sources are the largest contributor of CO emissions in South Carolina.[48] CO is harmful to the respiratory, cardiovascular, and nervous systems since it deprives these systems of oxygen, and at high levels, may cause poisoning and death.[49]

3.8.1.2 Nitrogen Dioxide

Nitric oxide (NO), the nitrate radical (NO_3), and nitrogen dioxide, are collectively called nitrogen oxides (NO_x).[50] NO_x is generally emitted in the form of NO, which is oxidized to NO_2. While most NO_x is odorless and colorless, NO_2 can be seen as a reddish haze. The principal anthropogenic source of NO_x is fuel combustion in motor vehicles and power plants, which are the main sources for Jasper County. According to 2011 NOx emissions data, Jasper County emitted between 7 and 21 tons of NOx per square mile.[51]

Due to its ability to be carried over great distances by prevailing winds, NO_x can cause a multitude of different impacts on the environment. NO_x is one of the primary components of ground-level ozone, which adversely affects the respiratory system.[52] In addition, it can contribute to the formation of acid rain and can combine with other air particles to produce toxic substances, as well as cause deterioration of waterbodies and visibility.

[45] Inversions occur in the winter months during calm weather when a warm layer of air traps cold air and pollutants closer to the ground. Since CO is more chemically stable at colder temperatures, it can accumulate at harmful levels during inversions. From USEPA, Office of Air and Radiation, "*Six Common Pollutants; Carbon Monoxide*," https://www.epa.gov/co-pollution (August 22, 2016).
[46] *Ibid*.
[47] USEPA, Office of Air and Radiation, "*State and County Emissions Summaries – CO*," https://www3.epa.gov/cgi-bin/broker?_service=data&_debug=0&_program=dataprog.state_1.sas&pol=CO&stfips=45 (August 21, 2016).
[48] *Ibid*.
[49] USEPA, Office of Air and Radiation, *"Six Common Pollutants: Carbon Monoxide - Health,"* https://www.epa.gov/co-pollution (August 22, 2016).
[50] USEPA, Office of Air and Radiation, "Six Common Pollutants: Nitrogen Dioxide", https://www.epa.gov/no2-pollution (August 22, 2016).
[51] USEPA, Office of Air and Radiation, "State and County Emissions Summaries – NOx" https://www3.epa.gov/cgi-bin/broker?_service=data&_debug=0&_program=dataprog.state_1.sas&pol=NOX&stfips=45 (August 21, 2016).
[52] USEPA, Office of Air and Radiation, "Six Common Pollutants: Nitrogen Dioxide," https://www3.epa.gov/airquality/nitrogenoxides/ (August 21, 2016).

3.8.1.3 Ozone

Ground-level ozone is created when NO_x compounds chemically react with volatile organic compounds (VOCs) in the presence of sunlight.[53] Since sunlight is required for its formation, it is known as a summertime air pollutant and can accumulate in harmful quantities during hot weather and extended periods of sunny weather.[54] Sources of NO_x and VOCs that create O_3 include vehicle exhaust emissions, gasoline vapors, industrial emissions, and chemical solvents. Based on 2011 emissions data, between 7 and 21 tons per square mile of NOx were emitted and between 37 and 49 tons per square mile of VOCs were emitted in Jasper County.[55]

While O_3 is beneficial in the upper atmosphere of the earth to shield it from the sun's potent ultraviolet rays, ground-level ozone can be harmful. Once it builds up in the environment, O_3 can cause respiratory problems, especially to those with existing respiratory conditions such as asthma or emphysema.[56] Ground-level O_3, like NO_x, can be carried far distances by prevailing winds, and can damage plants and ecosystems.[57]

3.8.1.4 Particulate Matter

Particulate matter (PM) is separated into two different sizes for the purpose of the NAAQS, $PM_{2.5}$ and PM_{10}. The nomenclature refers to PM with a diameter of 2.5 microns (µm) or less, and 10 µm or less, respectively. PM forms when small solid particles combine with liquid droplets to form dust, dirt, haze, soot, or smoke.[58] These substances can be emitted from primary sources such as unpaved roads, construction sites, fields, or smokestacks. They can also be emitted as a result of secondary reactions of gases released from automobiles and industrial plants.[59] In 2011, Jasper County emitted between 2.8 and 5.3 tons per square mile of $PM_{2.5}$.[60]

PM can cause problems to the cardiovascular and respiratory systems, including irregular heartbeat, non-fatal heart attacks, decreased lung function, airway irritation, development of chronic bronchitis, and aggravation of asthma and emphysema.[61] PM is the major cause of

[53] USEPA, Office of Air and Radiation, "Ground-level Ozone," https://www.epa.gov/ozone-pollution (August 21, 2016).
[54] *Ibid.*
[55] USEPA, Office of Air and Radiation, State and County Emissions Summaries – NOx and VOCs (August 21, 2016).
[56] USEPA, Office of Air and Radiation, "Six Common Pollutants: Ground Level Ozone - Health Effects," https://www.epa.gov/ozone-pollution/ozone-basics#effects (August 22, 2016).
[57] *Ibid.*
[58] USEPA, Office of Air and Radiation, "Six Common Pollutants: Particulate Matter," https://www.epa.gov/pm-pollution/particulate-matter-pm-basics#PM (August 21, 2016).
[59] *Ibid.*
[60] USEPA, Office of Air and Radiation, "State and County Emission Summaries – $PM_{2.5}$" - https://www3.epa.gov/cgi-bin/broker?_service=data&_debug=0&_program=dataprog.state_1.sas&pol=PM25_PRI&stfips=45 (August 21, 2016).
[61] USEPA, Office of Air and Radiation, "Six Common Pollutants: Particulate Matter - Health," https://www.epa.gov/pm-pollution/particulate-matter-pm-basics#effects (August 21, 2016).

haze in the United States, and since it can be carried great distances by prevailing winds, can cause damage to ecosystems and waterbodies wherever it ultimately settles.

3.8.1.5 Current Status of Air Quality Attainment in the Study Area

In accordance with the CAA, all portions of South Carolina are designated as in attainment, non-attainment, or unclassifiable for meeting NAAQS standards. An area with air quality that is better than NAAQS standards is considered to be in attainment, while an area with air quality that is worse than NAAQS standards is designated as being in non-attainment. If there is a lack of information for determining an attainment status, the area is designated as unclassifiable. Each state determines which areas within its boundaries are designated to be in attainment or non-attainment, and must develop a State Implementation Plan to ensure that areas achieve and/or maintain attainment status for NAAQS standards.

The study area is located in Jasper and Chatham Counties, which are currently in attainment for all NAAQS criteria pollutants.[62] Therefore, since the proposed project is located within an attainment area, then a general conformity analysis is not required by the CAA. Therefore, the conformity requirements would not apply to the proposed project.

3.8.2 Mobile Source Air Toxics

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that USEPA regulate 188 air toxics, also known as hazardous air pollutants. USEPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources[63] and identified a group of 93 compounds emitted from mobile sources that are part of USEPA's Integrated Risk Information System (IRIS). In addition, USEPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA).[64] These are 1,3-butadiene,acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules. According to EPA, MOVES2014 is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and VMT data. MOVES2014 incorporates the effects of three new Federal emissions standard rules not included in MOVES2010. These new standards are all expected to impact MSAT emissions and include

[62] USEPA, Office of Air and Radiation, "Green Book: Currently Designated Nonattainment Areas for All Criteria Pollutants," https://www.epa.gov/green-book (August 21, 2016).
[63] Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007
[64] USEPA, "National Air Toxics Assessment," https://www.epa.gov/national-air-toxics-assessment, (December 8, 2016).

Tier 3 emissions and fuel standards starting in 2017, heavy-duty greenhouse gas regulations that phase in during model years 2014-2018, and the second phase of light duty greenhouse gas regulations that phase in during model years 2017-2025.[65] Since the release of MOVES2014, USEPA has released MOVES2014a. In the November 2015 MOVES2014a Questions and Answers Guide, USEPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions.[66] The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014.

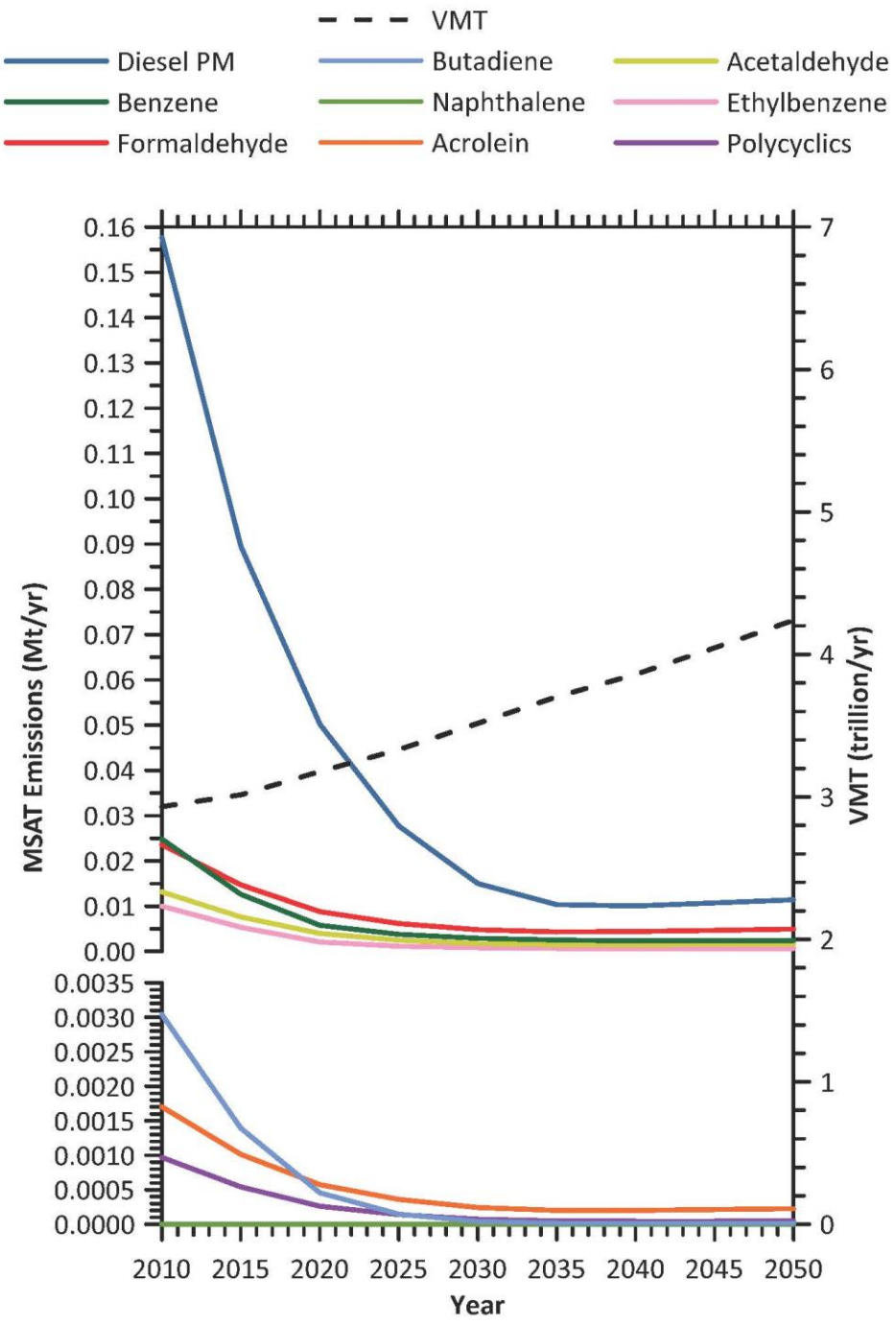
Using EPA's MOVES2014a model, as shown in the graphic on page 3-28, FHWA estimates that even if VMT increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period.

FHWA has provided updated interim guidance on addressing MSATs in the NEPA analysis through *Memorandum HEPN-10: Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*.[67] This EA includes a basic analysis of the likely MSAT emission impacts of the proposed project. A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. However, available technical tools do not enable FHWA to predict the project-specific health impacts of the emission changes associated with the alternatives in this re-evaluation. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR §1502.22(b)) regarding incomplete or unavailable information.

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

[65] 79 FR 60344
[66] USEPA, *EPA Releases MOVES2014a Mobile Source Emissions Model: Questions and Answers*, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NNR0.txt, (December 8, 2016).
[67] FHWA, *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*, https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/2016msat.pdf, October 18, 2016, (January 25, 2017).

FHWA Projected National MSAT Emissions Trends 2010-2050 for Vehicles Operating on Roadways Using EPA's MOVES2014 Model



USEPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. USEPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain IRIS, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects. Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations[68] or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI.[69] As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. USEPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently

[68] Health Effects Institute, Special Report 16: Mobile Source Air Toxics – A Critical Review of the Literature on Exposure and Health Effects, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects, November 2007, (December 8, 2016).
[69] *Ibid.*

confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk."[70]

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by USEPA as provided by the CAAA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires USEPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld USEPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.[71]

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

For the preferred alternative in this EA, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for the Build Alternatives is slightly higher than that for the No Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT would lead to higher MSAT emissions for the preferred action alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to USEPA's MOVES2014 model, emissions of all of the priority MSAT decrease as speed increases. It is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of USEPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent

[70] USEPA, IRIS Database, "Diesel Engine Exhaust, Section II.C." https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642.htm#quainhal, (December 8, 2016).
[71] United States Court of Appeals, *Case No. 07-1053: Natural Resources Defense Council and Lousiana Environmental Action Network vs. Environmental Protection Agency,* https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf , (December 8, 2016)

between 2010 and 2050.[72] Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the USEPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

The additional travel lanes contemplated as part of the project alternatives will have the effect of moving some traffic closer to nearby homes, schools, and businesses; therefore, there may be localized areas where ambient concentrations of MSAT could be higher under the Preferred Alternative than the No-Build Alternative. However, the magnitude and the duration of these potential increases compared to the No-Build alternative cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. In sum, when a highway is widened, the localized level of MSAT emissions for the Preferred Alternative could be higher relative to the No-Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSAT will be lower in other locations when traffic shifts away from them. However, on a regional basis, USEPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

3.8.3 Temporary Impacts to Air Quality

Temporary air quality impacts could occur during construction and would be in the form of emissions from construction equipment, dust from construction embankment, and clearing of areas prior to paving or revegetation. During construction, slowed traffic through construction areas may produce additional emissions.

Emissions from construction equipment are anticipated to have a minimal impact on air quality due to the short time period it would take to construct the proposed roadway improvements. Construction equipment would be maintained in satisfactory condition to meet minimum exhaust emission standards. In accordance with Section 107.07 of the *South Carolina Highway Department Standard Specifications for Highway Construction*,[73] the contractor will comply with *South Carolina Air Pollution Control Laws, Regulations and Standards*.[74] The contractor will also comply with county and other local air pollution regulations. Contractors will be required to comply with all regulations and standards for construction outlined in the *South Carolina Standard Specifications for Highway Construction* to reduce dust. Typically, BMPs include vegetative cover, mulch, spray-on adhesive, calcium chloride application, water sprinkling, stone, tillage, wind barriers, and construction of a temporary graveled entrance/exit to the construction site. Vehicles sitting in queue, waiting to go around construction work, would contribute more to air emissions, but this would only temporarily impact air quality.

[72] FHWA, Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/index.cfm, October 12, 2016, (December 8, 2016).
[73] SCDOT, *Standard Specifications for Highway Construction*, 2000.
[74] SCDHEC Bureau of Air Quality Control, *South Carolina Air Pollution Control Laws, Regulations, and Standards.*

The project study area is in an attainment area for NAAQS, and air quality impacts resulting from project construction would be temporary in nature.

Greenhouse gases (GHGs) are those that trap heat in the atmosphere of the Earth, and include carbon dioxide, methane, nitrous oxide, and fluorinated gases.[75] According to USEPA, the most common of the GHGs is carbon dioxide (CO_2), which accounted for almost 81% of all U.S. GHG emissions due to human activities in 2014. The combustion of fossil fuels, land use changes, as well as some industrial processes are the main emission generators of greenhouse gases.[76] In 2014, the transportation sector was responsible for almost 27% of the CO_2 emissions in the US.[77] Because GHGs trap heat in the atmosphere, the outcome has been a warming of the Earth's temperature, which has led to a change in the climate of the Earth, resulting in more extreme weather events, melting of glaciers, and sea level rise.[78]

On August 2, 2016, the Council on Environmental Quality (CEQ) issued *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews*. While this guidance does not legally require agencies to mitigate for impacts to the climate due to GHG emissions, it does direct agencies to disclose the potential amounts of GHG being released due to the agency's action, as well as the agency's influence on climate change.

3.8.3.1 GHG Analysis

For this project, the operations, fuel cycle, and construction/maintenance emissions were estimated. A GHG Analysis was completed for the Existing Condition, No-build Alternative and the Reasonable Alternatives, and included the emissions from constructions, operations, and fuel cycle. Operations and fuel cycle emissions were determined for the No-build Alternative and Preferred Alternative using lookup tables from MOVES2014a provided by FHWA. Since the reasonable alternatives are all located in close proximity to each other, the GHG analysis for the Preferred Alternative was completed only and is representative for all build alternatives. The results of the analysis are shown below in **Table 3.9** and the assumptions are included in **Appendix G**. The amount of CO2e emitted would be expected to decrease with the advent of better technologies between now and 2040, as noted in the table.

[75] USEPA, "GHG Overview," https://www.epa.gov/ghgemissions/overview-greenhouse-gases. (Last accessed 11/28/16).
[76] *Ibid.*
[77] USEPA, "Greenhouse Gas Inventory Data Explorer," https://www3.epa.gov/climatechange/ghgemissions/inventoryexplorer/#allsectors/allgas/econsect/current. (Last accessed 11/28/16).
[78] USEPA, "Climate Change Basic Information," https://www.epa.gov/climatechange/climate-change-basic-information. (Last accessed 11/28/16).

Table 3.9 Project CO2e Emissions and Fuel Cycle Emissions			
	Existing Condition (2015)	No-Build Alternative (2040)	Preferred Alternative* (2040)
CO2e operations emissions and fuel cycle emissions (metric tons)	17,315	15,875	15,875
* Note: for this project, the reasonable alternatives are very similar; thus, the GHG analysis was completed for the Preferred Alternative only.			

To determine the construction and maintenance emissions over the lifespan of the project, the FHWA's Infrastructure Carbon Estimator (ICE) Tool was used. The ICE Tool can be used to create estimates of energy usage and GHG emissions for a life-cycle of a project, including construction/rehabilitation and routine maintenance. However, it should be noted that this tool is not appropriate to inform engineering analysis and pavement selection.[79] The assumptions used for the ICE Tool are included in **Appendix G**. The results shown **Tables 3.10 and 3.11** include both annualized energy use and annual GHG emissions, per year over the 25-year analysis cycle, and include both unmitigated and mitigated scenarios.

Table 3.10 Annualized energy use (mmBTUs), per year over 25 years												
	Unmitigated						Mitigated					
	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total
Upstream Energy												
Materials	1,593	2,051	3,644	260	440	**4,344**	1,593	1,716	3,309	260	440	**4,009**
Direct Energy												
Construction Equipment	616	325	941	1,010	82	**2,033**	616	272	888	-	82	**970**
Routine Maintenance						**198**						**198**
Total	**2,209**	**2,376**	**4,585**	**1,270**	**522**	**6,575**	**2,209**	**1,988**	**4,197**	**260**	**522**	**5,177**

[79] FHWA, "Infrastructure Carbon Estimator Final Report and User's Guide," September 2014, https://www.fhwa.dot.gov/environment/climate_change/mitigation/tools/carbon_estimator/users_guide/page00.cfm. (Last accessed 11/28/16.)

Table 3.11
Annual GHG emissions (MT CO2e), per year over 25 years

	Unmitigated						Mitigated					
	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total
Upstream Emissions												
Materials	104	121	225	27	25	**277**	104	104	208	27	25	**260**
Direct Emissions												
Construction Equipment	45	24	69	8	6	**83**	45	21	66	8	6	**80**
Routine Maintenance						**14**						**14**
Total	**149**	**145**	**294**	**35**	**31**	**374**	**149**	**125**	**274**	**35**	**31**	**354**

3.8.3.2 Climate Change's Impact on the Proposed Project

As previously discussed in **Section 3.11.1**, the proposed project is located within the 100-year floodplain, and the 100-year flood limits are based on hurricane storm surge from the Atlantic Ocean. Sea level rise could be a potential climate change impact to this project over time due to the influence of the Atlantic Ocean into the Back River during storm surges. U.S. Route 17 is a major north-south route and cannot be relocated to avoid this area. The proposed project would be built primarily within the existing right-of-way, but the road bed may be raised slightly during construction to account for soil subsidence. This would result in a higher road that would be less subject to overtopping during smaller storm surge events. In addition, a detailed hydraulic analysis will be completed during final design and could incorporate other resiliency measures at that time.

3.9 Hazardous Materials/Hazardous Wastes

Hazardous materials are generally defined as any material that has or will have, when combined with other materials, a harmful effect on humans or the natural environment. Hazardous materials may be in the form of a solid, sludge, liquid, or gas and are characterized as reactive, toxic, infectious, flammable, explosive, corrosive, or radioactive.[80] A hazardous material that has been used and discarded is considered a hazardous waste. The *Resource Conservation and Recovery Act of 1976* (RCRA) and the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act of 1986* (SARA), regulate hazardous material sites. In addition, the United States Environmental Protection Agency and South Carolina Department of Health and Environmental

[80] RCRA Subtitle C, 40 CFR Part 251.

Control (SCDHEC) maintain a list of regulated sites or facilities in order to regulate businesses and individuals that handle hazardous materials.

3.9.1 Hazardous Materials/Wastes within the Study Area

The EPA website databases[81] were accessed to determine potential hazardous material/waste sites within the study area. The database search found three potential sites near the study area; SCAD, Caribbean Lumber Company, Inc. and Bilbia, Inc. The SCAD facility is an equestrian center and sports complex used by the Savannah College of Art and Design located in the northern portion of the study area (in SC) with frontage along U.S. 17. Biblia, Inc., is a marine towing company located on the Savannah River, east of U.S. 17 (in GA). Caribbean Lumber Inc., is a lumber preserving facility located on Hutchinson Island, east of U.S. 17 (in GA).

The database provided detailed information regarding each facility and/or violations. This information was provided in the form of an Enhanced Compliance History Online (ECHO) report. Based upon information in the ECHO report, SCAD and Bilbia, Inc. are registered as Conditionally Exempt Small Quantity Generators (CESQG) because they produce less than 220 pounds of hazardous waste (or less than 2.2 pounds of acutely hazardous waste) per month. The Caribbean Lumber Company is listed in the Toxic Release Inventory System.[82] None of the facilities has any record of violations or hazardous material/waste releases.[83] [84]

3.9.2 Impacts to Hazardous Materials/Hazardous Wastes

Based on the findings of the preliminary assessment, further environmental investigation of the aforementioned facilities is not recommended. Utilizing aerial photography and the proposed project limits, it does not appear that acquisition of any hazardous areas from these locations would be necessary. In addition based upon the rural undeveloped nature of the majority of the adjacent area, additional unknown sites are not likely to be present. Therefore, it is not likely that any hazardous material/wastes sites are in the footprint of the propose project. Therefore, the Preferred Alternative is not anticipated to have an impact to hazardous materials. No impacts to hazardous materials site would also occur under the No-build Alternative. If encountered during construction, contaminated soil or other hazardous materials would be tested and removed and/or treated in accordance with USEPA and SCDHEC requirements.

A Spill Prevention, Control and Countermeasures (SPCC) plan would be in place to address accidental releases of fuel or hydraulic fluids from construction equipment. In the event a spill occurs during construction, work will stop until the National Response Center is notified at 1-800-424-8802 and any required action is taken.

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[81] EPA, Envirofacts website, available online at: http://www.epa.gov/enviro/index.html July 26, 2016).
[82] USEPS, FRS Facility Detail Report, Caribbean Lumber Co. Inc., EPA Registry ID 110007485293, https://iaspub.epa.gov/enviro/fii_query_detail.disp_program_facility?p_registry_id=110007485293 (July 21, 2016).
[83] USEPA, RCRAinfo Facility Information, Biblia Inc., Handler ID GAR000022723, https://ofmpub.epa.gov/enviro/rcrainfoquery_3.facility_information?pgm_sys_id=GAR000022723 (July 21, 2016).
[84] USEPA, RCRAinfo Facility Information, Savannah College of Art and Design, Hander ID SCR000771717, https://ofmpub.epa.gov/enviro/rcrainfoquery_3.facility_information?pgm_sys_id=SCR000771717 (July 21, 2016).

3.10 WATER QUALITY

3.10.1 Ground Water

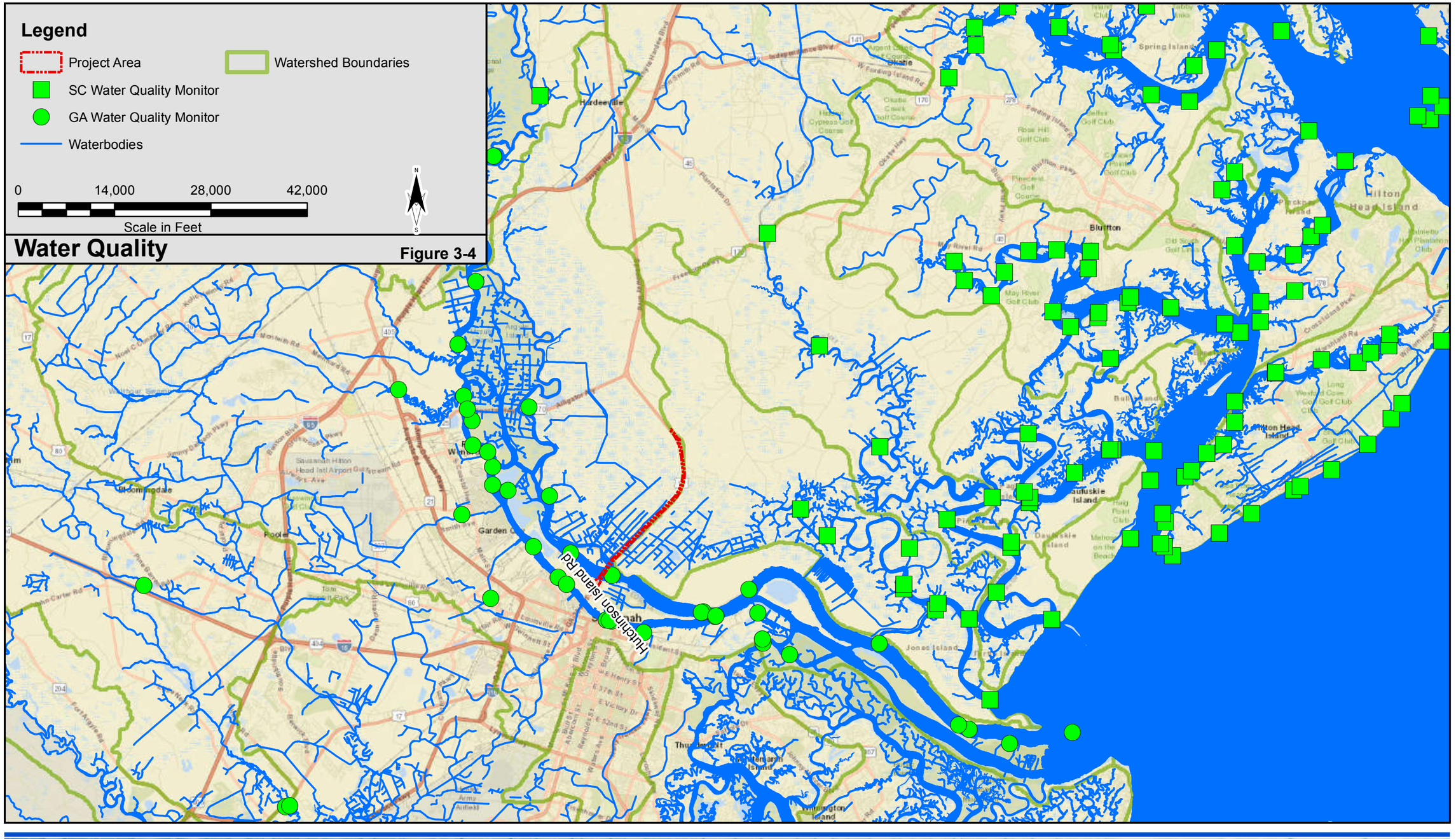
The study area is situated in the Lower Coastal Plain above the Southeastern Coastal Plain Aquifer System, which is comprised of seven regional aquifers and four major confining layers. The regional aquifers in descending order are the Surficial Aquifer, the Tertiary Sand/Limestone Aquifer, the Black Mingo Aquifer, the Pee Dee Aquifer, the Black Creek Aquifer, the Middendorf Aquifer, and the Cape Fear Aquifer.[85] With the exception of the Cape Fear Aquifer, all of these aquifers are used to some extent in South Carolina. The most widely used aquifers in the Lower Coastal Plain are the Middendorf and Tertiary Sand/Limestone Aquifers.[86]

SCDHEC has established an ambient groundwater quality monitoring network to determine statewide and aquifer-specific baseline values for groundwater quality within each of the nine regional aquifers in South Carolina.[87] Each year, a selection of wells from a specific area is sampled on a five-year rotation. The closest SCDHEC monitoring well, AMB-097, is located approximately eight miles northeast of the study area in Hardeeville, SC (refer to **Figure 3-4**) and within the Tertiary Sand/Limestone Aquifer[88]. Ground water at this location is considered "Class GB," which includes all ground waters of the state that qualify as underground sources of drinking water.[89]

GADNR-EPD relies on the United States Geological Survey's (USGS) daily-data groundwater monitoring sites located in the coastal Georgia region for monitoring ground water supplies. All of the USGS's monitoring sites are located southwest of the City of Savannah and not within the vicinity of the study area.[90] However, based upon March 2010 Water Resource Assessments compiled by GADNR-EPD, there is no evidence that there will be future impacts to any aquifers from increased usage.[91]

It is not likely that the Preferred Alternative would impact groundwater resources in the study area. Most of the groundwater aquifers, with the exception of the Surficial Aquifer, are located in confined units deep below the earth's surface. The Surficial Aquifer, due to its proximity to the surface of the earth, its variability in depth, and that it is an unconfined unit, could be impacted during construction. The Surficial Aquifer could be exposed during the grading activities for the newly paved areas of the Preferred Alternative, leading to sediment entering the aquifer. Soluble materials such as petroleum products could be leaked or spilled during

[85] SCDNR, 2009, *South Carolina State Water Assessment, Second Edition*, p. 3-17, http://www.dnr.sc.gov/water/hydro/HydroPubs/assessment/SC_Water_Assessment_2.pdf (July 26, 2016).
[86] SCDHEC, *South Carolina Water Use Report: 2006 Annual Summary*, Technical Report 004-07, July 2007, p. 5-6.
[87] SCDHEC, *Watershed Water Quality Assessment: Savannah River Basin*, 2010, p.15, http://www.scdhec.gov/HomeAndEnvironment/Docs/savannah.pdf July 26, 2016).
[88] *Ibid*. p. 155
[89] SCDHEC, R.61-68, *Water Classifications and Standards*, Effective June 22, 2012, p. 39, http://www.scdhec.gov/environment/water/regs/R.61-68.pdf (July 26, 2016).
[90] USGS, Coastal Georgia Water Planning Region Groundwater sites, http://ga.water.usgs.gov/waterplanning/regions/cga/sitesgw.html, (July 26, 2016)
[91] GADNR-EPD, *Ground water Availability*, 2010, http://www.coastalgeorgiacouncil.org/pages/resource_assessments/ground_water_availability.php, (July 26, 2016).


Legend
Project Area
Watershed Boundaries
SC Water Quality Monitor
GA Water Quality Monitor
Waterbodies
0
14,000
28,000
42,000
Scale in Feet
N
S
Water Quality
Figure 3-4
Hardeeville
Bluffton
Hilton Head Island
Spring Island
Daufuskie Island
Jones Island
Garden City
Pooler
Bloomingdale
Thunderbolt
Whitemarsh Island
Wilmington Island
Huguenin Island Rd

construction enter into exposed areas of the Surficial Aquifer, and cause contamination. However, Best Management Practices (BMPs) would be in place during construction, which would include an SPCC Plan to manage spills and leaks of soluble materials so as to limit potential impacts.

3.10.2 Surface Waters

The study area traverses one river basin (Savannah) and one watershed (Lower Savannah). SCDHEC produces a Watershed Water Quality Assessment (WWQA) to meet Section 305(b) of the *Clean Water Act*. Each basin in the state has an updated WWQA produced every five years. The Section 305(b) documentation serves to evaluate the extent to which surface waters are supporting their designated uses for categories such as drinking water supply, aquatic life, recreation use, and fish consumption. The most recent WWQA for the Savannah River Basin was completed in 2010, GADNR EPD DWQ also has a River Basin Management Plan for the Savannah River Basin that was completed in 2001.[92] Information from these documents was used to describe the watershed units in the study area.

The study area is located in the Savannah River Basin and more specifically in the Lower Savannah River Basin. Within the Lower Savannah River basin, the project corridor lies in Hydrologic Unit Code (HUC) 0306010903, which occupies 285,167 acres (49.5 percent of which are outside of South Carolina) of the Coastal Zone region, a mostly tidally-influenced area that is nearly level and dissected by many broad, shallow valleys with meandering stream channels; most of the valleys terminate in tidal estuaries along the coast. [93]

Numerous man-made canals are located within or in the vicinity of the portion of the project situated in the Savannah River Basin, including Shubra Canal, Clydesdale Canal, and Murray Hill Canal, all of which drain into the Back River prior to its confluence with the Savannah River. The Back River is classified as Freshwater (FW) by SCDHEC at the U.S. 17 bridge.[94] A freshwater classification is applied to water bodies that are suitable for primary and secondary contact recreation, as a drinking water supply source (after appropriate treatment), fishing, the survival and propagation of balanced indigenous aquatic communities of fauna and flora, and for industrial and/or agricultural uses.[95] The confluence of the Back River and the Savannah River is located approximately three river-miles downstream from the existing U.S. 17 bridge over the Back River. Numerous canals also extend to the east of U.S. 17 carrying flow between the Wright River to the east and the Back River to the south. The Wright River is classified as Salt Water – Class A (SA) by SCDHEC, downstream and east of the project area.[96] This classification comprises "tidal saltwaters" suitable for primary and secondary contact recreation, crabbing and fishing. These waters are not protected for harvesting of

[92] GADNR-EPD, *Savannah River Basin Management Plan 2001*, http://epd.georgia.gov/savannah-river-basin-watershed-protection-plan, (July 26, 2016).
[93] SCDHEC, *Watershed Water Quality Assessment: Savannah River Basin*, 2010, p.153, http://www.scdhec.gov/HomeAndEnvironment/Docs/savannah.pdf (July 26, 2016).
[94] SCDHEC, Water Quality Information Tool, http://gisweb01.dhec.sc.gov/water/Stormwater.html?mode=1 (July 26, 2016).
[95] *Ibid*, p. 6.
[96] SCDHEC, Water Quality Information Tool, http://gisweb01.dhec.sc.gov/water/Stormwater.html?mode=1/ (July 26, 2016).

clams, mussels, or oysters for market purposes or human consumption. The waters are suitable for the survival and propagation of a balanced indigenous aquatic community of marine fauna and flora.[97]

3.10.3 Impacts and Minimization Measures

An estimated 38 acres of new impervious surface area would be created with the widening of U.S. 17 and construction of the bridge over the Back River under the Preferred Alternative. No impacts would occur under the No-build Alternative. The proposed project has the potential to contribute to increased storm water runoff related to vehicle operation on the highway. Runoff from roadway surfaces can contain materials such as brake dust from vehicles, petroleum products, heavy metals, and trash. SCDOT stormwater BMPs would be utilized as necessary to minimize any water quality impacts to the adjacent waterbodies. Where possible, grassed swales, detention areas and/or engineered treatment systems would be implemented to address water quality concerns.

The Section 303(d) documentation is a comprehensive list of water bodies that do not support their designated use classifications and are considered impaired. SCDHEC and GADNR-EPD develop a priority list of water bodies pursuant to Section 303(d) of the *Clean Water Act* (CWA), as well as in accordance with 40 CFR §130.7. The South Carolina and Georgia Section 303(d) Lists, published in 2015 identify the water bodies that do not meet state water quality standards after the application of required controls for point and non-point source pollutants, as well as priority water bodies to which the resource agencies can direct their attention when developing required controls such as Total Maximum Daily Loads (TMDLs).[98] Watersheds that consistently fail to meet their designated uses are required to develop TMDLs per Section 303 of the CWA. A TMDL is a calculation of the total amount of pollutant a water body can accept from point and non-point sources and still meet water quality standards.[99] Existing and future projects or facilities discharging into a watershed with a TMDL in place must coordinate with state water quality agencies to ensure compliance with the TMDL.

The resource agencies evaluate water bodies based upon a permanent monitoring network of water quality sampling stations located throughout each watershed to develop the WWQA and determine waterbodies that need to be included on the 303(d) list.

There are no SCDHEC surface water quality monitoring stations located in the study area or project vicinity. Based on the SCDHEC, Water Quality Information Tool, there are currently no water quality monitoring stations downstream of the project on the Back River or the Savannah River. However, GADNR-EPD maintains five monitoring stations downstream of the project, one of which, R030601090318 - Savannah Harbor, is listed on the 2014 Section 303(d) List as not supporting designated use (coastal fishing) due to dissolved oxygen, and a

[97] SCDHEC, *Watershed Water Quality Assessment: Savannah River Basin*, 2010, p.6, http://www.scdhec.gov/HomeAndEnvironment/Docs/savannah.pdf (July 26, 2016).
[98] SCDHEC, *The State of South Carolina's 2014 Integrated Report, Part I: Listing of Impaired Waters,* http://www.scdhec.gov/HomeAndEnvironment/Docs/tmdl_14-303d.pdf (July 26, 2016).
[99] USEPA, "Introduction to TMDLS," https://www.epa.gov/tmdl (July 26, 2016).

TMDL was developed in 2006.[100] The TMDL for dissolved oxygen was withdrawn by the EPA in 2016, and water was moved to Category 5R.[101] Category 5R indicates that active remediation efforts are planned to reduce pollutant load in the affected waterbody.[102] The 2014 Section 303(d) lists the potential causes as municipal facilities, industrial facilities, and/or urban runoff/urban effects. The 2014 Section 303(d) list has removed all of the stations off the Not Supporting list and now has the Back River as Supporting All Uses.[103]

The project area also drains to the Wright River, where SCDHEC does maintain a monitoring station downstream of the project area, RT-10133. This station is not currently listed in the Section 303(d) list and according to the SCDHEC Water Quality Information Tool, is fully supporting all parameters assessed at this station.[104] There is also SCDHEC shellfish monitoring station downstream of RT-10133, station 19-20, which is also not listed on the Section 303(d) List, and is fully supporting all parameters assessed.[105]

3.10.4 Drinking Water

Drinking water is supplied to the northern portion of the study area by the Beaufort – Jasper Water and Sewer Authority, which relies on surface water from the Savannah River and ground water from the Floridian Aquifer for its water supply. The remaining portions of the study area in South Carolina do not receive public water service and it is anticipated that these areas would utilize groundwater wells for water service. The northern portion of the study area is in the Levy-Limehouse-Bellinger Hill Service Area, and receives water from a Floridian Aquifer Well.[106] The Floridian Aquifer is located from southern Florida along the Atlantic coast into South Carolina, and along to Gulf into eastern Mississippi, and is located within the study area.[107] However, no impacts to ground water are anticipated to result from implementation of the Preferred Alternative and would not have a negative impact on drinking water. There would be no impacts to groundwater under the No-build Alternative. The portion of the study area in Georgia is serviced by the City of Savannah, Department of Public Works for both water and sewer service. Drinking water for the City of Savannah is supplied by a number of

[100] GADNR-EPD, 2014 Integrated 305(b)/303(d) List, Sounds and Harbors, http://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/CY_2014_305b303d_SoundsHarbors.pdf (July 21, 2016).
[101] USEPA, Savannah Harbor TMDL Withdrawal Letter (May 13, 2016), http://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/EPA_Savannah_Harbor_TMDL_Withdrawal_Letter.pdf (July 21, 2016).
[102] GADNR- EPD, Notice of Availability of a Listing of Waterbodies Pursuant to Section 303(d) of the *Clean Water Act* (October 9, 2015), http://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/Public%20Notice%20Savannah%20Harbor%205R.pdf (July 212, 2016).
[103] GADNR-EPD, Georgia 2014 305(b)/303(d) List Documents, Coastal Streams, http://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/CY_2014_305b303d_CoastalStreams.pdf (July 26, 2016).
[104] SCDHEC, *The State of South Carolina's 2014 Integrated Report, Part I: Listing of Impaired Waters,* http://www.scdhec.gov/HomeAndEnvironment/Docs/tmdl_14-303d.pdf (July 26, 2016).
[105] *Ibid.*
[106] Beaufort-Jasper Water and Sewer Authority, *2012 Water Quality Report*, page 2 http://www.bjwsa.org/wp-content/uploads/2013/06/CCR_2016_PDF_for_water_delivered_2015-1.pdf, (July 26, 2016).
[107] USGS, Groundwater Atlas of the United States, Alabama, Florida, Georgia, and South Carolina, HA 730-G, Floridian Aquifer System, http://pubs.usgs.gov/ha/ha730/ch_g/G-Floridan.html (July 26, 2016).

wells throughout the city and Chatham County. The Department of Public Works operates eight separate water supply systems all supplied by groundwater wells.[108]

The project would involve work within the Back River. During construction activities, temporary siltation may occur in the creek beds and erosion would be of a greater degree than presently occurring on existing terrain. The contractor would be required to minimize this impact through implementation of construction BMP's, reflecting policies contained in 23 CFR 650 B and SCDOT's Supplemental Specifications on Seeding and Erosion Control Measures (August 15, 2001).

3.11 FLOODPLAINS

Executive Order 11988, Floodplain Management, requires that efforts be made by federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplains. When there is a practicable alternative, federal agencies are required to avoid direct or indirect support of floodplain development. In addition, this Executive Order prohibits floodplain encroachments that are uneconomic, hazardous, or would result in incompatible development of the floodplain. The Executive Order also prohibits any action that would cause a critical interruption of an emergency transportation facility, a substantial flood risk, or an adverse impact on the floodplain's natural resource values.

The 100-year floodplain boundary delineates the flood elevation that has a one percent chance of being equaled or exceeded each year. All floodplains in the study area are categorized as Zone AE, meaning that the area is a 100-year floodplain for which Base Flood Elevations (BFEs) have been established;[109] the floodplains are subject to regulation by FEMA. The floodway is the "channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height."[110] Encroachments into the floodplain or are discouraged, since it removes floodwater storage capacity. If impacts cannot be avoided, measures must be implemented to minimize impacts and restore the floodplain to the extent possible.[111] Federal regulations will allow development in the 100-year floodplain or the floodway if it is demonstrated through hydrologic and hydraulic analysis that the development would meet the requirements set forth by the Federal Emergency Management Agency (FEMA). Encroachment into the floodway is prohibited unless it has been demonstrated that no rise in flood levels would result.[112]

3.11.1 Impacts

Based on a study of the Flood Insurance Rate Maps (FIRM), published by FEMA, the Preferred Alternative would involve construction within the 100-year flood limits of waterways within

[108] Savannah Department of Public Works, *Water Supply & Treatment* http://www.savannahga.gov/index.aspx?nid=512, (July 26, 2016).
[109] FEMA, "Zone AE and A1-30," http://www.fema.gov/zone-ae-and-a1-30, (July 26, 2016).
[110] FEMA, "Floodway," http://www.fema.gov/floodplain-management/floodway, (July 26, 2016).
[111] FEMA, "Executive Order 11988: Floodplain Management," http://www.fema.gov/environmental-planning-and-historic-preservation-program/executive-order-11988-floodplain-management , (July 26, 2016).
[112] FEMA, Floodway, http://www.fema.gov/floodplain-management/floodway, (July 26, 2016).

the project area, including the Clydesdale Canal and the Back River (refer to **Figure 3-5**). The project is not expected to be a significant or longitudinal encroachment as defined under 23 CFR 650A, nor is it expected to have an appreciable environmental impact on this base floodplain. The project is not expected to have any increased potential for impact on those critical elements that would constitute a significant risk under 23 CFR 650A. A preliminary determination indicates that the project could be constructed to meet 'No-Rise' requirements. Since the 100-year flood limits within the study area is based on hurricane storm surge from the Atlantic Ocean the volume of fill associated with the project is negligible when compared to the volume of storm surge. A copy of the SCDOT Bridge Scope and Risk Assessment Form is included in **Appendix H**. As stated in the Bridge Scope and Risk Assessment Form, base flood elevations (BFEs) in coastal zones are determined by complex coastal models that include storm surge. These complex studies are for long stretches of coastline and were created using grids of several miles by several miles wide, so the resulting base flood elevations are not changed by minimal fill such as that associated with this project. Because of the scale and complexity of coastal models, FEMA does not require map revisions for fill in a coastal flood zone. FEMA is currently updating the storm surge studies for the coastal counties of South Carolina. The Jasper County Floodplain Manager should be consulted at the time of final design to ensure all local floodplain regulations are met. No impacts to floodplains would occur under the No-build Alternative.

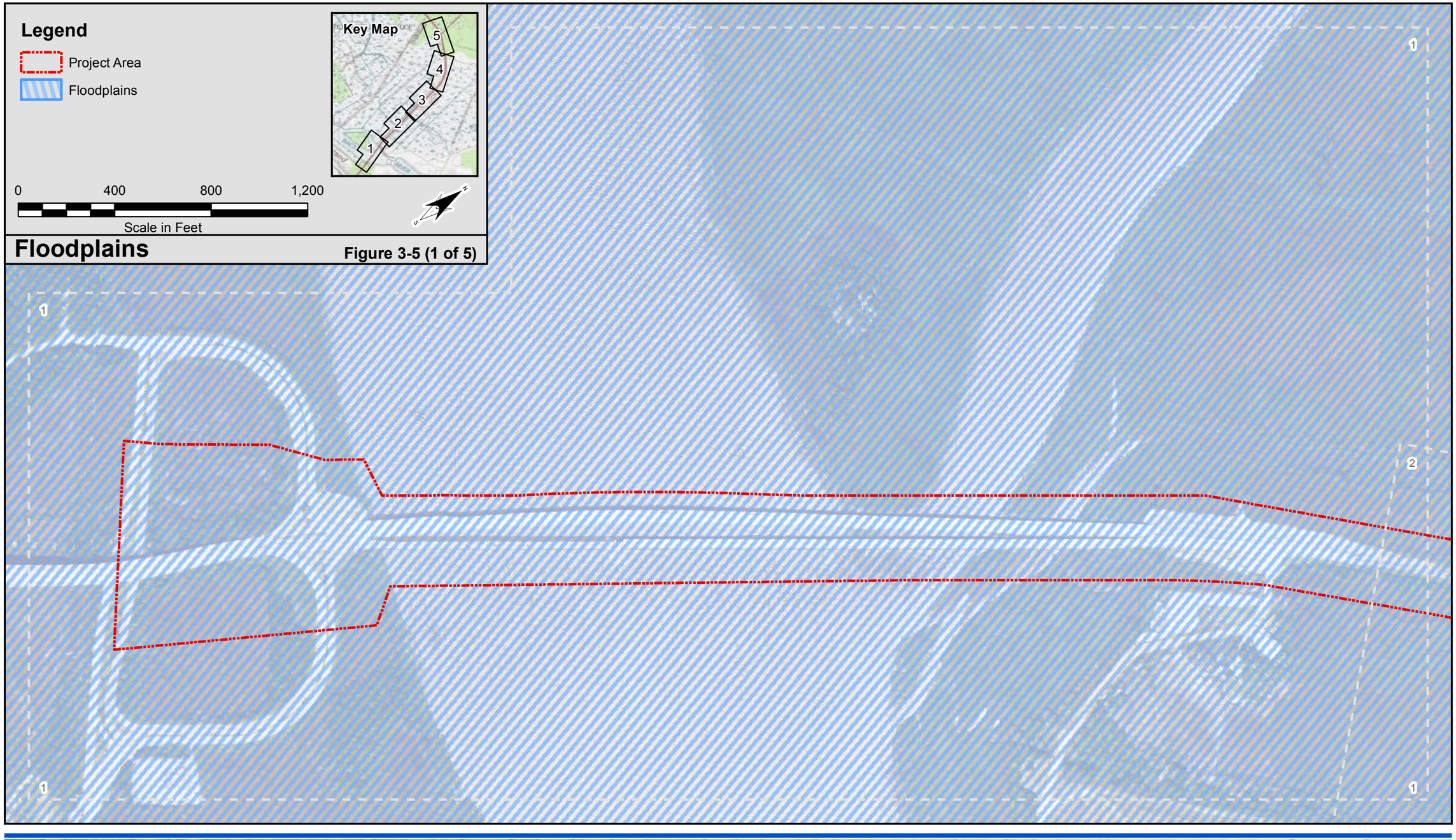
3.11.2 Minimization Measures

Due to the location of 100-year flood limits on both sides of the existing roadway, total avoidance of impacts to floodplains is not possible. Impacts to floodplains were considered throughout the preliminary design phase and were minimized in several ways. Utilizing as much of the alignment of the existing roadway as possible minimized the impact to adjacent 100-year flood limits. Using a narrower width median reduces the overall footprint of the proposed roadway and therefore, reduces the amount of fill in the adjacent floodplains. Design considerations of cross pipes and the Back River Bridge to allow free flow of water during flood events would reduce the impacts of potential flooding on upstream properties.

Coordination with FEMA would occur during future project phases, if required. The proposed project should be able to achieve a No Rise certification (no rise in flood levels resulting from the project) according to the SCDOT Bridge Scope and Reassessment Form and SCDOT Floodplains Checklist completed for the proposed project (refer to **Appendix H**). Detailed hydrologic studies would be completed during future design phases of the project, as required by 23 CFR 650, Subpart A, Location Floodplains, as well as coordination with the local delegated flood administrator to ensure that the project will meet state and federal requirements.

3.12 BIOTIC COMMUNITIES

Biotic communities were assessed in the study area based on data from federal and state agencies, published information with regards to habitat types, and field surveys conducted during the wetland delineation performed in 2008 and 2013. Natural areas observed within the study area were identified based on their vegetative composition, landscape position, soil type, and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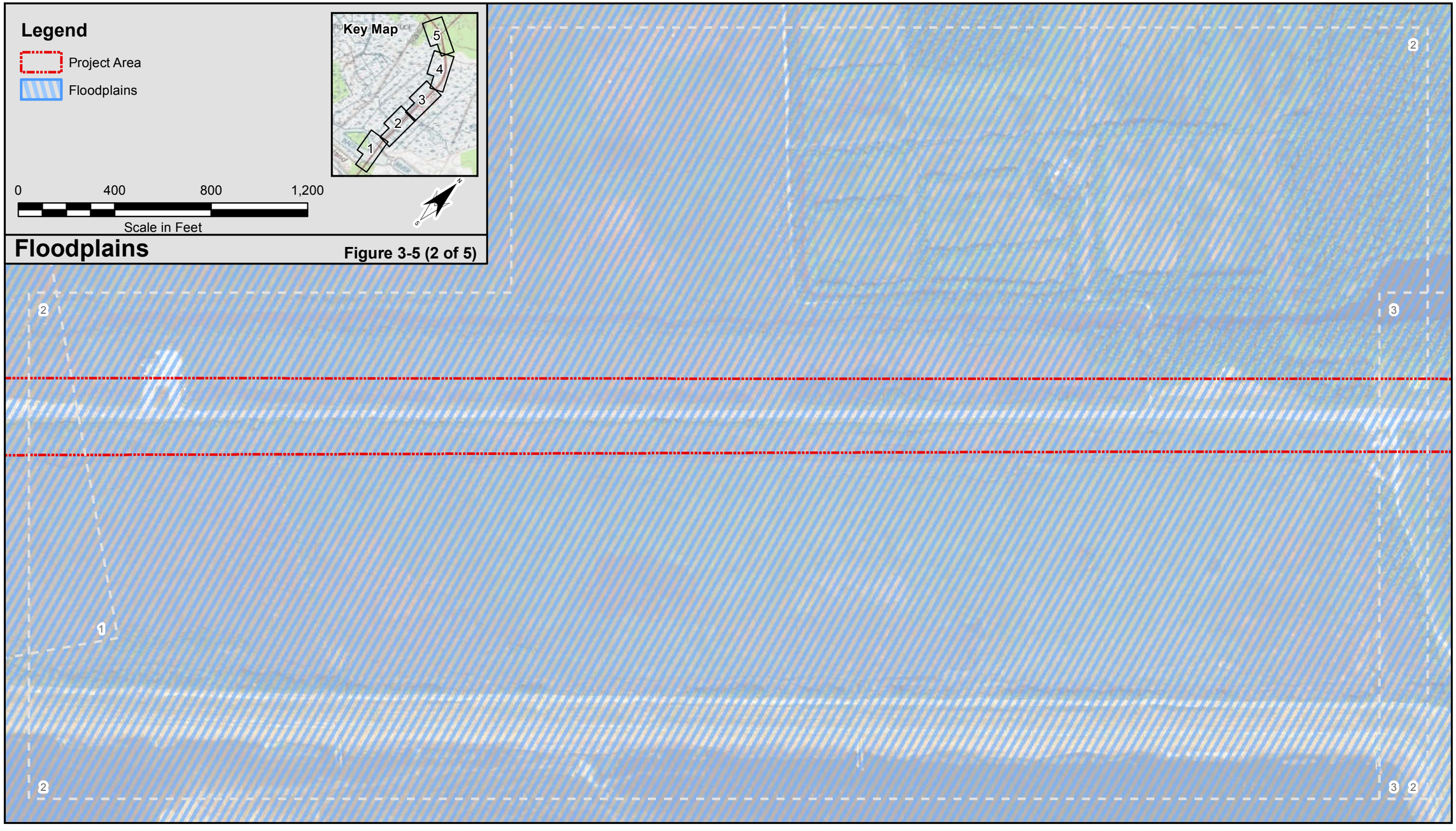
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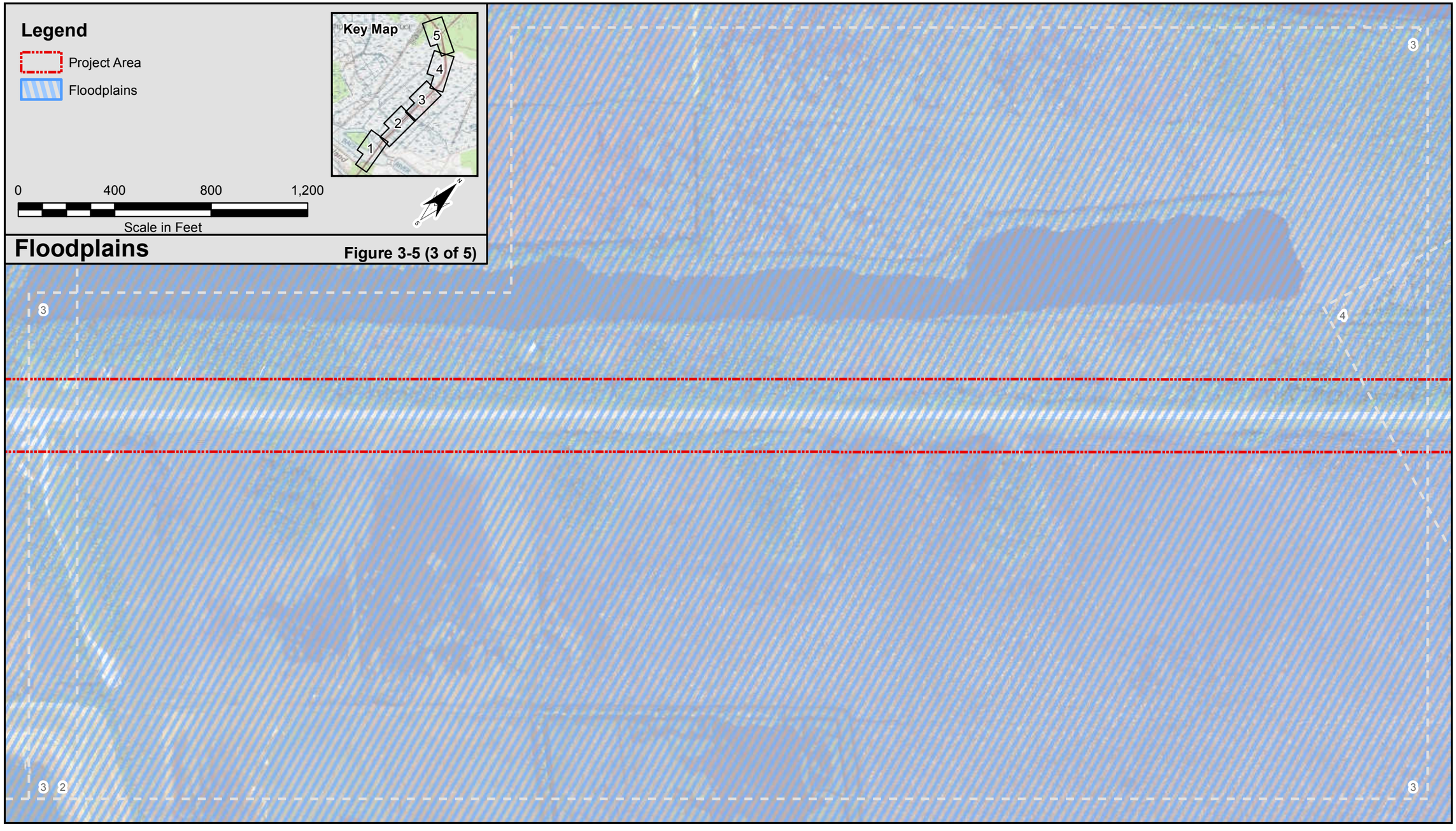
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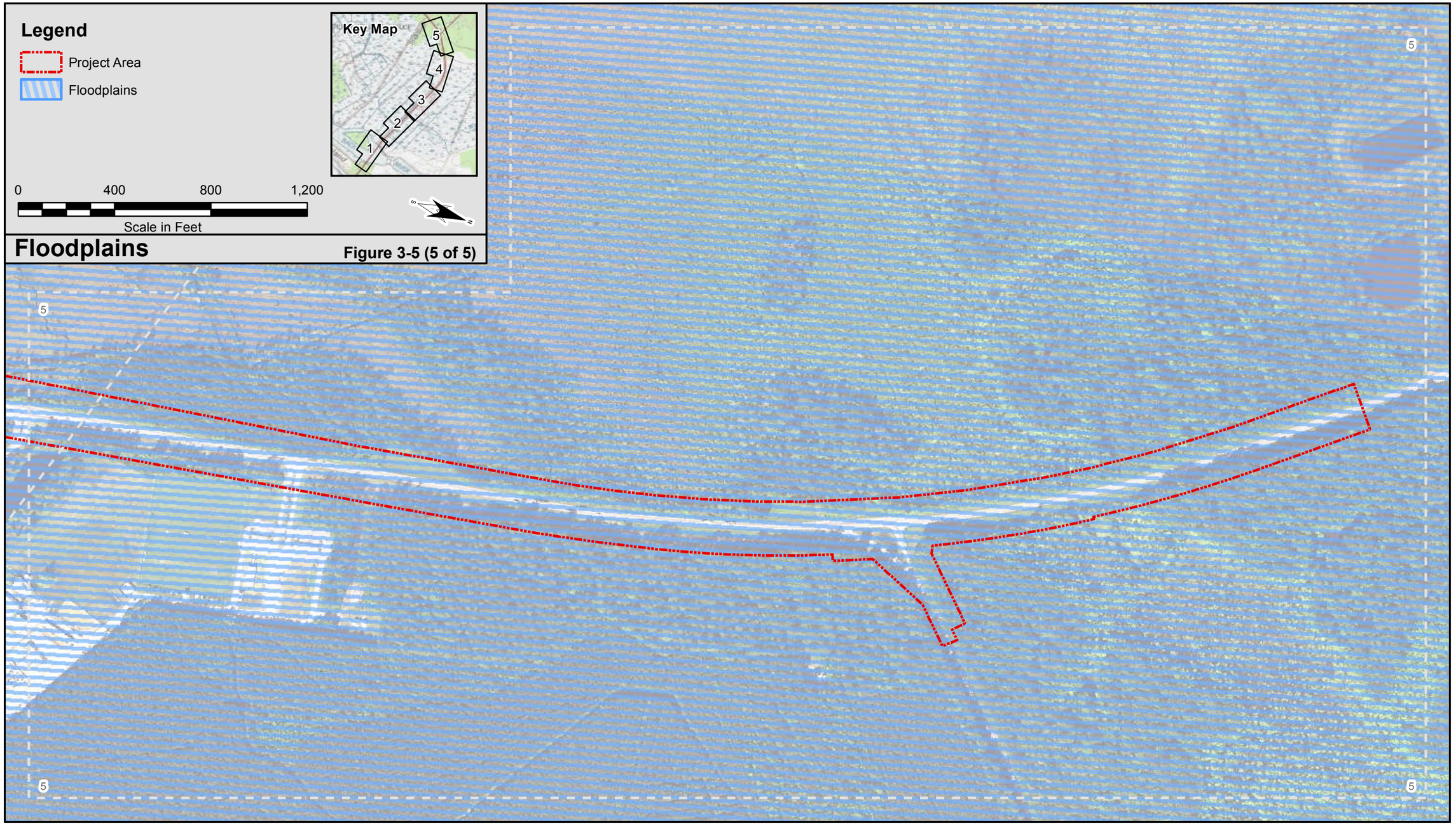
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Floodplains
Figure 3-5 (5 of 5)
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hydrologic regime and were classified by community type based on those found in *The Natural Communities of South Carolina*.[113]

Uplands are generally dry areas where the water table is one foot or more below the ground during the growing season. Mesic mixed hardwood forest, pine flatwoods/planted pine forests, and disturbed areas are upland types identified within the study area during field surveys.

Upland communities identified in the study area include planted pine stands, maintained roadsides, mixed hardwood forests, pine flatwoods, and commercial and institutional development. Wetland communities are discussed in **Section 3.13**. Dominant vegetation observed in the upland communities within the study area included sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), loblolly pine (*Pinus taeda*), red maple (*Acer rubrum*), Chinese tallow (*Triadica sebifera*), and southern red oak (*Quercus falcata*). Dominant understory vegetation included Chinese tallow, loblolly pine, water oak, winged sumac (*Rhus copallinum*), and sweetgum. Dominant shrub and herbaceous vegetation included wax myrtle (*Morella cerifera*), blueberry species (*Vaccinium* spp.), fescue species (*Festuca* spp.), blackberry species (*Rubus* spp.), crabgrass (*Digitaria* spp.), poison ivy (*Toxicodendron radicans*), and bahia grass (*Paspalum notatum*).

3.12.1 Mesic Mixed Hardwood Forest

Mesic mixed hardwood forests are uplands primarily on slopes and ravines in the Piedmont, but also occurring on the Coastal Plain on north-facing river bluffs. The canopy and understory is composed of a rich variety of hardwoods, and the herbaceous and shrub species are numerous. It may be difficult or impossible to recognize a single dominant species.[114] These forests identified within the Preferred Alternative study area during the field investigations were dominated by tulip-poplar (*Liriodendron tulipifera*), sweetgum (*Liquidambar styraciflua)*, red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), and white oak (*Quercus alba*). The understory had hornbeam (*Carpinus caroliniana*), American holly (*Ilex opaca)*, horse-sugar or sweetleaf (*Symplocos tinctoria*), and flowering dogwood (*Cornus florida*). The herbaceous layer included partridgeberry (*Mitchella repens*), heartleaf (*Hexastylis arifolia*), and pipsissewa (*Chimaphila maculata*).

3.12.2 Pine Flatwoods

This is the dominant natural upland habitat in the study area. Pine flatwoods are uplands with an essentially flat or rolling terrain, sandy soil, and a high water table. They have a canopy of pines and a well-developed sub-canopy of several tall shrub species. These habitats are successional from the abandonment of cropland, and quickly succeed to deciduous hardwood-dominated forests. If fire is maintained, they frequently grade into pine savannah habitat.[115] Pine flatwoods identified within the study area were dominated by loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), black gum, red maple, black cherry (*Prunus serotina*), and sweetgum in the canopy or near-canopy layer. The understory consisted of sweetleaf,

[113] John B. Nelson, *The Natural Communities of South Carolina: Initial Classification and Description* (Columbia, SC: S.C. Wildlife & Marine Resources Department Division of Wildlife and Freshwater Fisheries, 1986).
[114] *Ibid.*
[115] *Ibid.*

sparkleberry (*Vaccinium arboreum*), wax myrtle (*Morella cerifera*), persimmon (*Diospyros virginiana*), and beautyberry (*Callicarpa americana*), with the occasional eastern red cedar (*Juniperus virginiana*), highbush blueberry (*Vaccinium corymbosum*), and sassafras (*Sassafras albidum*). Woody vines included briers (*Smilax rotundifolia*, and *S. glauca*), yellow jessamine (*Gelsemium sempervirens*), muscadine (*Vitis rotundifolia*), poison ivy (*Toxicodendron radicans*), and Japanese honeysuckle (*Lonicera japonica*). The herbaceous layer was dominated by bracken fern (*Pteridium aquilinum*), silver-leaved grass (*Heterotheca graminifolia*), and ebony spleenwort (*Asplenium platyneuron*).

3.12.3 Disturbed Areas

In addition to the natural areas described above, the study area contained extensive disturbed areas. Disturbed areas are those lands that have been highly impacted by the activities of man, and are either under cultivation for crops or timber production, or are built upon for residential or commercial purposes. Those identified within the study area during the wetland delineation included early successional fields/woods, man-made ditches and ponds, abandoned home sites, pine plantations, maintained lawns, parking lots, vacant lots, and commercial buildings.

3.12.4 Impacts to Upland Biotic Communities

Impacts to natural upland biotic communities would occur due to the clearing, fill, and excavation required for the wider roadway footprint. Impacts to wetland biotic communities are discussed in **Section 3.13**. Areas within the fill footprint would be permanently converted to maintained grassed areas. These areas would be planted with grass species (with seed mix specified by SCDOT and/or GDOT) by the contractor during construction. To meet the intent of EO 13112, the Department will ensure no invasive species shown by the U.S. Department of Agriculture, South Carolina's (USDA-SC) Noxious Weeds list[116] are planted as part of the revegetation and stabilization of the project site. The Contractor will follow the SCDOT Supplemental Technical Specification SC-M-810-3,[117] as amended, in regards to all other aspects of seeding operations. Some maintenance of areas outside of the fill areas could be required in the future, such as woody vegetation encroaching into the clear zone, or issues with lines of sight at intersections occur. The implementation of the Preferred Alternative would result in the permanent loss/conversion of approximately 8.15 acres of mixed mesic hardwood and 2.0 acres of pine flatwood habitats. While these areas would be permanently lost/converted, based on field investigations and review of aerial photography, these habitat types are plentiful in areas adjacent to the study area.

3.13 JURISDICTIONAL WATERS OF THE U.S. (WETLANDS, OPEN WATERS & STREAMS)

The *Clean Water Act* (33 USC 1344) is the primary law regulating wetlands and other waters of the U.S. The Act regulates the discharge of dredged or fill material into waters of the U.S., (including wetlands) through Section 404 permitting promulgated by the U.S. Army Corps of

[116] USDA-SC, "Noxious Weeds List," https://plants.usda.gov/java/noxious?rptType=State&statefips=45, (December 7, 2016).
[117] SCDOT, *Supplemental Technical Specification SC-M-810-3*, http://www.scdot.org/doing/technicalPDFs/supTechSpecs/SC-M-810-3.pdf, July 2015, (December 7, 2016).

Engineers (USACE) with oversight by USEPA. Executive Order 11990 (Protection of Wetlands) established a national policy to avoid adverse impacts on wetlands wherever there is a practicable alternative. FHWA set forth the Department of Transportation Order 5660.1A in 1978 to comply with this direction. Alternatives which avoid wetlands must be considered.

Wetland habitats are defined by USACE (33 CFR 328.3) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, a prevalence of vegetation typically adapted for life in saturated soil conditions."[118]

USACE utilizes specific hydrologic, soil, and vegetation criteria in establishing the boundary of wetlands within their jurisdiction. SCDHEC-OCRM also maintains jurisdiction over "critical areas" which can include certain types of wetlands, coastal waters, tidelands, and beach/dune systems within the seven coastal counties. Wetlands are specifically protected by laws and orders because of the functions and values they provide with respect to:

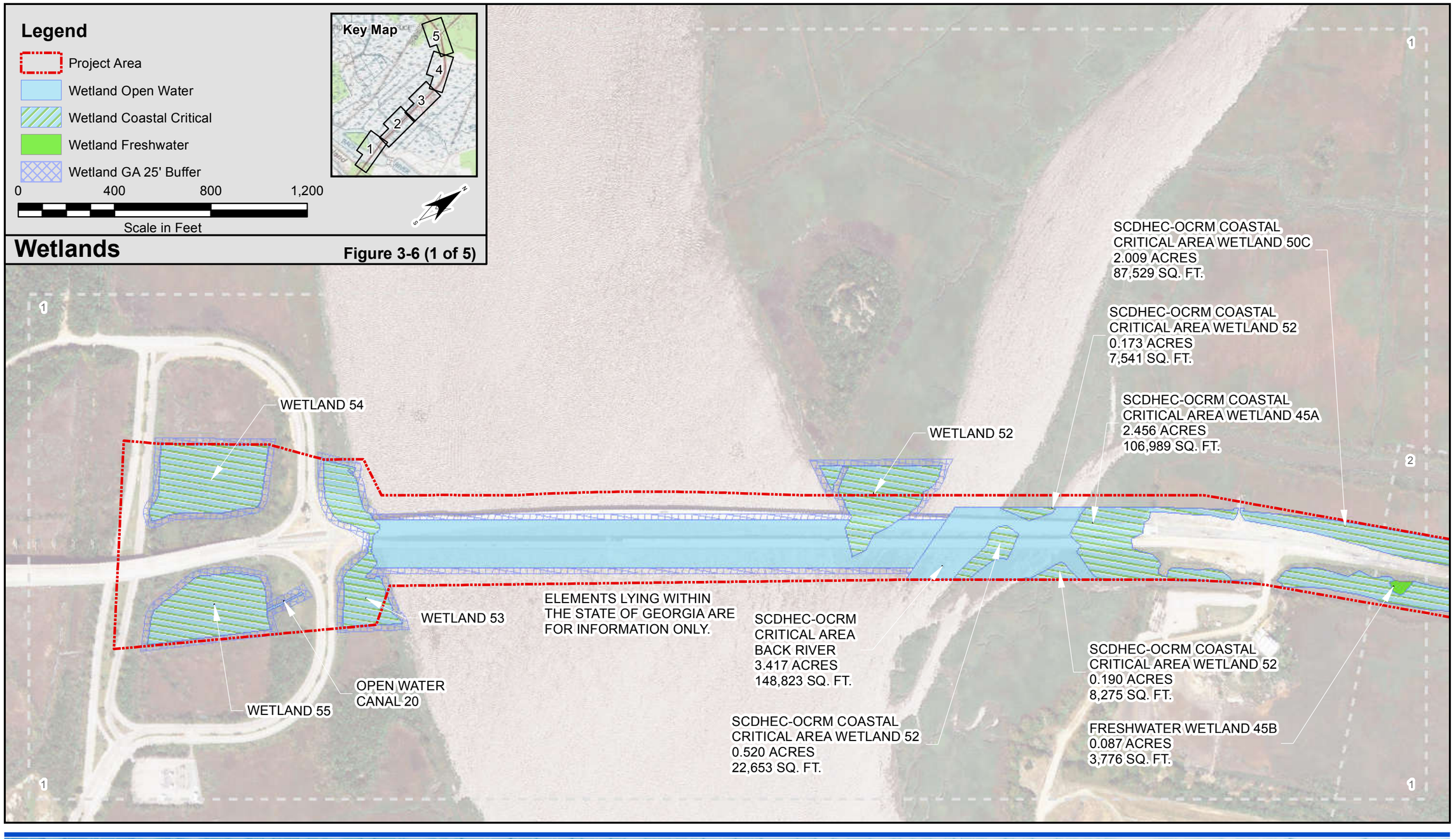
- **Hydrology** (e.g., flood control, groundwater recharge and discharge, and dissipation of erosive forces);
- **Water quality** (e.g., removal of sediments, toxins, and nutrients);
- **Food chain support and nutrient cycling** (e.g., primary production and nutrient export/utilization);
- **Wildlife habitat** (e.g., breeding, rearing, and feeding grounds for fish and wildlife species); and,
- **Socioeconomics** (e.g., recreational, educational, aesthetic, and consumptive uses).

3.13.1 Identification of South Carolina State Waters

Jurisdictional waters, including wetlands, were delineated in the field by project personnel during the weeks of May 4 – 8, 2009, May 18 – 22, 2009, and July 6 – 10, 2009. The delineation was performed according to the methodology outlined in the *1987 Corps of Engineers Wetland Delineation Manual*. National wetland inventory maps, soil maps, and aerial photography were reviewed in conjunction with fieldwork. The Jurisdictional Determination (SAC 2009-00631-DJM) was approved by USACE on October 13, 2010, and is included in **Appendix I**.

All wetlands from the SAC 2009-00631-DJM Jurisdictional Determination (in South Carolina) were re-marked in the field in 2013 and 2014 and the boundaries were surveyed by a Professional Land Surveyor to create a plat for all freshwater and tidal wetlands within the project area. A Critical Area Plat was approved by SCDHEC-OCRM on March 1, 2016, and the USACE Charleston District re-issued Jurisdictional Determination for the portion of the project in South Carolina on August 25, 2016 (refer to **Appendix I**). The USACE Savannah District is currently processing a re-issued Jurisdictional Determination for the portion of the project in Georgia. A total of 46 wetlands, five open water canals, and two streams were delineated within the study area during field studies (refer to **Figure 3-6**).

[118] Department of the Army, U.S. Army Corps of Engineers (1987). *Corps of Engineers Wetlands Delineation Manual*. Technical Report Y-87-1. Washington, D.C.


Legend
Project Area
Wetland Open Water
Wetland Coastal Critical
Wetland Freshwater
Wetland GA 25' Buffer
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Key Map
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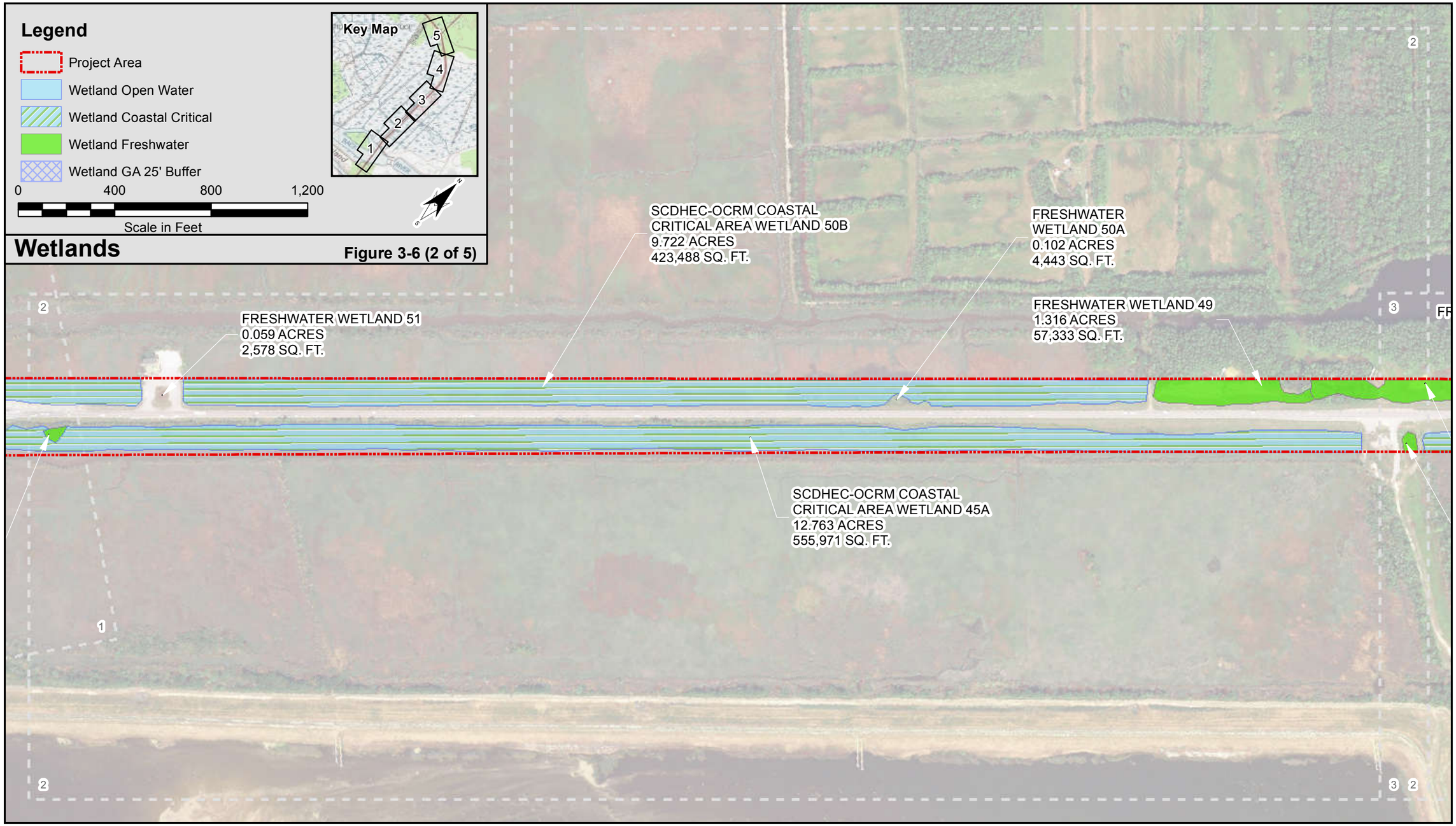
Wetlands
Figure 3-6 (1 of 5)
WETLAND 54
WETLAND 53
WETLAND 55
OPEN WATER
CANAL 20
ELEMENTS LYING WITHIN
THE STATE OF GEORGIA ARE
FOR INFORMATION ONLY.
WETLAND 52
SCDHEC-OCRM
CRITICAL AREA
BACK RIVER
3.417 ACRES
148,823 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 52
0.520 ACRES
22,653 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 50C
2.009 ACRES
87,529 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 52
0.173 ACRES
7,541 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 45A
2.456 ACRES
106,989 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 52
0.190 ACRES
8,275 SQ. FT.
FRESHWATER WETLAND 45B
0.087 ACRES
3,776 SQ. FT.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Wetland Freshwater
Wetland GA 25' Buffer
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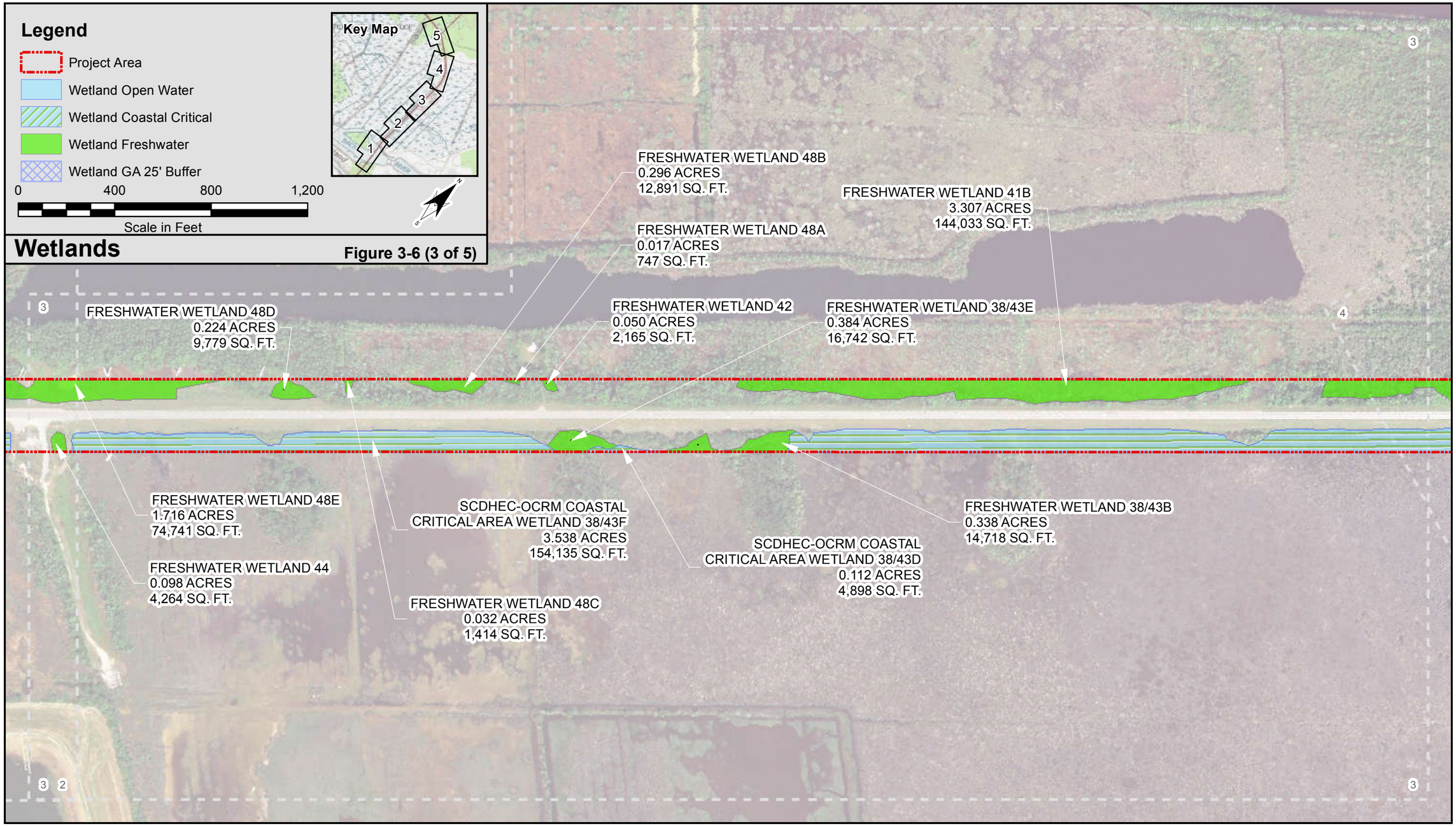
Wetlands
Figure 3-6 (2 of 5)
SCDHEC-OCRM COASTAL CRITICAL AREA WETLAND 50B
9.722 ACRES
423,488 SQ. FT.
FRESHWATER WETLAND 50A
0.102 ACRES
4,443 SQ. FT.
FRESHWATER WETLAND 49
1.316 ACRES
57,333 SQ. FT.
FRESHWATER WETLAND 51
0.059 ACRES
2,578 SQ. FT.
SCDHEC-OCRM COASTAL CRITICAL AREA WETLAND 45A
12.763 ACRES
555,971 SQ. FT.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Project Area
Wetland Open Water
Wetland Coastal Critical
Wetland Freshwater
Wetland GA 25' Buffer
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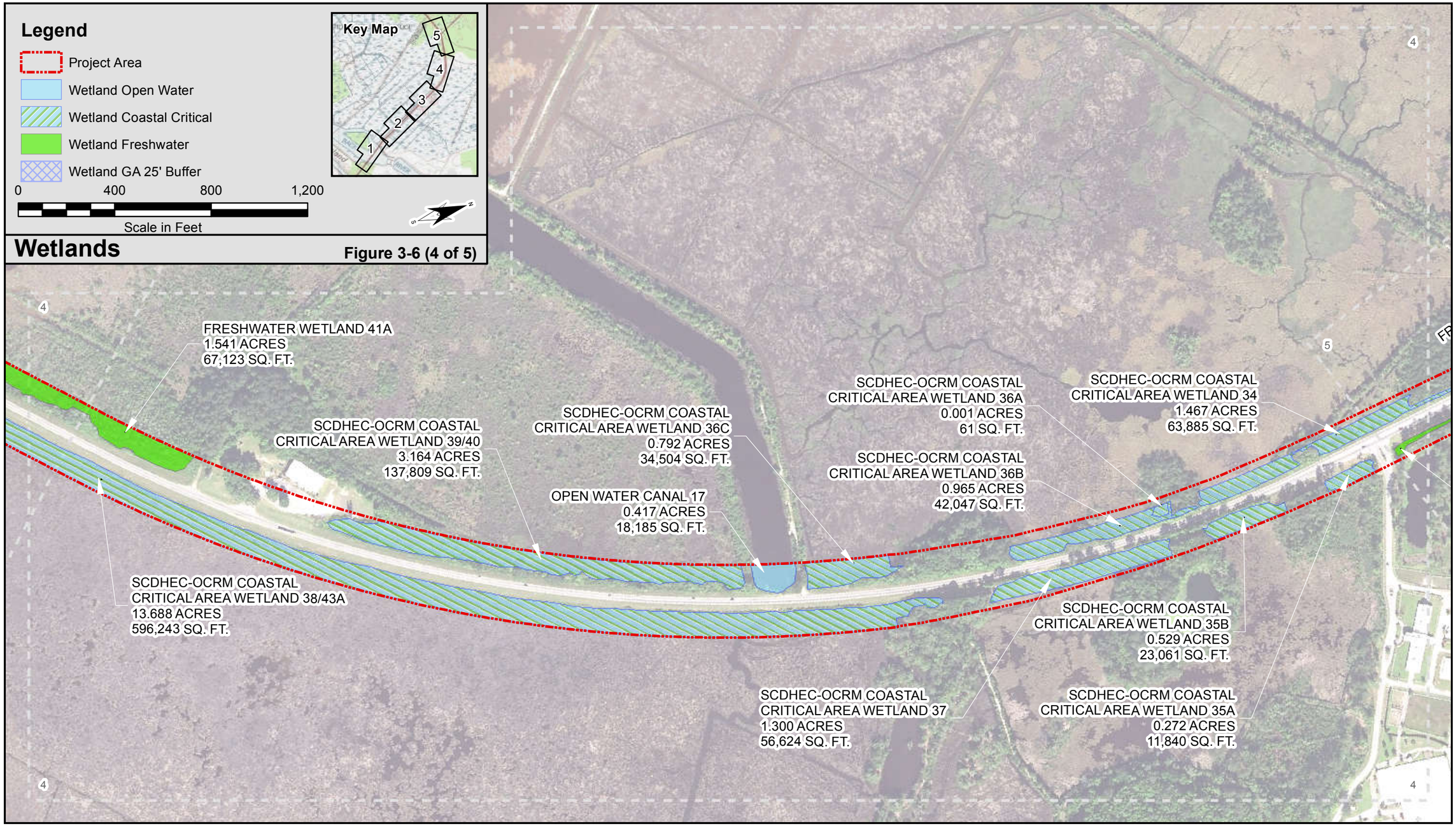
Wetlands
Figure 3-6 (3 of 5)
FRESHWATER WETLAND 48B
0.296 ACRES
12,891 SQ. FT.
FRESHWATER WETLAND 41B
3.307 ACRES
144,033 SQ. FT.
FRESHWATER WETLAND 48A
0.017 ACRES
747 SQ. FT.
FRESHWATER WETLAND 48D
0.224 ACRES
9,779 SQ. FT.
FRESHWATER WETLAND 42
0.050 ACRES
2,165 SQ. FT.
FRESHWATER WETLAND 38/43E
0.384 ACRES
16,742 SQ. FT.
FRESHWATER WETLAND 48E
1.716 ACRES
74,741 SQ. FT.
FRESHWATER WETLAND 44
0.098 ACRES
4,264 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 38/43F
3.538 ACRES
154,135 SQ. FT.
FRESHWATER WETLAND 48C
0.032 ACRES
1,414 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 38/43D
0.112 ACRES
4,898 SQ. FT.
FRESHWATER WETLAND 38/43B
0.338 ACRES
14,718 SQ. FT.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Project Area
Wetland Open Water
Wetland Coastal Critical
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Wetland GA 25' Buffer
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Wetlands
Figure 3-6 (4 of 5)
FRESHWATER WETLAND 41A
1.541 ACRES
67,123 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 39/40
3.164 ACRES
137,809 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 36C
0.792 ACRES
34,504 SQ. FT.
OPEN WATER CANAL 17
0.417 ACRES
18,185 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 38/43A
13.688 ACRES
596,243 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 36A
0.001 ACRES
61 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 36B
0.965 ACRES
42,047 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 34
1.467 ACRES
63,885 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 35B
0.529 ACRES
23,061 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 37
1.300 ACRES
56,624 SQ. FT.
SCDHEC-OCRM COASTAL
CRITICAL AREA WETLAND 35A
0.272 ACRES
11,840 SQ. FT.
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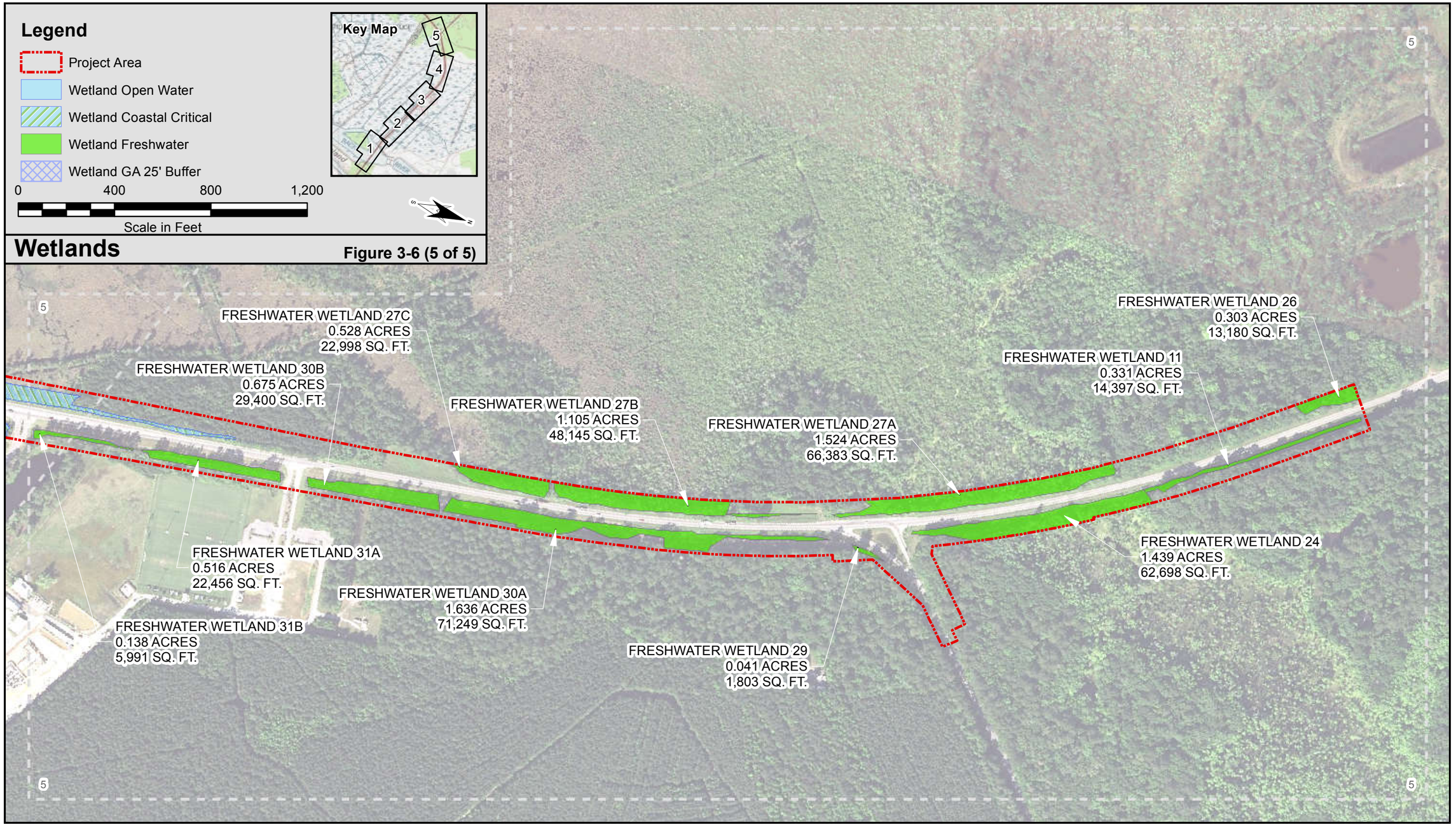
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Project Area
Wetland Open Water
Wetland Coastal Critical
Wetland Freshwater
Wetland GA 25' Buffer
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Scale in Feet
Key Map
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Wetlands
Figure 3-6 (5 of 5)
FRESHWATER WETLAND 27C
0.528 ACRES
22,998 SQ. FT.
FRESHWATER WETLAND 30B
0.675 ACRES
29,400 SQ. FT.
FRESHWATER WETLAND 27B
1.105 ACRES
48,145 SQ. FT.
FRESHWATER WETLAND 27A
1.524 ACRES
66,383 SQ. FT.
FRESHWATER WETLAND 26
0.303 ACRES
13,180 SQ. FT.
FRESHWATER WETLAND 11
0.331 ACRES
14,397 SQ. FT.
FRESHWATER WETLAND 31A
0.516 ACRES
22,456 SQ. FT.
FRESHWATER WETLAND 30A
1.636 ACRES
71,249 SQ. FT.
FRESHWATER WETLAND 31B
0.138 ACRES
5,991 SQ. FT.
FRESHWATER WETLAND 29
0.041 ACRES
1,803 SQ. FT.
FRESHWATER WETLAND 24
1.439 ACRES
62,698 SQ. FT.
5

Three of the open water canals (specifically, Open Water Canals 17, 18 and 19) and two of the streams (specifically, Streams 2 and 3) are estuarine waters subject to the ebb and flow of the tide and regulated pursuant to Section 10 of the *Rivers and Harbors Act*. All but one of the 46 wetlands are considered regulated, jurisdictional wetlands subject to Section 404 of the *Clean Water Act*. Twenty-two of the 46 wetlands are estuarine wetlands also subject to Section 10 of the *Rivers and Harbors Act*. In addtion, wetland areas within the roadway loops leading from U.S. 17 to Wayne Shackelford Boulevard on Hutchinson Island are mapped as previous mitigation area owned by the CSX Realty Corporation.

The study area contains several wetland types, including palustrine forested, palustrine scrub-shrub, and palustrine emergent wetlands, as well as estuarine emergent wetlands (i.e., tidal salt marsh wetlands). The hydrologic regime of the palustrine wetlands ranges from saturated to seasonally flooded to permanently flooded. The hydrologic regime of the estuarine wetlands ranges from regularly flooded to permanent-tidal. **Table 3.12** below is a summary of the total acreage and length of jurisdictional wetlands, streams, and canals delineated in the study area.

TABLE 3.12
Jurisdictional Area Summary

Resource Type	Total in Project Study Area (acres)
Bottomland Hardwood	14.848
Freshwater Marsh	0.157
Ponds/Open Waters	0.447
Salt Marsh/Salt Scrub Thicket	63.008
Stream	18.885
Wooded Swamp	2.963
TOTAL	**100.308**

SOURCE: Michael Baker International, 2016.

Wetlands and other waters of the United States identified within the study area were classified based on a modified Cowardin system. The Cowardin system, derived from *Classification of Wetlands and Deepwater Habitats of the United States*,[119] categorizes wetlands using hydrologic, geomorphologic, chemical, and biological factors. This system was modified by the United States Fish and Wildlife Service (USFWS) and groups the 275 Cowardin wetland types into eighteen general categories based on vegetative composition. This modification was used to classify the wetland types within the study area, then further refined with detailed descriptions of specific wetland types of South Carolina found in *The Natural Communities of South Carolina* by John B. Nelson.[120] Using this classification process, the potential jurisdictional wetlands observed within the study area were identified as salt marsh/salt scrub thicket, bottomland hardwoods, freshwater marshes, ponds/borrow pits, and wooded swamps.

[119] Lewis M. Cowardin, *Classification of Wetlands and Deepwater Habitats of the United States,* FWS/OBS – 79/31, 1979.
[120] John B. Nelson, South Carolina Wildlife and Marine Resources Department, Division of Wildlife and Freshwater Fisheries, *The Natural Communities of South Carolina: Initial Classification and Description*, 1986.

3.13.1.1 Salt Marsh/Salt Scrub Thicket

Salt marsh/salt scrub thicket is the dominant wetland type within the study area. This wetland type occurs along roadway shoulder where a road historically bisected the marsh. The salt marsh community is reasonably species-poor and is often nearly totally dominated by *Spartina* spp., especially *S. alterniflora* (smooth cordgrass), with *Spartina patens* and *Distichlis spicata* as common associates.[121] The salt shrub thicket is an estuarine wetland consisting of a narrow band of salt-tolerant shrubs growing between salt marsh and more upland areas. These shrubs usually consist of various sea-myrtles (*Baccharis* spp.), marsh-elder (*Iva frutescens*), sea-oxeye (*Borrichia frutescens*), wax-myrtle, cabbage palm (*Sabal palmetto*), and southern red-cedar (*Juniperus silicicola*).[122] The salt marsh and salt scrub thicket wetlands within the study area are dominated by smooth cordgrass (*Spartina alterniflora*), big cordgrass (*S. cynosuriodes*), and black needlerush (*Juncus roemerianus*) with small areas of glasswort (*Salicornia ssp.*) at the margin of the unvegetated tidal flats. Some areas were dominated by giant reed (*Phragmites communis*), an invasive, non-native species. Shrubby species along marsh boundaries included sea-myrtles, marsh-elder, sea-oxeye, wax-myrtle, sweetgum saplings, red maple saplings, and southern red-cedar.

3.13.1.2 Bottomland Hardwoods

Bottomland hardwoods occur within the study area along the interface between freshwater and salt water communities with scrub-shrub areas on maintained fringes. Bottomland hardwoods are palustrine wetlands frequently flooded by and associated with river systems, creeks, or other drainages. These floodplains are flat and somewhat elevated above the adjoining swamp, and are often dissected.[123] Dominant tree species contained within the bottomland hardwoods and scrub-shrub wetlands include sweetgum, bald cypress (*Taxodium distichum*), red maple, water tupelo (*Nyssa aquatica*), Chinese tallow *(Sapium sebiferum*), swamp chestnut oak (*Quercus michauxii*), and water oak. Dominant saplings and shrubs in the bottomland hardwoods and scrub-shrub wetland communities include red maple, sweetgum, Chinese tallow, black willow (*Salix nigra*), groundsel-tree (*Baccharis hamilifiolia*), elderberry (*Sambucus canadensis*), loblolly pine, wax myrtle, and dwarf palmetto (*Sabal minor*). Dominant herbaceous species of the bottomland hardwoods and scrub-shrub wetland communities include: lizard's tail (*Saururus cernuus*), netted chain fern (*Woodwardia areolata*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*O. regalis*), soft rush (*Juncus effusus*), rice cutgrass (*Leersia oryzoides*) and spikerush (*Eleocharis sp.*).

3.13.1.3 Freshwater Marshes

Freshwater marshes are open wetlands with a widely fluctuating water level, usually every year, dominated by emergent grasses, sedges, and rushes. This type of wetland is typically associated with deeper water wetlands, but can also be found where trees are kept at bay in

[121] Nelson, John B. 1986. *The Natural Communities of South Carolina: Initial Classification and Description*. Columbia, SC: South Carolina Wildlife and Marine Resources Department Division of Wildlife and Freshwater Fisheries.
[122] *Ibid.*
[123] *Ibid.*

power line and roadway rights-of-way and other places where man prevents succession into, or back into, wooded wetlands.[124] The freshwater marsh areas vary in vegetative composition. Dominant vegetation observed in the emergent wetlands include various sedges (*Carex sp.*), beaksedge (*Rhynchospora sp.*), Vasey's grass (*Paspalum urvillei*), marsh pennywort (*Hydrocotyle americana*), spikerush, soft rush, cattail (*Typha latifolia*), velvet panic grass (*Dichanthelium commutatum*), alligator weed (*Alternanthera philoxeroides*), and giant cane (*Arundinaria gigantea*).

3.13.1.4 Ponds and Borrow Pits

Ponds and borrow pits are typically manmade, open, freshwater communities. These water bodies are generally created by excavation activities, or altering stream or surface drainage flow. These ponds are created by excavation in uplands (borrow pits, agricultural ponds), or by damming or otherwise altering slow-moving streams by man or beavers (impoundments). Fringe wetlands are often found associated with ponds and borrow pits to form a freshwater wetland system. Those identified within the study area during the wetland delineation are dominated by cattail, giant cane and alligator weed.

3.13.1.5 Wooded Swamps

Wooded swamps are palustrine forested wetlands often associated with blackwater or brownwater rivers. In the Coastal Plain, swamps form extensive drainages that are often very wide, essentially forming "rivers" that eventually flow into true rivers. They may be flooded for several months during the growing season to nearly year round, and seldom dry out.[125] The canopy is dominated by bald cypress (*Taxodium distichum*) and/or pond cypress (*Taxodium ascendens*), and either swamp gum (*Nyssa sylvatica* var. *biflora*) in blackwater systems, or water tupelo in brownwater systems. These tree species have adaptations for growing in water, including swollen and buttressed bases, and, in the case of the cypress species, "knees." Most wooded swamps within the project area were very small fringe areas on the border of the larger tidally-influenced freshwater marshes. The tidal influence prevents freshwater from flowing out of the wetlands during high tides and is necessary to maintain the inundation required by this plant community. Wooded swamps identified within the study area during the wetland delineation were dominated by bald cypress and swamp gum, red maple, sweetgum, and the occasional water oak, willow oak (*Quercus phellos*), and pond pine (*Pinus serotina*). The understory was limited to young canopy species, titi (*Cyrilla racemiflora*), and giant cane. Vines included poison ivy, muscadine, and various briers (*Smilax laurifolia*, *S. rotundifolia*, and *S. glauca*). The herbaceous layer was dominated by netted chain fern, and, where sunlight was not blocked by the canopy, wool-grass bulrush (*Scirpus cyperinus*), and soft rush.

3.13.2 Rivers and Streams

USACE has regulatory authority over streams as waters of the United States under Section 404 of the CWA. USACE will assert jurisdiction over traditional navigable waters (TNWs), which

[124] *Ibid*.

[125] Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe, *Classification of Wetlands and Deepwater Habitats of the United States*, prepared for the USDI-FWS. FWS/OBS-79/31, Washington, D.C., (1979).

are described in 33 CFR§328(a)1 as, "[a]ll waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide." USACE will also assert jurisdiction over non-navigable tributaries, where the waters flow directly, or indirectly into a TNW, and are a relatively permanent water (RPW, perennial) which has a continuous flow for at least three consecutive months.[126] Streams with a non-relatively permanent flow of water (NRPWs, intermittent), less than three continuous months, will be considered jurisdictional when they are found to exhibit a significant nexus with downstream TNWs. In order to determine if a NRPW is a jurisdictional feature a significant nexus analysis is required. A significant nexus analysis will:

> *Assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of downstream traditional navigable waters.*[127]

The lateral extent of USACE jurisdiction of a drainage feature, in the absence of abutting wetlands, is based on the Ordinary High Water Mark (OHWM), as defined in 33 CFR §328.3(e), which states:

> *The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*[128]

Drainage features that exhibited an OHWM were identified during the field investigations. Features within the study area that exhibited an OHWM are considered to be jurisdictional waters of the United States, and are included on **Figure 3-6** (refer to page 3-51). The flow regime of each feature (RPW or NRPW) was also noted during the field investigation. Streams present in the study area have been previously disturbed, primarily via channelization. Named streams within or adjacent to the study area include Back River, Shubra Canal, Clydesdale Canal, and Salt Water Creek.

Stream 2 (tidal) drains toward the east from Open Water Canal 17 via a culvert beneath U.S. Highway 17 and through Wetland 38/43. Based on review of aerial photography, this stream eventually flows into Salt Water Creek east of the study area. Based on the estuarine nature of abutting Wetland 38/43, Stream 2 appears to be tidally influenced. Stream 2 is a perennial stream that is approximately 13 to 23 feet wide at the ordinary high water mark. This stream has a sinuous channel, well defined banks, and contained fish at the time of the field visit.

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[126] USACE and USEPA, *Clean Water Act Jurisdiction Following the UNITED STATES Supreme Court's Decision in Rapanos v. United States & Carabell v. United States* (December 2008), http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/cwa_guide/cwa_juris_2dec08.pdf (July 26, 2016).
[127] *Ibid.*
[128] USACE, *Regulatory Guidance Letter 05-05, December 2005*, http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/cwa_guide/app_h_rgl05-05.pdf (July 26, 2016).

Stream 3, the Back River, is an estuarine, tidal river that is approximately 2,500 feet wide in the project corridor. The majority of the River is situated within Georgia. The Back River is a navigable water of the U.S. The riparian corridor surrounding the river is primarily comprised of big cordgrass and a shrub layer located near the upland transition zone of wax myrtle. Multiple marsh islands composed of big cordgrass are present within the Back River. The proposed crossing of the Back River would occur adjacent to the new bridge that is under construction.

3.13.3 Impacts

The Preferred Alternative would impact approximately 30.8 acres of wetlands (refer to **Table 3.13**). The No-build Alterative would not result in impacts to wetlands. Impacts would occur from roadway fill, clearing, excavation, bridge construction, rip-rap placement, placement/access for geotechnical reinforcement along roadway shoulder. These impacts would be offset by providing wetland mitigation. Due to the disturbed nature of the communities adjacent to U.S. Highway 17, the proposed project is not likely to have an adverse impact on biotic communities.

TABLE 3.13
Jurisdictional Impact Summary

Resource Type	Project Impacts (acres)
Bottomland Hardwood	7.3
Freshwater Marsh	0.1
Ponds/Open Waters/Streams	0.1
Salt Marsh/Salt Scrub Thicket	20.8
Wooded Swamp	2.5
TOTAL	**30.8**

SOURCE: Michael Baker International, 2016.

Total wetland impacts are approximately 30.8 acres. The proposed project will require a USACE Section 404 Individual Permit and an Ocean and Coastal Resource Management (SCDHEC-OCRM) permit.

An objective of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” Toward achievement of this goal, the CWA prohibits the discharge of dredged or fill material into wetlands, streams, and other waters of the United States unless a permit issued by USACE or under CWA Section 404 authorizes such a discharge.

3.13.4 Avoidance and Minimization

Wetlands were given special consideration during development and evaluation of the project with a subsequent determination that the present design would pose the least disruption to wetlands other than the "no build" alternative. The project will also utilize 4:1 fill slopes to minimize the impact to wetlands throughout the project. Implementing erosion control measures, which includes seeding of slopes, silt fences, and sediment basins in median as

appropriate, would also minimize impact on adjacent wetlands. Other best management practices would be required of the contractor to ensure compliance with policies reflected in 23 CFR 650B. SCDOT will comply with Executive Order 11990 regarding protection of wetland.

Based on the above considerations, it appears that there is no practicable alternative to the proposed new construction in these wetland areas; the proposed action will include all practicable measures to minimize harm to wetlands that may result from construction.

When there is a proposed discharge, all appropriate and practicable steps must first be taken to avoid and minimize impacts to aquatic resources. For unavoidable impacts, compensatory mitigation is required to replace the loss of wetland, stream, and/or other aquatic resource functions. USACE (or approved state authority) is responsible for determining the appropriate form and amount of compensatory mitigation required.[129] USACE and USEPA require a project to adhere to the 'mitigation sequence' of avoidance, minimization and compensation (where impacts must first be avoided and minimized, and then for unavoidable impacts, compensation is required).

In that the proposed project involves improvements to an existing road with wetlands and other jurisdictional waters of the United States located adjacent to both sides of roadway, complete avoidance of impacts is not possible except with the implementation of the No-build Alternative. The No-build Alternative would not satisfy the Purpose and Need of the project. Preliminary alternatives were developed and altered to find a Preferred Alternative that would minimize impacts to resources, including wetlands, where possible. During the alternative analysis, shifting the roadway to the west resulted in a reduction of approximately 1.1 acres of wetland impacts compared to Alternative 2 and 2.8 acres compared to Alternative 3. The Preferred Alternative has the least wetland impacts of all the feasible alternatives studied.

Practicable measures taken to minimize impacts include steepening of side slopes, reducing median width from 48 feet to 36 feet, and using a grassed median for roadway drainage and inline post construction water quality treatment. The area to the northwest of the roadway is a newly authorized wetland mitigation bank and will be protected by a conservation easement that prevents development in perpetuity. The new roadway alignment would be limited to the existing ROW and avoid this property.

Permanent impacts from construction activities would be confined within construction limits. Jurisdictional areas would be visually marked by the presence of a double row of silt fence (or equivalent BMP) and orange barrier fencing to minimize accidental unpermitted impacts. Also, during construction, potential temporary impacts to adjacent jurisdictional areas would be minimized by implementing sediment and erosion control measures. Reclamation of wetland areas temporarily lost through construction activities would involve returning temporarily disturbed areas to their original elevations to the maximum extent possible. Other

[129] USEPA, *Compensatory Mitigation Rule: Improving, Restoring, and Protecting the Nation's Wetlands and Streams Questions and Answers*, http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/comp_mitig_finalrule_qa.pdf (July 26, 2016).

BMPs would be required of the contractor to ensure compliance with the policies of 23 CFR §650B.

3.13.5 Compensation

For wetland impacts that exceed 0.10-acre, compensatory mitigation is required. USACE and USEPA issued the *Department of Defense, Department of the Army, Corps of Engineers 33 CFR Parts 325 and 332/Environmental Protection Agency 40 CFR Part 230 Compensatory Mitigation for Losses of Aquatic Resources*; *Final Rule* (Final Rule), on April 10, 2008. The Final Rule requires the use of established wetland and stream mitigation banks and discourages onsite mitigation to meet mitigation obligations, unless there are no established banks that service the study area. For impacts to tidal creeks, the acreage of the impact is included in the wetland impacts and would be mitigated utilizing the purchase of wetland mitigation credits.

SCDOT proposes to purchase required mitigation credits for unavoidable impacts from a USACE-approved commercial mitigation bank. Due to the time anticipated to receive permit approval and the large amount of credit required, a specific bank or combination of banks would be identified further into the permitting process. According to the USACE Regulatory In-Lieu Fee and Bank Information Tracking System (RIBITS), possible banks for estuarine credits include the Clydesdale Mitigation and Murray Hill (proposed) Banks for impacts in South Carolina and the Salt Creek Mitigation Bank for estuarine impacts in Georgia. A possible bank for palustrine wetland credits would be the Sweetleaf Swamp Mitigation Bank.

3.13.6 Georgia State Waters

State Waters are defined by the Official Code of Georgia 12-7-1 and protected by the *Georgia Erosion and Sedimentation Control Act of 1975* (E&S Act). In compliance with the National Pollutants Discharge Elimination System (NPDES) permit under Section 402 of the *Clean Water Act*, any encroachment within the designated 25-foot or 50-foot buffer of a state water will be described, and the need for a variance will be indicated. All federally jurisdictional streams are also classified as State Waters, as well as any channel with wrested vegetation. One small channel was identified within the interchange loops on Hutchinson Island that meets the definition of a state water, as well as Back River, and both have a 25-foot buffer.

3.13.6.1 State Mandated Buffers

In compliance with the NPDES permit under Section 402 of the *Clean Water Act*, any encroachment within the designated 25-foot or 50-foot buffer of a State Water will require a variance. Buffer encroachments that will occur in conjunction with a bridge or culvert may be exempt from the need for a buffer variance. As of July, 2007, the roadway drainage feature exemption includes/exempts all buffer encroachments within 50 feet from the edge of a culvert, or 100 feet from the edge of the bridge footprint. The July 2007 interpretation includes all tributaries or unassociated state waters, including the water being crossed.

All of the streams and tidal marsh within the Georgia portion of the project area are state buffered waters. The buffer encroachments to Stream 3 (Back River) would be exempt within 100 feet of the bridge footprint (refer to **Figure 3-6,** page 3-51).

3.14 PROTECTED SPECIES

Pursuant to Section 7 of the *Endangered Species Act of 1973* (16 USC, Section 1531, et seq., see also 50 CFR part 402), a field survey of the existing and proposed right-of-way was conducted. USFWS and the National Oceanic and Atmospheric Administration (NOAA) share responsibility for administration of the *Endangered Species Act* (ESA). The amended Act provides for the conservation of threatened and endangered species and the habitat upon which they depend. Section 7 of the Act requires federal agencies to consult with USFWS and NOAA to ensure that activities are not likely to jeopardize the continued existence of listed species or adversely impact their critical habitat.

Prior to the field studies, a review of available resources was performed to develop a list of potential federally-listed species for Jasper County, South Carolina, and Chatham County, Georgia. A search of the USFWS and South Carolina Department of Natural Resources (SCDNR) databases provided existing information concerning the potential occurrence of threatened or endangered species within Jasper County. These databases indicate that there are twenty federally threatened or endangered species that may occur in Jasper County. A similar search was done for Chatham County and there are sixteen federally listed species. A number of the species listed require marine, beach dune or flats habitat, none of which occurs in the study area and therefore, further analysis of these species was not necessary. The remaining eleven species were assessed for their potential occurrence and are discussed in detail in the next section.

The *South Carolina Nongame and Endangered Species Conservation Act* outlines the state's role in assisting with the preservation and propagation of federally listed threatened and endangered species, as well as setting forth guidelines to protect wildlife which, although not listed on a federal level, have been determined to be endangered within the state. SCDNR maintains a list of species it considers rare, threatened, and/or endangered in South Carolina, listed as "Species of Concern". According to SCDNR 2015 State Wildlife Action Plan, the Species of Concern list does not carry the weight of law and is used only as a conservation tool to assist in protection planning and to direct research and survey efforts. The Georgia Department of Natural Resources (GDNR) also lists species of special concern and maintains a database of rare, threatened and endangered species for each county.

Wildlife observed in the study area included the American alligator (*Alligator mississippiensis*), raccoon (*Procyon lotor*), feral hog (*Sus scrofa*), water moccasin (*Agkistrodon piscivorous*), red-jointed fiddler crab (*Uca minax*), and white-tailed deer (*Odocoileus virginianus*). Other common wildlife in rural areas that would be expected in the study area include gray squirrel (*Sciurus carolinensis*), common crow (*Corvus brachyrhynchos*), and yellow-bellied sliders (*Trachemys scripta*).

The Back River is a tidally influenced system that is approximately 2,500 feet wide in the study area. The riparian corridor surrounding the river is primarily comprised of big cordgrass (*Spartina cynosuroides*) and a shrub layer located near the upland transition zone of wax myrtle (*Morella*

cerifera). Multiple marsh islands composed of big cordgrass are present within the Back River. Wildlife commonly found in the river include the American alligator, spotted sea trout (*Cynoscion nebulosus*), striped bass (*Morone saxatilis*), red drum (*Sciaenops ocellatus*), tarpon (*Megalops atlanticus*), sheepshead (*Archosargus probatocephalus*), largemouth bass (*Micropterus salmoides*), Atlantic croaker (*Micropogonias undulatus*), and striped mullet (*Mugil cephalus*).

3.14.1 Federally Listed Species

Field studies were conducted to determine the presence of suitable habitat and the potential occurrence of protected species in the study area. No protected species were observed during field studies; however, potential habitat was identified for Atlantic sturgeon, Kirtland's warbler, shortnose sturgeon, and West Indian manatee.

No impacts to federally listed species would occur under the No-build Alternative. Copies of the Biological Assessments (BAs), prepared in accordance with Section 7 of the ESA to address potential effects under the Preferred Alternative, can be found in **Appendix J**. In addition, the USFWS Charleston Office reviewed the Biological Assessment (BA) prepared for the proposed improvements of U.S. Highway 17. In a letter dated December 1, 2009 (see **Appendix E**), the USFWS Charleston Office concurred with the findings presented in the BA, that no adverse effects to federally listed species would occur, with the exception of shortnose sturgeon and West Indian manatee, which they deferred to the USFWS Brunswick Sub-Office and National Marine Fisheries Service (NMFS), respectively. After the Atlantic sturgeon became federally listed in February 6, 2012, a separate BA was prepared for both the Atlantic and shortnose sturgeon as well as the West Indian manatee (refer to **Appendix J**). Concurrence was received from the USFWS that the proposed project was unlikely to adversely affect the West Indian manatee (refer to **Appendix E**). Section 7 consultation with NOAA-NMFS Protected Species Division for the two sturgeon species will be completed prior to a final decision on the project.

Due to later additions to the Federally Protected Species list, an additional BA was prepared for the red knot, which became federally listed on January 12, 2015, and Kirtland's warbler (refer to **Appendix J**). The Kirtland's warbler was not included on the County projected species lists for Jasper and Chatham Counties when the original BA was prepared, but it was later added through the USFWS Information for Planning and Conservation project planning tool. USFWS concurred that the Preferred Alternative is not likely to adversely affect the Kirtland's warbler or the red knot (refer to **Appendix E**).

Table 3.14 on page 3-65 includes a summary of the federally protected species listed for Jasper and Chatham Counties.

TABLE 3.14
Federally Protected Species Known to Occur or Possibly Occur within Jasper County, South Carolina, and Chatham County, Georgia

Common Name	Scientific Name	Status	Occurrence Potential
Atlantic sturgeon	*Acipenser oxyrinchus*	E	Possible
American chaffseed	*Schwalbea americana*	E	Known
Bald eagle	*Haliaeetus leucocephalus*	Protected under BGEPA[a]	Known
Canby's dropwort	*Oxypolis canbyi*	E	Possible
Eastern Indigo snake	*Drymarchon corais couperi*	T	Possible
Finback whale[b]	*Balaenoptera physalus**	E	Not applicable
Frosted flatwoods salamander	*Ambystoma cingulatum*	T	Known
Gopher tortoise	*Gopherus polyphemus*	C	Known
Green sea turtle[b]	*Chelonia mydas*	T	Not applicable
Humpback whale[b]	*Megaptera novaengliae**	E	Not applicable
Kemp's ridley sea turtle[b]	*Lepidochelys kempii*	E	Not applicable
Kirtland's warbler	*Dendroica kirtlandii*	E	Possible
Leatherback sea turtle[b]	*Dermochelys coriacea*	E	Not applicable
Loggerhead sea turtle[b]	*Caretta caretta*	T	Not applicable
Pondberry	*Lindera melissifolia*	E	Possible
Piping plover[b]	*Charadrius melodus*	T	Possible
Red-cockaded woodpecker	*Picoides borealis*	E	Possible
Red knot[b]	*Calidris canutus rufa*	C	Possible
Right whale[b]	*Balaena glacialis**	E	Not applicable
Shortnose sturgeon	*Acipenser brevirostrum*	E	Known*
West Indian manatee	*Trichechus manatus*	E	Possible
Wood stork	*Mycteria americana*	E	Known

Source: USFWS, July 22, 2016 website http://ecos.fws.gov/ipac/ and https://www.fws.gov/charleston/pdf/Endangered/species_by_county/jasper_county.pdf

NOTES: E = Endangered, T = Threatened, C = Candidate

[a] *Bald and Golden Eagle Protection Act*.

[b] Species requires marine aquatic or beach dune habitat and have been eliminated from further consideration because there is no marine or beach habitat present in the study area.

* Concurrence received from U.S. Fish & Wildlife Service – Charleston Office, dated December 1, 2009, and National Marine Fisheries Service dated April 8, 2011 for the shortnose sturgeon.

3.14.2 Species Descriptions

3.14.2.1 American chaffseed

The American chaffseed (*Schwalbea americana*), was listed as endangered in 1992 by USFWS, which means that USFWS has determined the species "is in danger of extinction throughout all or a significant portion of its range."[130] It is a perennial herb currently found New Jersey, and in the coastal states of the southeast, from North Carolina south to Florida, and from Louisiana east to Georgia.[131]

The stem of this upright, perennial herb is unbranched or only branches at its base.[132] American chaffseed grows to a height of one to two feet, is "densely, but minutely hairy" over its entirety, and has lance-shaped to elliptic, alternate leaves that connect directly to the stem.[133] Flowering occurs May to June and fruits mature shortly afterward.

American chaffseed habitat includes savannahs, sandhill-pocosin ecotones, sandhill longleaf pine woodlands,[134] as well as "areas between peaty wetlands and xeric sandy soils, and other open, grass-sedge systems."[135] Although naturally occurring fires historically maintained these open habitat types, now controlled burns, mowing, or fluctuating water tables more typically provide the open or partially open suitable habitat for American chaffseed.[136]

Suitable habitat was not present for the American chaffseed, and no individuals of the species were observed during the field survey. Any pine savannah/flatwoods within the study area have not been maintained by burning and are too heavily vegetated to be potential habitat. Therefore, it is anticipated that there would be no effect to the American chaffseed as a result of the proposed project.

3.14.2.2 Atlantic sturgeon

The Atlantic sturgeon (*Acipenser oxyrinchus*) is a long-lived fish (up to 60 years) that reaches a maximum length of around fourteen feet and a weight of 800 pounds.[137] Instead of scales, this fish has rows of boney plates called scutes that are located on the head, each side, and the

[130] USFWS, "Listing a Species as Threatened or Endangered," http://www.fws.gov/endangered/esa-library/pdf/listing.pdf (July 26, 2016).
[131] USFWS, "Species Profile for American chaffseed (*Schwalbea americana*)," http://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2I4#status (July, 26, 2016).
[132] USFWS, Southeast Region, *Endangered and Threatened Species of the Southeastern United States* (*The Red Book)*, "American Chaffseed," January 1995.
[133] *Ibid.*
[134] Alan S. Weakly, *Flora of the Southern and Mid-Atlantic States*, Working Draft, May 21, 2015, p.1043, http://www.herbarium.unc.edu/FloraArchives/WeakleyFlora_2015-05-29.pdf (July 26, 2016).
[135] Richard D. Porcher and Douglas A. Rayner, *A Guide to the Wildflowers of South Carolina*, 2001, p. 249.
[136] USFWS, Southeast Region, *Endangered and Threatened Species of the Southeastern United States* (*The Red Book)*, "American Chaffseed," January 1995.
[137] National Marine Fisheries Service, 2012 Endangered and Threatened Wildlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Southeast, Federal Register 77(24):5914-5982.

belly. The lighter colored scutes with their spines contrast with the darker body.[138] The snout is shovel shaped, longer, and more sharply v-shaped than the shortnose sturgeon. The body color is blue-black on the back shading to white on the belly as opposed to an olive-gray for the shortnose sturgeon and green above for the green sturgeon.[139] Sturgeons have mouths with large fleshy barbells that protrude from the underside of the snout, enabling foraging along the substrate for prey items such as mussels and crustaceans.

The Atlantic sturgeon is found in riverine, estuarine, and near-shore marine environments of eastern North America and the Atlantic Ocean. Spawning and larval stages of the life cycle typically occur in freshwater channels of large, unobstructed river basins from as far inland as the fall line to the zone of tidal influence in estuarine or brackish channels. Foraging occurs near the freshwater/saltwater interface in riverine and estuarine environments, i.e., sounds and bays of river basin deltas. In South Carolina, the drainage basins utilized by adults are the Great Pee Dee, Waccamaw, Sampit, Santee, Lake Moultrie, Cooper, Ashley, ACE Basin (Ashepoo, Combahee and Edisto rivers), and Savannah Rivers. During February and March, spawning adults move inland up the major river basins.[140] Spawning is assumed to occur in the Santee, at least one of the ACE Basin tributaries, the Savannah and possibly the Cooper, Great Pee Dee and Waccamaw Rivers based on the collection of juveniles less than one year of age from these rivers.[141] Threats include alteration of habitat due to damming of rivers dredging of channels, pollution, climate change, and incidental take by commercial fisheries.[142]

Suitable habitat for Atlantic sturgeon is present within the study area. The Savannah River basin is a known suitable spawning migration corridor for the species. The proposed project would cross the Back River which is part of the Savannah River system.[143] The tide gate downstream of the U.S. 17 bridge would limit sturgeon from directly swimming upstream but sturgeon may enter the Back River in the vicinity of the study area by crossing from the main channel of the Savannah River into the Middle and Back Rivers at their confluence above Hutchinson Island. Atlantic sturgeon have been documented in the Back River through telemetry data of tagged individuals at River Mile 4 approximately 1 mile upstream of the U.S. 17 bridge crossing most recently in February through May 2013, by SCDNR.[144]

As a result of discussions with NMFS on past projects, SCDOT has agreed to implement certain conditions on construction and demolition activities that could potentially disturb migrating Atlantic sturgeon in the vicinity of the project. The selected contractor will be required to minimize impacts of siltation and erosion through implementation of Best

[138] NatureServe, NatureServe Explorer: An online encyclopedia of life [web application], Version 7.1. NatureServe, Arlington, Virginia, http://www.natureserve.org/explorer (July 26, 2016).
[139] *Ibid.*
[140] National Marine Fisheries Service (NMFS), 2012 Endangered and Threatened Wildlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Southeast, Federal Register 77(24):5914-5982.
[141] Mark R. Collins & Theodore I. J. Smith, *Management Briefs: Distributions of Shortnose and Atlantic Sturgeons in South Carolina*, North American Journal of Fisheries Management, 17:4, 995-1000, 1997.
[142] NOAA, *Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus); Threats,* http://www.fisheries.noaa.gov/pr/species/fish/atlantic-sturgeon.html (July 26, 2016).
[143] Mark R. Collins & Theodore I. J. Smith, *Management Briefs: Distributions of Shortnose and Atlantic Sturgeons in South Carolina*, North American Journal of Fisheries Management, 17:4, 995-1000, 1997.
[144] Bill Post, SCDNR, personal communication by email dated 4/17/2014.

Management Practices (BMPs). From October 1 - April 15, the use of a noise reduction technique for impact driving will be required during in-water work. No noise reduction technique will be required for dilled shafts. In the event that SCDOT decides to use bubble curtains for noise reduction, a contained bubble curtain technique will be used to keep the bubbles from being swept out of place by tidal or river currents. During this period, construction-related equipment or materials will not block more than 50 percent of the river channel. The construction conditions would prevent impacts to the Atlantic sturgeon in the same manner as the shortnose sturgeon. Based on these findings, it is anticipated that the project may affect, but is not likely to adversely affect, the Atlantic sturgeon. Section 7 consultation with NOAA-NMFS Protected Species Division will be completed prior to a final decision on the project.

3.14.2.3 Bald eagle

The bald eagle (*Haliaeetus leucocephalus*) was formerly protected under the *Endangered Species Act* until August 2007, when the USFWS determined that populations of the species had recovered to the point in the country that the species could be removed from the federal threatened and endangered species list. Federal protection is still provided to the species by the *Bald and Golden Eagle Protection Act*, which prohibits any form of taking of both bald and golden eagles except as provided by a permit.[145]

The bald eagle is a large bird, with the adult species in South Carolina having an average wing span of approximately six feet, and weighing approximately seven pounds.[146] The raptor has both a bright yellow bill and feet, with a dark brown body and legs, and white feathers on its head, neck, and tail.[147]

Bald eagles normally utilize habitats near large bodies of water for nesting and foraging, such as the transitional areas between uplands and fresh, brackish, or estuarine waters.[148] Bald eagles initially select areas for nesting that have limited disturbance; however, once they have established a nest and territorial area, they can adapt to some disturbances.[149] These birds construct nests that can last for many years in large trees with open limb structures in close proximity to open waters, so that they can have a line of sight to nearby foraging areas.[150]

Suitable foraging habitat for the bald eagle is present within the study area. The Back River is immediately adjacent to U.S. 17 (Speedway Boulevard); however, there are no suitable nesting sites located within or near the study area. Transient individuals may forage in the Back River, but it is unlikely that they would remain in the area for any length of time due to the lack of suitable nesting and roosting habitat and the limited long term forage available. Transitional areas for nesting and roosting habitat were not present, and no eagles or nests were observed during field surveys. Bald eagles are known to utilize the Savannah Wildlife Refuge, which is

[145] 16 U.S.C. §668(a).
[146] South Carolina Department of Natural Resources, "Comprehensive Wildlife Conservation Strategy: Bald Eagle Description," http://www.dnr.sc.gov/cwcs/pdf/Baldeagle.pdf (July 26, 2016).
[147] *Ibid.*
[148] *Ibid.*
[149] *Ibid.*
[150] *Ibid.*

in the vicinity of the project area. Based on the results of the field surveys, it is anticipated that there would be no effect to bald eagle as a result of the proposed project.

3.14.2.4 Canby's dropwort

Canby's dropwort (*Oxypolis canbyi*) is a perennial herbaceous plant that grows to approximately four feet tall. It has a slender stem that is purplish at the base and green above. The stem may branch above the middle. The leaves are long, slender, and quill-like. Flowers of Canby's dropwort are minute (~0.1 inches across), with white petals and are arranged in compound umbels.[151]

Canby's dropwort favors the high water table, open canopy, and medium- to highly-organic soils found in cypress-pine ponds, sloughs, wet meadows, and wet pine savannahs. Suitable habitat for Canby's dropwort is not present within the study area. The area does have very small areas of wet pine habitat, generally at the margins of the tidally influenced wetlands. However, most of these areas have dense plant growth that would have excluded the species in these areas. No Canby's dropwort was observed within the study area during the survey. Based on the results of the field survey, it is anticipated that there would be no effect to the Canby's dropwort as a result of the proposed project.

3.14.2.5 Eastern indigo snake

Eastern indigo snake (*Drymarchon corais couperi*) is a large, gentle, nonpoisonous snake averaging around six feet in length, and occasionally to eight feet—the longest of any native U.S. snake.[152] It has scales that are smooth, and a shiny bluish-black, hence the name, with some red or cream coloring about the chin and sides of the head.

Eastern indigo snake is usually found in xeric longleaf pine/turkey oak forests in sandhills or sand ridges, palmetto stands, and open pine forests. The snake is dependent on underground burrows excavated by other animals, particularly the gopher tortoise, with which they commonly cohabitate, especially during winter. During warm months, they forage for prey in creek bottoms, upland forests, and agricultural fields.[153]

No gopher tortoise burrows were observed on-site, and potential habitat was also not observed within the study area; therefore, construction of this project would have no effect on this species.

3.14.2.6 Frosted flatwoods salamander

The frosted flatwoods salamander (*Ambystoma cingulatum*) has a gray to black body with a lighter gray pattern of reticulation (a net like pattern). Its belly exhibits distinct white spots

[151] Murdock, Nora and Rayner, Douglas. *Recovery Plan for Canby's Dropwort*. Asheville Field Office, USFWS, 1990.
[152] Whit Gibbons and Mike Dorcas, *Snakes of the Southeast*, p. 129.
[153] *Ibid*.

against a dark background.[154] It is small, 3.5 to 5 inches long, slender, and has a relatively small head. It is very similar in appearance to the closely related reticulated flatwoods salamander (*Ambystoma bishopi*), but the two species have been determined to be separate distinct species based in part on subtle morphological differences and mitochondrial DNA evidence.[155] The frosted flatwoods salamander is reported to have less distinct reticulation on its back and more distinct white spotting on its belly than the reticulated flatwoods salamander.[156] The two species are separated geographically by the Appalachicola River drainage, with the frosted flatwoods salamander being found east of the drainage, and the reticulated flatwoods salamander being found west of the drainage.[157]

The chief habitat for the frosted flatwoods salamander is open, mesic flatwoods dominated by longleaf (*Pinus palustris*) or slash pines (*Pinus elliottii*) and wiregrass (*Aristida stricta*) maintained by frequent fires. These pine flatwood communities are positioned between upslope sandhill communities and lower slope wetlands.[158] The herbaceous groundcover in these pine flatwoods provides forage for numerous herbivorous invertebrates that are the prey base for the frosted flatwoods salamander.[159] This species breeds in herbaceous vegetation along the margins of isolated, seasonal pools that typically have a sparse open canopy of pond cypress and blackgum. As the larvae hatch and develop they feed on the aquatic macroinvertebrate community within the herbaceous cover of the pond margins. Because the ponds are only seasonally inundated, they typically do not support populations of predatory fish large enough to prey upon the salamander larvae.[160] Fire at a frequency of once every three to five years is necessary to prevent the degradation of natural flatwoods communities; in its absence shrubs and hardwood understory increase and herbaceous groundcover decreases, which reduces the prey base for the frosted flatwoods salamander. Fire is also necessary to prevent canopy closure at the pond margins, which can result in a decrease in the herbaceous vegetation at the pond margins where the adults would typically deposit their eggs and the larvae would typically develop.[161] In South Carolina, the frosted flatwoods salamander occurs in the southern half of the Coastal Plain.

The mosaic of habitats used by the frosted flatwoods salamander do not occur in the vicinity of the proposed project. There are several areas with seasonal ponds; however, the required adjacent open mesic flatwoods are not present. Most upland wooded areas within the study area are extremely densely vegetated. Based on these findings, no effect to the frosted flatwoods salamander would occur as a result of the proposed project.

[154] Federal Register 56, Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Reticulated Flatwoods Salamander; Designation of Critical Habitat for Frosted Flatwoods Salamander and Reticulated Flatwoods Salamander, Final Rule, 6700-6774, February 10, 2009.
[155] *Ibid.*
[156] *Ibid.*
[157] *Ibid.*
[158] Walton Beacham, et. al., editors, *Beacham's Guide to the Endangered Species of North America,* 2001, Farmington Hills, MI: Gale Group.
[159] *Ibid.*
[160] *Ibid.*
[161] *Ibid.*

3.14.2.7 Pondberry

Pondberry (*Lindera melissifolia*) is a deciduous shrub with an alternate drooping leaf arrangement that reaches up to six feet in height. The leaves and other parts are aromatic, having a fragrance very similar to sassafras when crushed. In March, before the leaves come out, small yellow flowers appear in clusters along the branches. The bright red fruits mature in late summer to early fall.

Pondberry grows along the edges of sandy lime sinks, cypress-pine ponds, swamp forests, open bogs, and in wet depressions in pine flatwoods.[162] This plant prefers shaded areas but is sometimes found in areas of full sun.

Suitable habitat for pondberry is not present within the study area. Small areas of wet pine flatwoods are present in the area; however, most of the study area has dense plant growth that has excluded the species. No pondberry was observed within the project study area limits during the survey. Based on the results of the field surveys, the project would have no effect on pondberry.

3.14.2.8 Kirtland's warbler

Kirtland's warbler (*Dendroica kirtlandii*) is a small (approximately six inches in length) wood warbler, upperparts are blue-gray (streaked with black), underparts are yellow (with black streaks on side), white eye ring is broken by black lores and eye line, and white wing bars are indistinct.[163] Kirtland's warbler is a very rare transient in South Carolina. It breeds in only a few protected stands of jack pine in Michigan and over-winters in the Bahamas. Its migration takes it across South Carolina in late April to early May, and early September to October. The bird frequents thickets and woodland edges on high ground just beyond the wet margins of lakes and swamps, often in association with flocks of other songbirds.[164]

Potentially suitable habitat for Kirtland's warbler is present within the study area. However, suitable habitat is common in South Carolina for transient migrants of this species and is therefore not a limiting factor for this species. Based on these findings, it is anticipated that the project would have no effect on Kirtland's warbler.

3.14.2.9 Red-cockaded woodpecker

The red-cockaded woodpecker (*Picoides borealis*) is listed as an endangered species by USFWS. Current populations are known to occur from Virginia south to Florida, and extending west through the southeastern states to Texas and Oklahoma. The bird is a small woodpecker, approximately seven inches in length, with a wingspan up to 15 inches. The bird has black and white horizontal stripes on its back, white cheeks and breast, black-streaked flanks, and a black

[162] Porcher, Richard D. and Douglas A. Rayner. 2001. *A Guide to the Wildflowers of South Carolina*. Columbia, SC: University of South Carolina Press.
[163] NatureServe, NatureServe Explorer: An online encyclopedia of life [web application], Version 7.1. NatureServe, Arlington, Virginia, http://www.natureserve.org/explorer (July 25, 2016).
[164] Potter, Eloise F., et. al. 1980. Birds of the Carolinas. Chapel Hill, NC: University of North Carolina Press.

cap and throat. Adult males have small red spots or "cockades" on each side of the cap just behind the eye, which are not easily discernible in the field.

Suitable habitat for the red-cockaded woodpecker includes old-growth open pine forests, with longleaf pines over eighty years old, or loblolly pines over seventy years of age. The tree's age makes it prone to fungal heartwood disease that will soften the hardwood, allowing the woodpecker to excavate a cavity in a live pine tree. The red-cockaded woodpecker also uses this same mature pine habitat for foraging.

Suitable habitat for the red-cockaded woodpecker is not present within the study area, as the majority of the study area consists of tidally influenced wetlands or planted pine stands less than 30 years old. A few mature pine trees greater than 30 years of age are present in various areas, but most of these are in forests with a dense mid- and understory or are in areas that do not contain the associated pine forest needed for nesting and/or foraging. Large pine trees suitable for nesting that were found during the survey were checked for the presence of cavities and/or "candling," but neither cavities nor candling were observed. Based on the results of the field survey, it is anticipated that there would be no effect to the red-cockaded woodpecker as a result of the proposed project.

3.14.2.10 Red knot

The red knot (*Calidris canutus rufa*) is a stocky, medium-sized (10- to 11-inch) shorebird sometimes called "robin snipe" because in breeding plumage it has a gray back and a rusty (or red) breast. Its plumage is strikingly different in winter, when it is gray with a white rump and white wing stripe.[165]

Red knot occurs on beaches and flats, and rarely inland.[166] It can be found year-round in the state, but does not breed here. Red knots migrate from the Canadian arctic to the southern tip of South America. Migratory shorebirds in South Carolina like red knot may be transient birds on a northbound flight in the spring, a southbound flight in the fall, or over-wintering birds.[167]

Migrating and over-wintering red knots primarily feed and roost while present in the southeastern part of the United States. They mostly utilize beaches for roosting but may also be found feeding on shellfish and crustaceans on mud flats, shallow waters, and oyster reefs during low tides.[168]

Beach habitat is not located within or immediately adjacent to the proposed project area due to its location inland from the coastline. However, tidal marsh and mudflats are located on the eastern side of the project area in the vicinity of the tidal stream as well as along the Back River at the southern terminus of the proposed project. Several different types of shorebirds

[165] USFWS, Environmental Conservation Online System (ECOS), Species Profile for Red Knot (*Calidris canutus rufa*), https://ecos.fws.gov/ecp0/profile/speciesProfile.action?spcode=B0DM, (August 16, 2016).
[166] Eloise F. Potter, et al., Birds of the Carolinas, 1980, p.156.
[167] S.C. DNR, Migratory Shorebird Guild, http://www.dnr.sc.gov/cwcs/pdf/Migratoryshorebirdguild.pdf (August 16, 2016).
[168] *Ibid.*

were observed feeding in these areas at low tide during several site visits, although none were specifically identified as red knots. This species is known to be found at Tybee National Wildlife Refuge in Chatham County, Georgia; and Ernest F. Hollings ACE Basin National Wildlife Refuge in Beaufort County, South Carolina[169], therefore it is possible that some individuals of red knot might use the tidal mudflats in the project vicinity.

Potential impacts to the red knot would mostly likely occur during construction from noise and vibrations of heavy earth-moving equipment during low tide periods. These impacts would most likely be in the form of flushing feeding birds from the surrounding tidal marshes and mudflats. These impacts would be temporary and flushed birds would relocate to other nearby feeding areas. Other impacts would be from the permanent loss of tidal marsh and mudflats from fill for the roadway widening and from shading impacts from the new bridge, however, these impacts would be minimal relative to the total amount of tidal marsh and mudflats in the project vicinity. In addition, a recently approved tidal wetland mitigation bank located along the north western side of the project would be managed to restore and enhance tidal marsh, thereby increasing overall available habitat for wildlife populations. Based on these findings, it is anticipated that the project may affect, but is not likely to adversely affect, the red knot.

3.14.2.11 Shortnose sturgeon

The shortnose sturgeon (*Acipenser brevirostrum*) is a primitive, bony fish that has five rows of bony plates, known as "scutes" on its body rather than scales.[170] This endangered fish is brownish in color on the top, with light pink or salmon coloration on the sides, and is normally white in color on its belly.[171] The shortnose sturgeon has a forked tail, with the top lobe being longer than the bottom, and has a mouth that protrudes from the underside of the snout.[172] Adult species can live up to 55 years on average,[173] with females normally living longer than males, which average about a 30-year lifespan.[174]

The shortnose sturgeon is similar to the Atlantic sturgeon (*Acipenser oxyrinchus*), and sometimes utilize the same habitats. However, the adult shortnose sturgeon (approximately four feet in length) is smaller than the adult Atlantic sturgeon (which can be over nine feet in length), and the snout of a shortnose sturgeon is shorter and blunter when compared to the Atlantic sturgeon.[175]

[169] USFWS, Environmental Conservation Online System (ECOS), Species Profile for Red Knot (*Calidris canutus rufa*), https://ecos.fws.gov/ecp0/profile/speciesProfile.action?spcode=B0DM, (August 16, 2016).
[170] NOAA Fisheries, "Shortnose Sturgeon (*Acipenser brevirostrum*)," http://www.fisheries.noaa.gov/pr/species/fish/shortnose-sturgeon.html (July 26, 2016).
[171] South Carolina Department of Natural Resources, "Comprehensive Wildlife Conservation Strategy: Sturgeons," http://www.dnr.sc.gov/cwcs/pdf/Sturgeon.pdf (July 26, 2016).
[172] *Ibid.*
[173] *Ibid.*
[174] NOAA Fisheries, "Shortnose Sturgeon (*Acipenser brevirostrum*)," http://www.fisheries.noaa.gov/pr/species/fish/shortnose-sturgeon.html (July 26, 2016).
[175] NOAA Fisheries, *Final Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum),* December 1998, pp. 9 to 10.

Shortnose sturgeons feed on invertebrates, with juvenile species feeding on aquatic insects, larvae, and small mollusks, while adults normally feed on larger mollusks.[176,177] The shortnose sturgeon's range extends from New Brunswick south to the northern part of Florida, and adults are commonly found in brackish and estuarine waters along the coastline.[178] The adult shortnose sturgeon will migrate upstream to freshwater to spawn in the spring, and can go as far inland as the fall line in South Carolina to spawn, as long the stream is unobstructed.[179] The species may be making their way farther upstream than previously thought, as SCDNR recently reported that two electronically tracked shortnose sturgeon swam over 80 miles from Tailrace Canal on the Cooper River to reach the upper Wateree River, near the base of the Lake Wateree dam.[180] Adults will feed in these upstream freshwater areas for a while, eventually returning to the coastal brackish and estuarine waters in the fall and winter.[181] Larvae will hatch in freshwater and develop into juvenile species, which will migrate towards the brackish area of the river channel, where there is a mixing of freshwater and saltwater.[182] This is where juveniles will forage and develop for three to ten years, until they reach sexual maturity as an adult.[183]

Suitable habitat is present in the study area in the Back River. The downstream tide gate prevents sturgeon from swimming directly up the Back River, but migrating individuals may reach the Middle and Back Rivers from the main channel of the Savannah River by crossing over at the confluence of the channels upstream of Hutchinson Island. Shortnose sturgeon have been documented in the Back River by SCDNR by use of telemetry data of tagged individuals as recently as March through June 2013 at River Mile 4, approximately one mile upstream from the study area.[184]

Based on a letter to GDOT from NOAA, dated January 12, 2009, regarding Section 7 consultation for GDOT's proposed replacement of the U.S. Highway 17 bridge over the Back River, the only potential effect to shortnose sturgeon from the construction of GDOT's proposed bridge is on migration. The January 12, 2009 letter initially required a moratorium on construction between December 1 and April 30 of any year, and concluded that the project is not likely to adversely affect shortnose sturgeon as a result of the moratorium (NOAA, 2009). Potential habitat for shortnose sturgeon was observed within the proposed U.S. Highway 17 widening study area, particularly within the Back River. A December 19, 2016 letter from SCDOT to NOAA proposed that there be no moratorium on in-water work, however, the use of a noise reduction technique will be required between October 1 and April 15. Noise reduction will be required for impact driving or, if drilled shafts are used, no noise reduction will be required. If bubble

[176] *Ibid*., p. 41.
[177] South Carolina Department of Natural Resources, "Comprehensive Wildlife Conservation Strategy: Sturgeons," http://www.dnr.sc.gov/cwcs/pdf/Sturgeon.pdf (July 26, 2016).
[178] NOAA Fisheries, *Final Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum),* December 1998, p. 12.
[179] South Carolina Department of Natural Resources, "Comprehensive Wildlife Conservation Strategy: Sturgeons," http://www.dnr.sc.gov/cwcs/pdf/Sturgeon.pdf (July 26, 2016).
[180] Sammy Fretwell, *The State*, "Rare fish found in upper Wateree River," August 21, 2011, page 1.
[181] *Ibid.*
[182] NOAA Fisheries, *Final Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum),* December 1998, pp. 26 to 28.
[183] *Ibid.*
[184] Bill Post, SCDNR, Personal Communication by email dated 04/17/2014.

curtains are used, a contained bubble curtain technique will be utilized to keep the bubbles from being swept out of place by tidal or river currents. Given the presence of habitat and the proposed noise reduction measures during construction, construction of this project may affect, but is not likely to adversely affect this species. Section 7 consultation with NOAA-NMFS Protected Species Division will be completed prior to a final decision on the project.

3.14.2.12 West Indian manatee

The West Indian manatee (*Trichechus manatus*) is totally aquatic, with a slate gray to brown body that is rounded and tapered at both ends. It has a short neck, and a small head with a squarish snout and a large upper lip bearing numerous stiff hairs. There are only a few scattered hairs on the remainder of the body. The eye and ear are very small and it is lacking external ears. The hind limbs are vestigial and the forelimbs are paddle like. The tail is a horizontally flattened oval fluke. The manatee can grow to ten to thirteen feet long, and can weigh as much as 1,100 pounds.[185]In general, the manatee lives in coastal waters, estuaries, and freshwater streams bordering tropical and sub-tropical seas. It has been reported in the coastal waters of South Carolina, though its principal stronghold is Florida. It cannot tolerate cold water and rarely strays from warmer latitudes; therefore, its appearance north of Florida is incidental and it is often found at discharges of warm water. The primary threat to its survival is injury or death from propellers of motor boats.[186]

The Back River provides suitable habitat for the West Indian manatee. According to "Ecology Assessment/Description of Jurisdictional Wetland, Non-Wetland Waters of the U.S., and Protected Species Survey," prepared by the GDOT Office of Environment/Location (GDOT, 2007), the Natural Heritage Program has noted observations of manatee 0.40 mile southwest of the Back River Bridge. No individuals were observed during the field survey. Due to the historical presence of manatees and the presence of suitable habitat, the project may affect, but is not likely adversely affect this species. Concurrence was received from the USFWS's Brunswick Office regarding this determination (see **Appendix E**). In order to limit any potential for impacts to the manatee, bridge construction access would be located in upland areas to the maximum extent practicable and no contaminants will be released into the water. Equipment usage and materials for the bridge may not impede 50 percent of the river channel to allow safe passage for the manatee during bridge construction. All contractors involved in the construction would be required to comply with USFWS's Standard Manatee Conditions for In-water Work.

3.14.2.13 Wood stork

The wood stork (*Mycteria americana*) is a large wading bird that reaches four feet in height and has a wingspan of up to five feet. The wood stork's plumage is white except for the black feathers on its tail, primary feathers, and the trailing edge of its wings. Its head and neck are featherless, and its long bill is black in color.[187] Wood storks typically nest in the upper branches of black gum or bald cypress trees that are in standing water of swamps along rivers

[185] Webster, Wm. David, et al. 1985. *Mammals of the Carolinas, Virginia, and Maryland*. Chapel Hill: University of North Carolina Press, 255 pages.
[186] *Ibid.*, pages 224-225.
[187] USFWS, *The Red Book*. 1996.

and streams or adjacent to shallow lakes. Standing water deters mammalian predators and is an essential element of colony sites. Storks require open access to nest trees and are frequently found in trees adjacent to open water areas. They frequently feed in large groups in open wetlands where prey species are available and water depths are less than 20 inches. Forested riverine floodplain habitats are frequently used, but a variety of ponds, ditches and diked marsh impoundments are important habitats. Receding water, especially in areas that flood in the spring and begin to dry up in the summer, enhances feeding by concentrating fish for the catch. Wood storks also forage around low tide along many coastal tidal creeks. In South Carolina, colony sites are surrounded by extensive wetlands, in particular palustrine forested wetlands.[188]

Suitable foraging habitat for the wood stork is present within the study area. The study area has the wooded swamp and estuarine marsh or creeks that this species requires for foraging. However, much of the forested areas are not suitable nesting habitat. No wood storks were observed during the site visits nor were any of its nesting areas observed. Wood storks are known to utilize areas of the Savannah Wildlife Refuge and therefore, it is possible that they may forage in the tidal areas adjacent to the roadway. The project will impact a small portion of the tidal wetlands; however, the amount impacted is only a very small percentage of the total tidal wetlands within Jasper County, SC. Based upon this information, it is anticipated that the project may effect, but would not adversely affect the wood stork as a result of the proposed project.

3.14.3 State Listed Species

The state-listed threatened and endangered species that potentially may or are known to occur in Jasper County and/or Chatham County was reviewed for the proposed project. Their habitat requirements were reviewed to determine if suitable habitat is present in the study area. These species have no legal protection, but were studied in the event that their status becomes elevated to warrant federal protection. A table summarizing the results of habitat analysis is included in **Appendix K.**

3.14.4 Essential Fish Habitat Assessment

Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growing to maturity (16 USC 1802, 50 CFR 600.10). NMFS works closely with the South Atlantic Fishery Management Council to minimize adverse impacts to EFH in the southeast. Adverse effects are those that reduce the quality and/or quantity of EFH, including direct, indirect, site specific, or habitat wide impacts, including individual, cumulative or synergistic consequences of actions. In conformance with the *Magnuson-Stevens Fishery Conservation and Management Act of 1976* (as amended 1996), this assessment is being provided within this document (and attached in **Appendix L)** to describe potential adverse effects on EFH. **Figure 3-7** illustrates the areas of EFH within the study area or immediately adjacent to it.

Habitats identified within the project area include estuarine open waters (Back River), estuarine wetlands, freshwater forested wetlands, and freshwater marsh. Estuarine wetlands

[188] *Ibid.*


Legend
Project Area
Proposed Roadway
Tidal Creek
Intertidal Non-Vegetated Flats
Unconsolidated Bottom
Estuarine Emergent
Freshwater Wetlands
Key Map
1
2
3
4
5
0
400
800
1,200
Scale in Feet
Essential Fish Habitat
Figure 3-7 (1 of 5)
Wayne Stockaford Blvd
GA-25-ALT
Speedway


Legend
Project Area
Proposed Roadway
Tidal Creek
Intertidal Non-Vegetated Flats
Unconsolidated Bottom
Estuarine Emergent
Freshwater Wetlands
Key Map
1
2
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Figure 3-7 (2 of 5)
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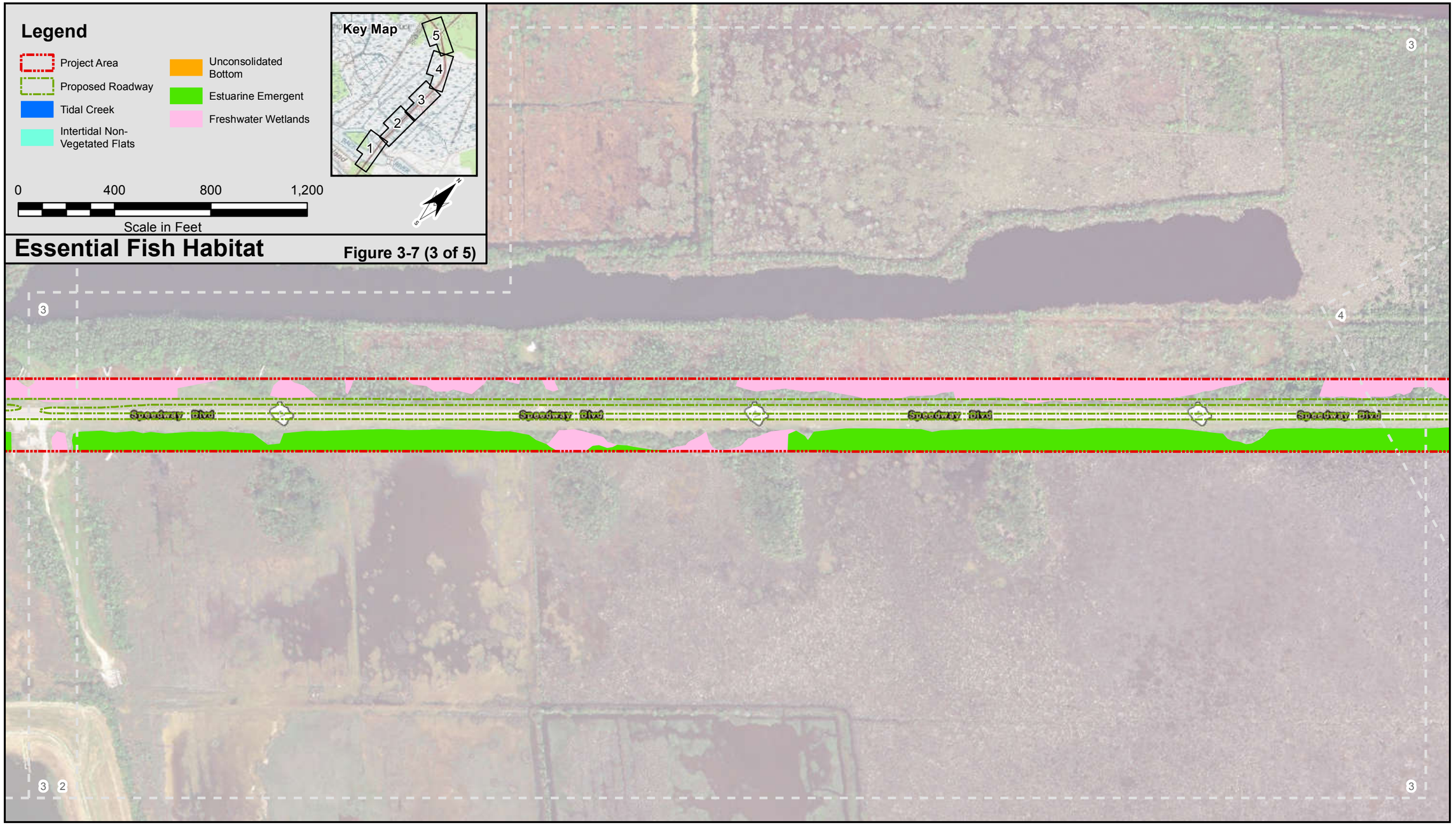
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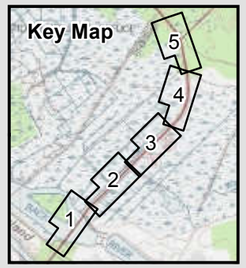
Essential Fish Habitat
Figure 3-7 (3 of 5)
Speedway Blvd
Speedway Blvd
Speedway Blvd
Speedway Blvd

SCDOT U.S. Department of Transportation Federal Highway Administration

Legend

- Project Area
- Proposed Roadway
- Tidal Creek
- Intertidal Non-Vegetated Flats
- Unconsolidated Bottom
- Estuarine Emergent
- Freshwater Wetlands

Key Map



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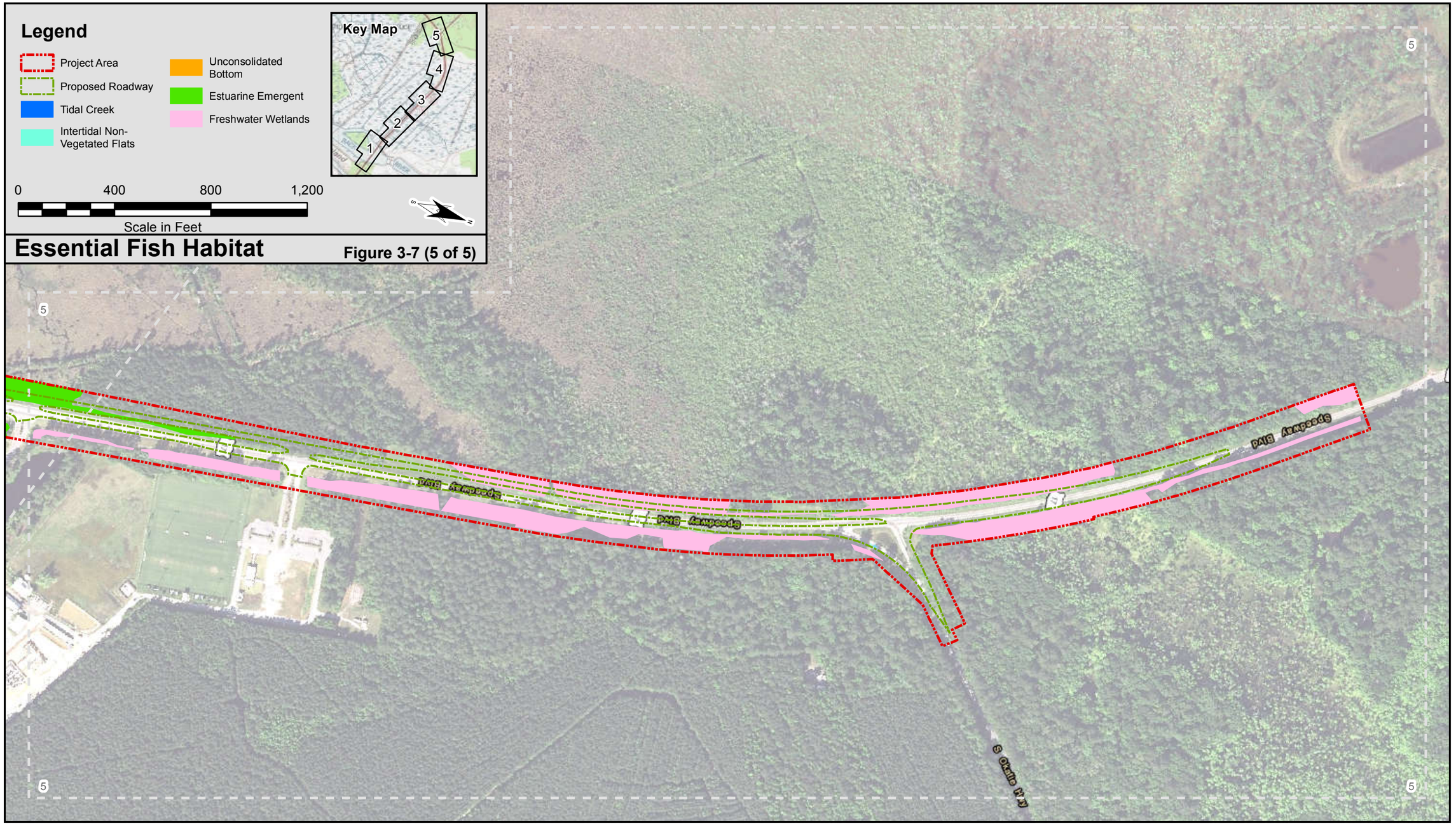
Scale in Feet

Essential Fish Habitat

Figure 3-7 (4 of 5)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adjacent to the project are estimated to be fully functional, while freshwater wetlands are estimated to range from partially impaired to very impaired. The freshwater wetland areas have been historically impacted by the construction of the roadway, planting of pine stands, and other development, which has impacted the wetland hydrology. Some freshwater areas may have been historically estuarine prior to installation of tidal gates adjacent to the project area and construction of U.S. 17, which potentially modified tidal influence in the area. The adjacent area to the northwest of the bridge over the Back River is planned to be used as a commercial mitigation bank. Historically, the tidal wetlands within this area were converted to freshwater rice fields. The establishment of the commercial mitigation bank will restore the tidal influence to this area and, theoretically, restore the tidal marsh to estuarine marshes. This would restore the area to EFH, thereby increasing the availability of habitat to aquatic organisms.

SCDOT initiated informal consultation with NOAA NMFS on September 22, 2016 for the proposed project with the submittal of the biological assessment for EFH. NMFS sent a response letter on December 1, 2016, acknowledging the request for informal consultation and receipt of the biological assessment and draft Environmental Assessment. This letter also made initial recommendations as to how to minimize impacts to EFH. SCDOT responded to NMFS on December 19, 2016 with its own proposal for avoidance and minimization; NMFS concurred with this approach on January 13, 2017 (refer to **Appendix L**).

3.14.4.1 Impacts and Minimization Measures

Due to the linear nature of the project, the need to construct a new bridge over the Back River, and the presence of estuarine wetlands on both sides of the roadway, total avoidance of estuarine resources was not feasible. Minimization efforts include using existing bridge approaches for new bridge location as much as possible, utilizing the existing alignment of U.S. Route 17 as much as possible for widening footprint, minimizing median width as much as safely possible, and maintaining/improving existing hydrologic connections under the roadway.

SCDOT coordinated with NOAA-NMFS to determine how best to prevent unnecessary impacts to EFH. E-mail correspondence on January 5, 2017 with NOAA-NMFS Protected Species Division (refer to **Appendix E**) determined that there will be no moratorium on in-water work, however, the use of a noise reduction technique will be required between October 1 and April 15. Noise reduction will be required for impact driving or, if drilled shafts are used, no noise reduction will be required. If bubble curtains are used, a contained bubble curtain technique will be utilized to keep the bubbles from being swept out of place by tidal or river currents. Additionally, an existing undersized culvert at the northern end of the project study area will be replaced with twin box culverts.

Permanent impacts to EFH under the Preferred Alternative would include 19.69 acres of fill and 0.55-acre of shading. Temporary impacts would include 7.92 acres of clearing and 0.02-acre of temporary fill. These impacts include areas of freshwater marsh, palustrine forested wetlands, and open water canals. No impact would to EFH would occur under the No-build Alternative.

To offset impacts to EFH, SCDOT would likely purchase credits from a mitigation bank. A mitigation bank is an entity that performs wetland restoration, enhancement, and/or preservation to generate 'credits' based on the amount of wetland restored, enhanced, and/or preserved. These credits are then made available for purchase to offset wetland impacts. Due to the time anticipated to receive permit approval and the large amount of credit required, a specific wetland bank or combination of wetland banks would be identified further into the permitting process. According RIBITS), there are two potential banks that could serve the project in South Carolina for estuarine credits, Clydesdale (approved) and Murray Hill (proposed) Mitigation Banks.

For estuarine credits in Georgia, the Salt Creek Mitigation Bank is also a potential option. These banks involve the restoration, enhancement, and/or preservation of estuarine habitats similar to the EFH that would be impacted by the Preferred Alternative and have the potential to offset EFH impacts such that no net loss occurs. For freshwater credits in South Carolina, the Sweetleaf Swamp Mitigation Bank would be a possibility to offset freshwater impacts. The proposed project is within the primary service area of all of these banks. This mitigation would be in kind and therefore, would potentially be suitable for mitigation for EFH impacts. SCDOT will account for additional shading impacts that the bridge may cause from being in close proximity to the existing bridge during final design. SCDOT will use these updated calculations when determining the wetland credits needed for mitigation.

3.15 INDIRECT AND CUMULATIVE IMPACTS

An analysis of the indirect and cumulative impacts (ICI) was completed for the proposed project in accordance with 40 CFR §1508.25(c) of NEPA and the CEQ. Indirect and cumulative impacts were analyzed using the National Cooperative Highway Research Program's *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*[189] and the CEQ's *Considering Cumulative Effects*.[190] Indirect impacts, as defined by 40 CFR §1508.8(b), are caused by the proposed action and "are later in time or farther removed in distance, but are still reasonably foreseeable." Cumulative impacts are defined by 40 CFR §1508.7 as:

> "*The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*"\

3.15.1 Study Area Boundaries

The study area for ICI was determined by using the limits of the developments and projects that either directly abutted the current study area limits, or would receive a direct benefit by the implementation of the proposed project. Areas that are currently protected where it is

[189] National Cooperative Highway Research Program, Report 466, *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*, 2002.
[190] Council on Environmental Quality, *Considering Cumulative Effects*, January 1997.

highly unlikely that future development would occur were also used to determine study area limits.

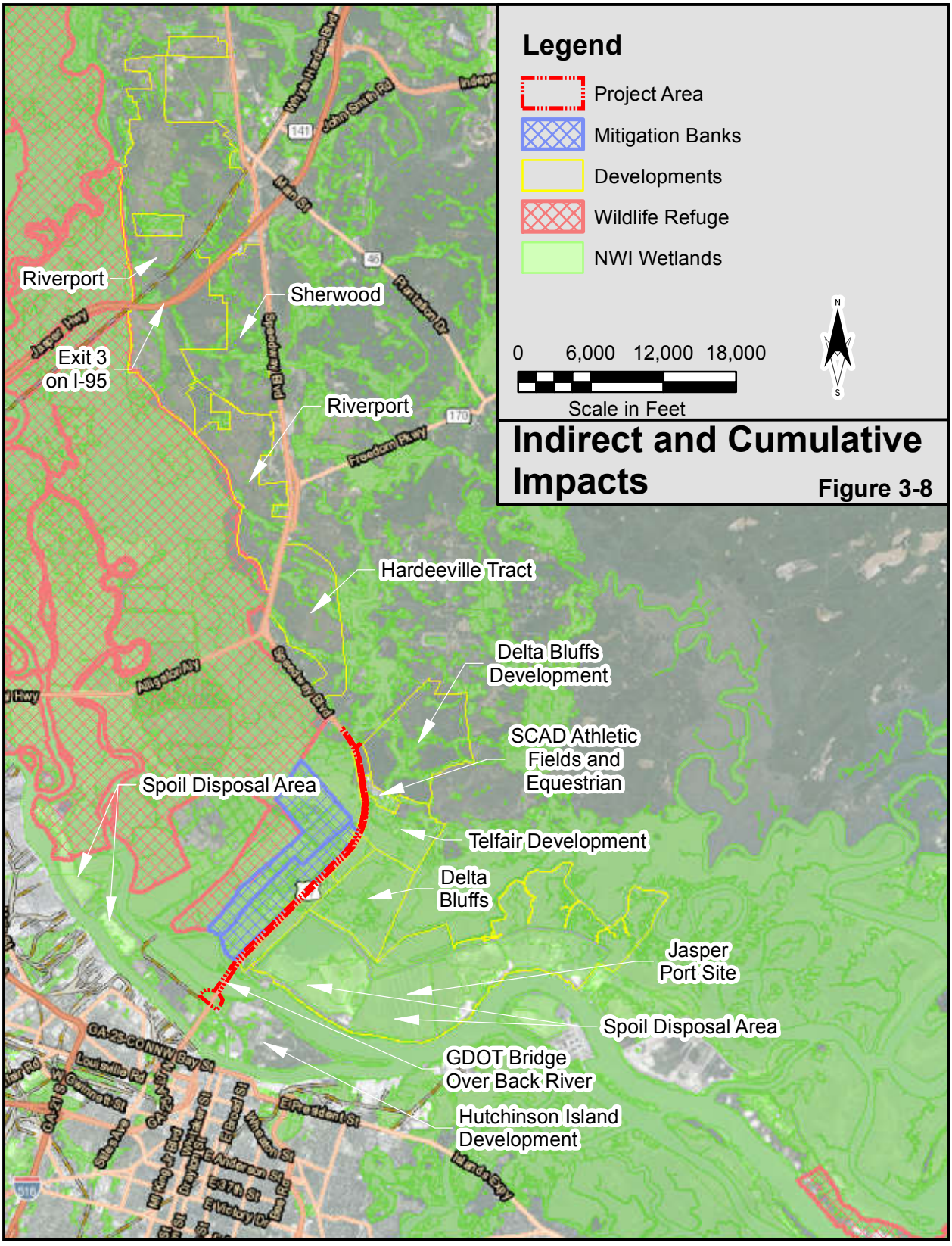
These limits bound the ICI study area to the south by the southern bank of the Savannah River, since the existing southern terminus for the project ties into an existing four lane section of U.S. Route 17. The northern boundary occurs along proposed developments along U.S. 17 north to I-95. The western ICI study area is bound by the Savannah NWR and the proposed Clydesdale Club Mitigation Bank, since these areas are unlikely to be developed due to federal protections. In addition, this area consists largely of jurisdictional wetland, which would also deter development in this area. The eastern ICI study area limit occurs along the proposed limits of the proposed Jasper Ocean Terminal, the existing salt marsh parallel to U.S. 17, and the boundaries of two planned developments adjacent to the northern portion of the project area. The study area boundary for ICI is depicted on **Figure 3-8**. The timeframe used for the analysis is approximately 25 years, since the project is using a design year of 2038. The design year is the year in which a facility is anticipated to reasonably function. Using the 25-year timeframe captures incremental impacts that would occur as development continues over time.

3.15.2 Directions and Goals of Study Area

As described in **Section 3.1**, Land Use (refer to page 3-1), the study area for the proposed improvement is largely undeveloped wetlands. Looking at the larger ICI study area captures the existing dredge disposal areas along the Back River and some additional residential development in the northern portion of the ICI study area. Overall, the ICI study area largely consists of undeveloped forested areas and wetland areas. Future land use within the ICI study area would largely be driven by the development of the proposed Jasper Ocean Terminal and properties that would also serve the Port of Savannah, including the proposed RiverPort and Exit 3 Development. In support of the proposed Jasper Ocean Terminal and existing Port of Savannah, warehousing, commercial, and residential development is also planned to occur.

Therefore, the overall goal and direction of development for the study area, as defined by Jasper County and the City of Savannah, is economic development. The SC portion of the ICI study area is included in a larger area known as Zone 1 along I-95.[191] The County is encouraging the development and properties in this area of SC since infrastructure and utilities are already available, and it is in close proximity to the Port of Savannah and the proposed Jasper Ocean Terminal.[192]

[191] Jasper County Comprehensive Plan, 2014 Update, May 8, 2014, p., 71, http://www.jaspercountysc.org/_fileUploads/file/Comprehensive%20Plan/Jasper%20Comp%20Plan-%20Final%20Draft%202014_05_08.pdf (July 22, 2016).
[192] *Ibid.*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Project Area
Mitigation Banks
Developments
Wildlife Refuge
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Indirect and Cumulative Impacts
Figure 3-8
Riverport
Sherwood
Exit 3 on I-95
Riverport
Hardeeville Tract
Delta Bluffs Development
SCAD Athletic Fields and Equestrian
Spoil Disposal Area
Telfair Development
Delta Bluffs
Jasper Port Site
Spoil Disposal Area
GDOT Bridge Over Back River
Hutchinson Island Development

3.15.3 Notable Features within the ICI Study Area

Since the ICI study area is largely undeveloped at this time, notable features are primarily composed of natural and cultural resources located within the ICI study area boundaries. The ICI study area consists of large expanses of wetlands and forested habitat, which include both freshwater and saltwater resources, tidal creeks, canals, and the Back River. The ICI study area also includes floodplains associated with rivers, streams, and canals. Only features impacted by the Preferred Alternative are considered in the assessment of ICIs.

Suitable habitats for federally listed species are present within the ICI study area. The SCDNR Heritage Program Database and the GADNR County Rare Elements Data were used to identify known or potential locations of federally protected species within the ICI study area, and supplemented with field reconnaissance. There are numerous occurrences of bald eagle within and adjacent to the ICI study area. Coordination with SCDNR has indicated occurrences of Atlantic and shortnose sturgeon in the vicinity of the ICI study area, and the Back River contains suitable habitat for West Indian manatee. Habitat for federally listed species likely occurs within the ICI study area; however, without detailed surveys, their presence or absence cannot be verified. Since most of the ICI study area is not developed, previous studies have not occurred on much of the undeveloped land. However, in addition to studies completed for the Preferred Alternative, studies have also been completed for the Riverport/Exit 3 Project and the GDOT Bridge over the Back River. Both of these studies identified potential habitat for Federally Listed Species in the ICI study area. Therefore, since there is documented habitat for Federally Listed Species in the ICI study area, and impacts to the habitats would occur under the Preferred Alternative, additional analysis is warranted.

Due to the large amount of salt marsh habitat and tidal open waters present, EFH is also prevalent in the ICI study area. Coordination with NMFS occurred for impacts to EFH associated with the construction of the GDOT bridge in 2015. Changes to the landscape from undeveloped forested areas to developed land would lead to changes in the land use and could have an impact on water quality within the ICI study area, which can have an impact on EFH. **Table 3.16** lists potential notable features and whether ICI to these features are anticipated. Features and future development are shown on **Figure 3-8** (refer to page 3-85).

TABLE 3.16
Notable Features within ICI Study Area

Notable Features	Potential ICI (Yes/No)
Floodplains	Yes
EFF/Water Quality	Yes
Wetlands/Streams	Yes
Habitat/Federally Listed Species	Yes

Source: Michael Baker International, 2016.

3.15.4 Impact Causing Activities

Impact causing activities in the ICI study area would consist of the construction of port related development, residential/mixed use developments, and roadway/transportation improvements. Potential impact causing activities are listed in **Table 3.17** (refer to page 3-88). Impacts related to development in the ICI study area would be caused by land clearing, excavation, construction of additional impervious surfaces, and alteration in traffic patterns. Land clearing and excavation could impact natural habitats (potential federally listed species habitat wetlands, floodplains, and/or EFH,). The addition of impervious surface within the ICI study area could have an impact on water quality, which can also have an impact on EFH.

The proposed Jasper Ocean Terminal would be located across the Savannah River from an existing Liquid Natural Gas Facility on Elba Island, Georgia, and would increase the region's capacity to efficiently handle the forecasted growth in containerized cargo[193]. Construction of the proposed Jasper Ocean Terminal, would require the addition of new utility and transportation facilities and would occur on 1,500 acres along the north bank of the Back River.[194] Proposed transportation and utility improvements include a 4-lane divided highway to connect the Jasper Ocean Terminal to U.S. 17, a rail corridor to connect the Jasper Ocean Terminal's rail yard to existing rail lines, a new rail bridge across the Savannah River, and utility lines and intermediary facilities to connect to existing services (e.g., water, sewer, and electricity).[195]

The proposed RiverPort and Exit 3 Project would require the addition of a new interchange with I-95 (Exit 3) as well as an approximately 4,300-acre mixed used development. RiverPort could potentially include up to 3,339 residential units and over 2.6 million square feet of commercial area.[196] Delta Bluffs is a planned 1,300 acre mixed use development, with up to 2,255 residential units and 100 acres of commercial development.[197] The Sherwood Development would include up to 3,688 residential units and 1,028 acres of commercial development on a 1,500-acre parcel.[198] The Telfair Planned Development is a 562-acre residential area that is currently partially developed, and has approximately 72 residential lots.[199] Past development has occurred on Hutchinson Island including the Club at Savannah Harbor (a mixed use/golf course community), industrial marine related facilities, a hotel/resort, and the Savannah International Trade and Convention Center. All of this development would result the clearing, excavation, and filling of natural habits. Impervious surfaces related to

[193] USACE Charleston District, Notice of Intent to Prepare a Draft Environmental Impact Statement for the Proposed Jasper Ocean Terminal in Jasper County, South Carolina. P/N SAC 2015-01238. October 21, 2016.
[194] Jasper Ocean Terminal Joint Project Office, An Update on the Jasper Ocean Terminal, March 11, 2011, p., 9. http://www.jaspercountysc.org/_fileUploads/JPO%20White%20Paper%2003.11.11.pdf (July 26, 2016)
[195] USACE Charleston District, Notice of Intent to Prepare a Draft Environmental Impact Statement for the Proposed Jasper Ocean Terminal in Jasper County, South Carolina. P/N SAC 2015-01238. October 21, 2016.
[196] Sligh Environmental Consultants, SLF III – Hardeeville, LLC RiverPort Development Draft Permit Application, July 26, 2016
[197] Development Agreement By and Between Delta Bluffs, LLC., and the Jasper County Council, September 5, 2006.
[198] McNair Law Firm, P.A., Development Agreement, Sherwood Tract, Hardeeville, South Carolina.
[199] Telfair Plantation, Planned Development and Master Plan, September 11, 2007.

roadways, parking lot, buildings, etc., would be required. The locations of these developments are shown on **Figure 3-8** (refer to page 3-85).

TABLE 3.17
Past, Present, and Future Impact Causing Activities within the ICI Study Area

Project	Project Type	Timeframe	Impacts
Jasper Ocean Terminal	Port	Future	Clearing, Excavation, Fill, Impervious Surface, Traffic Patterns
Telfair Planned Development	Residential	Future	Clearing, Excavation, Fill, Impervious Surface
Delta Bluffs Planned Development	Mixed Use	Future	Clearing, Excavation, Fill, Impervious Surface
RiverPort/Hardeeville Tract Development	Mixed Use	Future	Clearing, Excavation, Fill, Impervious Surface
Sherwood Development	Mixed Use	Future	Clearing, Excavation, Fill, Impervious Surface
Exit 3 on I-95	Transportation	Future	Clearing, Excavation, Fill, Impervious Surface, Traffic Patterns
Hutchinson Island Development	Mixed Use	Past	Clearing, Excavation, Fill, Impervious Surface, Traffic Patterns
GDOT Bridge over Back River	Transportation	Past	Clearing, Excavation, Fill, Impervious Surface, Traffic Patterns
SCAD Facility	Educational	Past	Clearing, Excavation, Fill, Impervious Surface
Residential Development along U.S. Route 17	Residential	Past	Clearing, Excavation, Fill, Impervious Surface
Spoil Disposal Areas	Industrial	Past/Present	Excavation and Fill
Commercial Development along U.S. Route 17	Commercial	Past	Clearing, Excavation, Fill, Impervious Surface
Rice Cultivation	Agricultural	Past	Hydrology
Construction of U.S. Route 17	Transportation	Past	Clearing, Excavation, Fill, Impervious Surface, Traffic Patterns

Source: Michael Baker Engineering, Inc. 2016.

3.15.5 Identification of Indirect and Cumulative Impacts for Analysis

The inventory of notable features based on impacts caused by the Preferred Alternative was compared to impact causing activities to determine which features would likely be impacted by these activities. The features selected for further evaluation using this method are floodplains, water quality, wetlands/streams, federally listed species and their habitats, and EFH.

3.15.6 Analysis of Indirect and Cumulative Impacts

The following is an analysis of the indirect and cumulative impacts for the notable features identified within the ICI study area. Since no direct impacts to land use are anticipated to occur under the Preferred Alternative, it is not anticipated there would be cumulative impacts to land use under the Preferred Alternative.

3.15.6.1 Floodplains

Indirect

Because proposed developments within and adjacent to the ICI study area would have existing access points without the construction of the proposed project, it is anticipated that these developments would occur independently of the proposed project. Floodplain impacts would be anticipated to occur regardless of the implementation of the proposed project. When floodplain impacts are modeled under future conditions, the Preferred Alternative would be accounted for in the hydrologic model. Since the proposed project is anticipated to have no impact on base flood elevations (refer to **Appendix H**), the proposed project is not anticipated to have an indirect impact on floodplains in the ICI study area, and would not have a negative impact on the floodplain elevations in hydrologic models for future development. The No-build Alternative is not anticipated to have an indirect impact on floodplains.

Cumulative

Because a large portion of the ICI study area is within the FEMA mapped floodplain, the GDOT bridge replacement over the Back River was constructed within the FEMA mapped floodplain. Some of the infrastructure improvements required for the proposed developments and some development parcels are also located within the FEMA mapped floodplain. If an impact is determined to increase flood elevations by greater than 1.0-foot, then coordination with FEMA would need to occur. Additional future residential and commercial development has the potential to impact floodplains; however, private development is usually avoided in floodplains due to the higher insurance costs.

Per the U.S. Global Change Research Program, the southeast is likely to see sea level rise due to climate change, and coastal areas will be more predisposed to to these effects.[200] This could increase the amount of regulated floodplains in the ICI study area, making more areas prone to flooding during storm surge events. The ICI study area is not yet densely developed, but future development is planned in this area. Adaptive strategies could be evaluated when these future developments are designed and constructed, such as the construction of levees or sea walls, or natural protective measures, to mitigate for the effects of sea level rise and storm surge on floodplains in the ICI study area.

A preliminary determination indicates that the Preferred Alternative could be constructed to meet 'No-Rise' requirements. Therefore, the implementation of the Preferred Alternative is not anticipated to have a cumulative effect on floodplains. There would be no cumulative impacts to floodplains under the No-build Alternative.

3.17.6.2 Water Quality

Indirect

No indirect impacts to water quality are anticipated with the implementation of the Preferred Alternative. Additional impervious surfaces would be added in areas within the ICI study area associated with developments. However, these developments would occur independently of

[200] U.S. Global Change Research Program, "Climate Change Impacts in the United States: Chapter 17, Southeast and the Caribbean," 2014, http://nca2014.globalchange.gov/report/regions/southeast. (Last accessed 11/28/16.)

the proposed improvements. Furthermore, additional developments in the vicinity of the proposed project will be required to comply with Section 402 of the CWA (refer to **Section 3.13.6**, page 3-62) and receive necessary NPDES permits. The No-build Alternative is not anticipated to have an indirect impact on water quality.

Cumulative

Past impacts to water quality may have resulted from increased impervious surfaces and maintenance practices related to residential and industrial development within and adjacent to the ICI study area. Impacts to water quality also occurred from the construction of roadways, which would have increased impervious surfaces in a largely undeveloped area.

The proposed projects would increase the amount of impervious surfaces within the ICI study area and could thereby result in incremental water quality impacts. However, it is required that additional run-off will be treated according to state and federal requirements prior to discharge in the numerous water bodies present in the ICI study area, which would minimize water quality impacts. Future development of residential and industrial sites would increase impervious area and run-off in areas that are currently undeveloped. These sites will have to comply with state and local regulations regarding treatment and release of stormwater.

Since the Preferred Alternative would be constructed to meet state and federal water quality requirements, it is not anticipated that cumulative impacts to water quality would occur. There would be no cumulative impacts to water quality under the No-build Alternative.

3.17.6.3 Wetlands

Indirect

Indirect impacts to wetlands or other jurisdictional waters of the United States are not anticipated to occur with the implementation of the proposed project. As discussed earlier, this development would occur independently of the proposed project and is subject to Section 404 permit approval and regulations. The No-build Alternative is not anticipated to have an indirect impact on wetlands.

Cumulative

Past impacts to wetlands occurred from residential/industrial development within and adjacent to the ICI study area, where wetlands were filled, drained, or otherwise altered with borrow pits and berms. In addition, natural streams within the area were also channelized for the cultivation of rice and silviculture, and wetlands were filled for access road construction within the area. During the cultivation of rice, tidal gates installed within canals were used to limit saltwater intrusion and convert historically brackish areas to freshwater systems. The construction of U.S. 17 would have bisected a historically continuous marsh area. There are scattered commercial business (past and present) along U.S. 17, which likely involved wetland impacts.

Currently, development is ongoing within the ICI study area. It is likely that this ongoing development has resulted in wetland impacts. However, developers will have had to obtain a Section 404 Permit and compensate for impacts. Future impacts would also occur from planned developments. In addition, the southeast is likely to experience sea level rise due to

climate change and coastal areas will be more prone to these effects.[201] This could impact tidal marshes and swamps in this area, and lead to an inundation of coastal wetlands. **Table 3.18** depicts the total estimated wetland acreage associated with proposed development within the ICI study area. Wetland acreage was taken from existing permits where available, for future development where permits have not yet been obtained the total was taken from wetland delineations or other available sources. Therefore, the totals represent either the permitted impacts or the entire amount of estimated wetland acreage on the parcels planned to be developed.

TABLE 3.18
Cumulative Wetland Acreage for Adjacent Projects

Project	Estimated Wetland Acreage
Jasper Ocean Terminal	226[a]
Delta Bluffs Development	316[b]
Telfair Development	5.22[c]
RiverPort Development	82.95[d]
Sherwood Development	275[f]
GDOT Bridge over Back River	1.93[g]
Hardeeville Tract	690[h]
TOTAL	**1,600.1**

Source: [a] Jasper Ocean Terminal Joint Project Office, An Update on the Jasper Ocean Terminal, March 11, 2011, p., 12. http://www.jaspercountysc.org/_fileUploads/JPO%20White%20Paper%2003.11.11.pdf (July 26, 2016)
[b] Thomas and Hutton, Delta Bluffs Boundary Survey, April 11, 2013.
[c] Section 404 Individual Permit SAC 2005-1W-155
[d] Sligh Environmental Consultants, SLF III – Hardeeville, LLC RiverPort Development Draft Permit Application, July 26, 2016.
[e] Jurisdictional Determinations SAC 81-2001-1138 and SAC 81-2001-0990
[f] Sherwood Tract Development Agreement, 2007, p., 11.
[g] Section 404 Individual Permit SAC 2001-1156
[h] Hardeeville-Savannah Tract Planned Development District and Conceptual Master Plan, April 2011.

A permit application was submitted to USACE for the proposed RiverPort/Exit 3 project in July 2016; however, this permit application only included the RiverPort portion of the project. Although it is anticipated that a new interchange on I-95 (Exit 3) would be needed to accommodate project traffic increases, no permit application has been requested at the time this EA was prepared. Therefore, the estimated wetland acreages shown in **Table 3.18** for RiverPort do not include Exit 3.

The purpose of **Table 3.18** is to put into context the potential acreage of impacts associated with the Preferred Alternative relative to past, present, and future developments in the ICI study area. The Preferred Alternative would make up less than 1.0 percent of the estimated cumulative impacts. While the Preferred Alternative and cumulative development would reduce the amount of wetlands within the watersheds that encompasses the proposed

[201] U.S. Global Change Research Program, "Climate Change Impacts in the United States: Chapter 17, Southeast and the Caribbean," 2014, http://nca2014.globalchange.gov/report/regions/southeast. (Last accessed 11/28/16.)

improvements, the total cumulative impacts make up only 2.0 percent of the 78,509 acres of wetlands in these watersheds.[202]

As shown on **Figure 3-8** (refer to page 3-84), the Clydesdale Mitigation Bank and the Murray Hill Mitigation Bank are within the ICI study area. The Clydesdale Bank is a 720.38 acre parcel, which includes 694.1 acres of wetland preservation and restoration.[203] The Murray Hill Bank is an 865-acre tract and would include restoration of 357.6 acres of saltwater wetland habitat.[204] In addition, the RiverPort Development includes 1,283.25 acres of wetland preservation and restoration/enhancement.[205] These sites represent a total of 2,334.95 acres of wetlands that would be preserved, enhanced, and/or restored within the ICI study area. This total is approximately 145 percent more wetland acreage than is estimated to be impacted within the ICI study area. These sites would protect wetlands within the ICI study area from future development and enhance wetland functions within the watershed. Adaptive strategies could be evaluated in the future to protect salt marsh and tidal creeks, such as the construction of levees or sea wells, or natural protective measures. These strategies could be developed and implemented at a local or state level by numerous entities. Therefore, the Preferred Alternative would not substantially diminish wetland resources when viewed in this context. The wetland locations relative to the development are shown on **Figure 3-8** (refer to page 3-84). There would be no cumulative impacts to wetlands under the No-build Alternative.

3.15.6.4 Habitat Loss/Fragmentation and Federally Listed Species

Indirect

Because development within the ICI study area is anticipated to occur independently of the proposed improvements, indirect impacts to habitat are not expected to occur under the Preferred Alternative. The No-build Alternative is not anticipated to have an indirect impact on federally listed species.

Cumulative

Past impacts to habitat occurred from residential/industrial development within and adjacent to the study area, when land was cleared for development. Past impacts would have also occurred from land clearing associated with agricultural and silviculture operations. Impacts have also occurred with the construction of existing roadways within the ICI study area. Currently, development is ongoing within the adjacent areas to the proposed project. It is likely that current ongoing development has resulted in habitat loss and fragmentation.

Habitat loss and fragmentation are anticipated to continue as previously undeveloped tracts of land are converted to residential, commercial, and industrial uses. Some of the habitat impacted by development could be suitable for federally listed species. However, without detailed

[202] South Carolina Department of Health and Environmental Control, Bureau of Water, Hydrologic Unit Code 03060109-03 (Savannah River), http://www.scdhec.gov/HomeAndEnvironment/Docs/savannah.pdf (July 26, 2016).
[203] Resource and Land Consultants, Clydesdale Mitigation Bank, Final Banking Instrument, June 2012, p. 6,
[204] USACE, Public Notice, South Coast Mitigation Venture, LLC (SAC 2014-00160), February 13, 2014, http://www.sac.usace.army.mil/Portals/43/docs/regulatory/publicnotices/Feb14_PN/SAC-2014-00160_Jasper_County_Murray_Hill_Mitigation_Bank.pdf (July 28, 2016).
[205] Sligh Enviornmental Consultants, Inc., Permittee-Responsible Mitigation Plan, SLF III Hardeeville, LLC, Riverport Development, July 22, 2016.

surveys, the presence or absence of federally listed species cannot be verified. As previously noted, the SCDNR Heritage Program Database containing known occurrences of federally protected species was reviewed and occurrences of bald eagles were found in the ICI study area.

Future impacts to shortnose sturgeon, Atlantic sturgeon, and West Indian manatee could occur with the construction and implementation of the Jasper Ocean Terminal. These impacts will be thoroughly studied in an Environmental Impact Statement for the USACE. Clearing and development of large forested tracts of land could have impacts to red-cockaded woodpecker, bald eagle, Canby's dropwort, Pondberry, eastern indigo snake, and frosted flatwoods salamander. Critical habitat for frosted flatwoods salamander was identified within the limits of the RiverPort project.[206] Impacts to this area are being avoided and coordinated with USACE and USFWS.[207]

The southeast is likely to see sea level rise and an increase in temperature due to climate change and coastal areas will be more prone to these effects.[208] This could impact federally protected species by altering migratory patterns or spawning seasons; cause a change in species growth rates; change the local species composition (food chain) available; or, result in the introduction of invasive or new locally viable species.[209] In addition, the rise in temperatures could increase harmful algal blooms in inland and coastal waters that were not previously problems in the southeast.[210] This could also impact federally protected species in the long-term. Response strategies could be numerous to this, and implemented at many different levels, both locally and regionally. The U.S. Global Change Research Program has Adaption and Mitigation strategies presented in its 2014 report that could be implemented by various entities to address some of these potential effects.[211]

Future development requiring a Section 404 permit would need a threatened and endangered species survey as part of the permit application. Coordination with USFWS would occur during the permitting process. This coordination would also include compliance with the *Bald and Golden Eagle Protection Act*, which affords protections to the bald eagle. Due the large amount of wetland area in the ICI study area, it is likely that any future development would require a Section 404 permit.

Since no direct impacts to Federally Listed Species are anticipated to occur under the Preferred Alternative, it is not anticipated there would be cumulative impacts to Federally Listed Species. Loss of habitats would occur as a result of the Preferred Alternative. However, impacts to wetland habitat would be mitigated, and upland habitats impacted are not rare in nature.

[206] Sligh Environmental Consultants, Inc., Biological Assessment for Federally Protected Species, and At-Risk Species, Riverport Development, Jasper County, South Carolina, April 21, 2016.
[207] Sligh Environmental Consultants, Inc., Biological Assessment for Federally Protected Species, and At-Risk Species, Riverport Development, Jasper County, South Carolina, April 21, 2016.
[208] U.S. Global Change Research Program, "Climate Change Impacts in the United States: Chapter 17, Southeast and the Caribbean," 2014, http://nca2014.globalchange.gov/report/regions/southeast. (Last accessed 11/28/16.)
[209] *Ibid* at p. 402.
[210] *Ibid* at p. 404.
[211] *Ibid.*

Therefore, the Preferred Alternative is not anticipated to have a cumulative impact. There would be no cumulative impacts to habitats under the No-build Alternative.

3.15.6.5 Essential Fish Habitat

Indirect

Because development within the ICI study area is anticipated to occur independently of the proposed improvements, indirect impacts to EFH are not expected to occur. The No-build Alternative is not anticipated to have an indirect impact on EFH.

Cumulative

Past impacts to EFH occurred from residential/industrial development within and adjacent to the study area. Impacts would have also occurred with the construction of existing roadways within the ICI study area. Historically, EFH would have been lost due to rice cultivation, where brackish EFH was converted to freshwater for rice production. Large expanses of the salt marsh habitat within the ICI study area have also been impacted by the construction of spoil disposal areas along the Back River. Past impacts could have also occurred due to impacts to water quality within the ICI study area, due to siltation during construction, which can have a detrimental effect on EFH. The construction of the GDOT bridge over the Back River would have impacted EFH due to the placement of pilings from the new bridge, shading from the bridge, and temporary impacts that occurred during the bridge construction (use of temporary trestles over marsh area). GDOT provided mitigation for EFH by purchasing mitigation credits from the Salt Creek and Huspa Creek Mitigation Banks. Currently, development is ongoing within the adjacent areas to the proposed project. It is likely that current ongoing development has resulted in wetland fill that resulted in the loss of EFH. Climate change impacts previously discussed in the wetlands **Section 3.17.6.3**, could influence the amount and quality of essential fish habitat in the future.

Loss of EFH habitat is anticipated to continue as previously undeveloped tracts of land are converted to residential, commercial, and industrial uses. Due to the wetland types within the ICI study area, it is likely that any wetland impact within or adjacent to a saltwater habitat would also be considered an EFH impact. Future impacts to EFH could occur with the construction and implementation of the Jasper Ocean Terminal. These impacts will be thoroughly studied in an Environmental Impact Statement for USACE and coordinated with NMFS. It is likely that mitigation would be required for any impacts to EFH resulting from the Jasper Ocean Terminal.

Future development requiring a Section 404 permit would need to address impacts to EFH as part of the permit application. Coordination with NMFS would occur during the permitting process, as determined by USACE. Due to the amount of wetland area in the ICI study area, it is likely that any future development would require a Section 404 permit, and would also likely require mitigation. Mitigation for impacts to wetlands that also serve as EFH, would need to mitigated in-kind. Future developments would also have the potential to impact water quality, which can have a direct impact on EFH. However, it is required that additional run-off will be treated according to state and federal requirements prior to discharge in the numerous water bodies present in the ICI study area, which would minimize water quality

impacts. Future development of residential and industrial sites would increase impervious area and run-off in areas that are currently undeveloped. These sites will have to comply with state and local regulations regarding treatment and release of stormwater, which would minimize water quality impacts.

Direct impact to EFH resulting from the implementation of the Preferred Alternative would require mitigation to off-set impacts. Any wetland impacts that also serve as EFH would need to be mitigated in-kind for the Preferred Alternative, as would any future development with EFH impacts. For the proposed project, mitigation for impacts to estuarine wetland impacts, which also serve as EFH, would likely be provided by the Clydesdale/Murray Hill Bank in SC, and the Salt Creek Bank in GA. The usage of these banks for mitigation (utilizing the USACE protocols for credit calculations) is designed to ensure a no-net loss of wetland, and in turn, EFH. It is worth noting, that the both the Clydesdale and Murray Hill Mitigation Banks border the western study area for the Preferred Alternative and present an opportunity to provide the majority of mitigation virtually on-site. Therefore, when viewed in the context of the mitigation proposed for the Preferred Alternative, it is not anticipated to contribute to a collectively significant loss of EFH resources. There would be no cumulative impacts to EFH under the No-build Alternative.

3.15.7 Evaluation of Analysis Results

The analysis of ICI was based on data collected for ongoing and planned development within the study area. Since much of the development is still in the planning stages, it is likely that some development plans could change. However, the best available data available at the time of the analysis was utilized.

3.15.8 Indirect and Cumulative Impacts Summary

Because the proposed developments are planned, or permitted, they could and would occur independent of the proposed road improvements, no indirect impacts to social or natural resource impact categories are anticipated. Current and future development in the ICI study area is anticipated to impact land use, water quality, wetlands, and wildlife habitats. Impacts could also occur to floodplains, cultural resources, EFH, and/or federally protected species. Development would increase the amount of impervious surfaces, runoff, and sewage treatment needs, and increase the pressure to fill on-site wetlands. A summary of past, present, and future actions, and potential ICI is included in **Table 3.19** (refer to page 3-96).

TABLE 3.19
Summary of Past, Present, and Future Impact Causing Activities within the ICI Study Area

	Floodplains	Water Quality	Wetlands/ Streams	Federally Listed Species	EFH
Proposed Action	✓	✓	✓		✓
Jasper Ocean Terminal	✓	✓	✓	✓	✓
Telfair Planned Development		✓	✓		✓
Delta Bluffs Planned Development		✓	✓		✓
Riverport/Hardeeville Tract Development	✓	✓	✓	✓	✓
Sherwood Development		✓	✓		✓
Exit 3 on I-95		✓	✓		
Hutchinson Island Development		✓	✓		✓
GDOT Bridge over Back River	✓	✓	✓		✓
SCAD Facility		✓	✓		
Residential Development along U.S 17		✓	✓		
Spoil Disposal Areas	✓	✓	✓		✓
Commercial Development along U.S. 17		✓	✓		✓
Rice Cultivation		✓	✓		✓
Original Construction of U.S. 17	✓	✓	✓		✓

Source: Michael Baker International, 2016.
Note: Red checkmarks indicated potential impacts for that category.

Although the proposed project would improve access to existing and planned developments within (and adjacent to) the study area, it is anticipated that these developments would occur independently. They would not directly depend on the construction of the proposed project, and therefore would not be considered as indirect impacts resulting from the implementation of the Preferred Alternative. Cumulative impacts to water quality, habitat, wetlands, and EFH are expected to continue as additional development occurs within Jasper County. These impacts would be moderated by Sections 401 and 402 regulations and Section 404 requirements. Habitat loss would continue as previously undeveloped tracts of land are converted to residential, commercial, and industrial uses.

3.16 PERMITS REQUIRED

The federal *Clean Water Act* (33 USC 1344) is the basis of law regulating wetlands and other waters, known as "waters of the United States". Section 404 of the *Clean Water Act* regulates the discharge of dredge or fill material into waters of the U.S. USACE holds the primary federal authority for regulation of discharges into waters and wetlands. A Nationwide Permit (NWP) is required when the proposed action would have only minimal individual and cumulative environmental impacts. An Individual Permit (IP) would be required for major activities that are not covered under the general conditions of the Nationwide Permit program. Due the amount of wetland impact associated with the proposed project, an Individual Section 404 Permit would be required from USACE.

The U.S. Coast Guard (USCG) regulates the obstruction of navigable waters. Section 9 of the *Rivers and Harbors Act of 1899* prohibits the construction of a bridge, dam, dike, or causeway over navigable waters. Given that the Back River is considered a navigable waterway, coordination and communication with USCG is required. Coordination began with USCG on May 14, 2009 through SCDOT's letter of intent (see **Appendix E**). USCG responded to SCDOT's request via letter dated July 20, 2009. In this letter, the Commandant gave an advanced approval of the location and bridge plans constructed across navigable waterways for this project. The letter also stated that a USCG Permit would not be required (see **Appendix E**).

Section 10 of the *Rivers and Harbors Act of 1899* states that "the creation of any obstruction not affirmatively authorized by Congress, to the navigable capacity of any of the waters of the United States is hereby prohibited; and it shall not be lawful to build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, or other structures in any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, except on plans recommended by the Chief of Engineers and authorized by the Secretary of War; and it shall not be lawful to excavate or fill, or in any manner to alter or modify the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor of refuge, or enclosure within the limits of any breakwater, or of the channel of any navigable water of the United States, unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same." A permit may be obtained from USACE to construct in navigable waters. This application would occur with the Section 404 Individual Permit.

SCDHEC administers the Water Quality Certification program pursuant to Section 401 of the *Clean Water Act*. Section 401 requires that the State issue certification for any activity which requires a Federal permit and may result in a discharge to state waters. This certification must state that applicable effluent limits and water quality standards will not be violated. Regulation 61-101 (Water Quality Certification) outlines the procedures and policies for implementing the state water quality certifications.

Section 402 of the CWA authorizes USEPA to issue NPDES Permits for the discharge of pollutants into water of the United States. The *Stormwater Management and Sediment Reduction Act* (1991) transferred the NPDES permitting authority for South Carolina to SCDHEC. Section 402 permit compliance will be required prior to the construction of the proposed project.

The *Federal Coastal Zone Management Act of 1972* requires that activities in the coastal zone comply with approved state coastal management guidelines. The *South Carolina Coastal Zone Management Ac*t (1977, as amended 1993 by Act 181) gives authority to SCDHEC-OCRM to promote the economic and social welfare of the citizens of South Carolina while protecting the sensitive and fragile areas in the coastal counties and promoting sound development of coastal resources. A permit would be required from SCDHEC-OCRM for activities within the critical area and the coastal zone. SCDHEC-OCRM classifies a new bridge as a major activity.

The *Coastal Marshlands Protection Act* (O.C.G.A. § 12-5-280) gives authority to regulate marshland in Georgia to the GADNR to protect public trust lands that are held for the citizens of Georgia. As public trustees of the coastal marshlands for succeeding generations, GADNR-CRD

allows for the sustainable use of the estuarine area through permits and other methods of authorization that will preserve the condition of the marsh while still allowing for its enjoyment.[212] A *Coastal Management Protection Act* Permit would be required from GADNR for impacts to marshland in Georgia. In addition, a state Revocable License is permission from the State to use publicly owned lands lying below the ordinary high water mark. This permission is required for any activities, whether permanent or temporary, that would impact tidally influenced waters, salt marshes, intertidal areas, mud flats or tidal waterbottoms.[213] The project will also require a State Water Buffer Variance from GADNR for the Georgia portion of the project.

Permitted projects within critical areas usually require mitigation to offset impacts to tidal lands. Mitigation for the Section 404 permit will generally also satisfy the critical area permit mitigation, however, SCDHEC-OCRM may require additional mitigation above and beyond that required by USACE if the agency deems that mitigation insufficient in either amount or kind.

[212] GADNR, *Coastal Marshland Protection Act*, http://www.coastalgadnr.org/msp/ap/marsh (July 25, 2016).
[213] GADNR, State Revocable License for Use of Waterbottoms, http://www.coastalgadnr.org/msp/ap/lic (July 25, 2016).

CHAPTER FOUR: AGENCY AND PUBLIC INVOLVEMENT

4.1 AGENCY COORDINATION

4.1.1 Letters of Intent and Responses

As part of the scoping process, SCDOT sent letters of intent dated April 15, 2014, to the following agencies and organizations:

Federal

- Federal Highway Administration
- U.S. Army Corps of Engineers, Regulatory Division, Charleston District
- U.S. Army Corps of Engineers, Regulatory Division, Savannah District
- U.S. Environmental Protection Agency, Office of Environmental Assessment
- U.S. Environmental Protection Agency, Wetlands Regulatory Section
- U.S. Fish and Wildlife Service
- U.S. Department of Agriculture, Natural Resources Conservation Service
- U.S. Department of Homeland Security, U.S. Coast Guard
- National Oceanic and Atmospheric Administration, National Marine Fisheries Service

State

- S.C. Department of Archives and History
- S.C. State Historic Preservation Office
- S.C. Institute of Archaeology and Anthropology
- S.C. Budget and Control Board
- S.C. Department of Health and Environmental Control, Bureau of Air Quality
- S.C. Department of Health and Environmental Control, Bureau of Land and Waste Management
- S.C. Department of Health and Environmental Control, Bureau of Water
- S.C. Department of Health and Environmental Control, Office of Ocean and Coastal Resource Management
- S.C. Department of Health and Environmental Control, Region 8 Environmental Quality Control Office
- S.C. Department of Natural Resources

- S.C. Department of Parks, Recreation, and Tourism
- S.C. Department of Transportation
- S.C. Forestry Commission
- GA Department of Transportation, Office of Environmental Services
- GA Department of Natural Resources, Coastal Resource Division
- GA Department of Natural Resources, Historic Preservation Division
- GA Coastal Regional Commission

Local

- Lowcountry Council of Governments
- Jasper County, Planning and Building Services Department
- Jasper County, County Administration
- Metropolitan Planning Commission, Transportation Services
- Chatham County, Department of Engineering
- City of Savannah

Organizations

- Sierra Club, South Carolina Chapter
- The Nature Conservancy, South Carolina Chapter
- South Carolina Wildlife Federation

The letter of intent provided information about the project and gave agencies, local government entities, and organizations an opportunity to comment on this project.

The agency comments that were received are summarized below and have been addressed in this document. Copies of the agency comment letters are included in **Appendix E**.

The S.C. Department of Health and Environmental Control, Bureau of Air Quality stated that currently only two criteria pollutants, Ozone and Particulate Matter 2.5, are of concern in South Carolina. They also stated that only the eastern portion of York County has been designated as nonattainment for the 2008 8-hour ozone NAAQS. They also suggested that an asbestos survey and project license may be required for demolition activities and provided the appropriate contact information. They warned that emissions from construction equipment are regulated by federal standards and offered several suggestions to promote compliance with the NAAQS. They also offered model language for construction contracts to help vendors to meet clean construction requirements and suggested that upgrades to equipment might be eligible for Congestion Mitigation and Air Quality (CMAQ) funds.

The S.C. Department of Health and Environmental Control, Bureau of Water, recommended that impacts to open water, associated wetlands, water quality and navigations be minimized during planning and construction of the project. They suggested a number of ways such as increasing bridge length and vertical clearance, working from highland or portions already completed and/or using temporary trestles, floating barges or mats rather than canals or causeways. They also suggested enlarging existing culverts to accommodate bankfull flows and utilizing 2:1 side slope to reduce the footprint. They also noted that the Back River is designated as SB waters so shellfish harvesting is not an issue, and that there are no impaired monitoring sites or TMDLs in the area of the proposed project. They advised the use of Best Management Practices to avoid potential water quality impacts and to minimize stormwater discharges directly from the bridge scuppers. They also stated that they would review additional information regarding impacts to open waters and wetlands which would be useful for the project's water quality review and Critical Area Permit application. They also warned that additional conditions might be required of the Critical Area Permit to further reduce wetland and water quality impacts and that a final mitigation plan must be reviewed and approved by SCDHEC during the certification process. Lastly, they reminded that the proposed work must be incompliance with State Sediment and Erosion Control and NPDES MS4 permitting requirements.

The South Carolina Department of Natural Resources stated that based upon the limited information provided, they were unable to provide specific comments on the potential impacts, however, they would express some general comments. Firstly, they stated that careful consideration should be given to avoided wetland impacts and to minimizing unavoidable impact to the maximum extent possible. They also stated that mitigation for unavoidable impacts to wetlands should focus on in-kind replacement of lost wetland functions. Secondly, they stated that potential impacts to threatened and endangered species should be included in environmental review of the proposed project. They also stated that information on known populations of federal and/or state protected species is available through their Wildlife Diversity Section. Lastly, they asked to be contacted for further comment when additional information is available.

The Office of the Jasper County Administrator responded with an assessment of the social, economic and environmental impacts. They stated that the social impacts are positive as the project will improve safety of "a heavily traveled and dangerous road…" with direct access to the Savannah College of Art and Design's Equestrian Center and the Savannah Wildlife Refuge. They also stated that the economic impact is positive as the road serves as a major commuting route and is critical infrastructure for the future Jasper Ocean Terminal. Lastly, they stated that the potential environmental impacts are negligible as the project abuts a federal dredge spoil area. They also requested a meeting with the SCDOT Secretary Ms. Janet Oakley to discuss the status of the project.

4.1.2 Inter-Agency Meeting

SCDOT also conducted an Inter-Agency Meeting to allow individuals from the various agencies to express their concerns regarding the project. The meeting was held on June 17, 2014 at the offices of SCDNR. Those attending were:

- **South Carolina Department of Transportation (SCDOT)** – Chad Long (Organizer, ENV project manager), Nicole Riddle, Will McGoldrick, Russell Chandler
- **Baker** – Gordon Murphy (ENV Project manager), Renée Flinchum-Bowles
- **Federal Highways Administration (FHWA)** – Shane Belcher
- **US Army Corps of Engineers (USACE)** – Elizabeth Williams
- **US Fish and Wildlife Services (USFWS)** – Mark Caldwell
- **SC Department of Health and Environmental Control- Ocean and Coastal Resource Management (SCDHEC-OCRM)** – Paul Wojoski
- **National Oceanic and Atmospheric Administration-National Marine Fisheries (NOAA-NMFS)** – Jaclyn Daly
- **SC Department of Natural** Resources (SCDNR) – Susan Davis
- **SCDHEC Water Quality division** – Don Padgett (via conference call)

A copy of the meeting minutes and sign-in sheet are included in **Appendix E**. Several concerns were expressed by the members of the various agencies. Most comments and questions could be grouped into one of the following categories:

1. Reducing impacts
2. Mitigation
3. Protected species including EFH
4. Alternatives

Because the existing roadway crosses numerous tidal and freshwater wetlands, the agencies were primarily focused on minimizing impacts through alternative selection and effectively mitigating for unavoidable impacts. USFWS discussed several possibilities for mitigation, including the purchase of credits at the Murray Hill, Clydesdale, and HUSPA Creek Mitigation banks; USFWS recommended the HUSPA Creek Mitigation Bank as its preference. USFWS also inquired regarding the possible use of permittee responsible mitigation (PRM) at the Savannah River Wildlife Refuge, including possible land acquisition and restoration activities. USFWS and SCDNR objected to the use of Clydesdale or the pending Murray Hill mitigation banks. USACE stated that any USACE-approved mitigation bank would be acceptable for the purpose of mitigating unavoidable impacts, but stated that PRM mitigation would be an option if it is

available, closer to the project area, and would provide more benefits to the watershed. Overall, the agencies emphasized a desire to minimize impacts to wetlands and encouraged the design of alternatives that would accomplish this goal.

Three alternatives for widening and bridge construction were proposed during the interagency meeting (refer to **Appendix E**). The project team proposed the three widening alternatives that existed at the time, which included shifting to the east of the centerline, to the west of the centerline, and symmetrically along the centerline with a 36-foot median. At the time of the interagency meeting, no preferred alternative had been selected. Based on anticipated impacts resulting from the three alternatives, SCDNR inquired as to the possibility of an alternative with a narrower footprint as was done for the U.S. 17 ACE Basin widening. A 24-foot median alternative with a Jersey barrier was discussed. The project team explained that in addition to serious safety issues associated with the narrower median and use of jersey barriers, the relatively short length of the project (approximately 4.5 miles) would create an expectancy issue for drivers and require a complete redesign. Also, this would require a closed stormwater drainage system and would not provide an opportunity for pretreatment before discharging into the adjacent wetlands. After further examining the safety issues associated with the narrower median, the alternative was eliminated for consideration.

4.2 PUBLIC INVOLVEMENT

SCDOT held a Public Information Meeting on Thursday, September 14, 2010, at the Hardeeville Community Center located in Hardeeville, South Carolina to provide information and to solicit information from the local community concerning the proposed widening of U.S. 17. The meeting was held in an informal "drop in" format and agency personnel were present to provide information and answer questions. Attendees were given an information sheet with the project description, purpose background, schedule, and contact information upon signing an attendance record. Comment forms were also provided.

Approximately thirty persons attended the Public Information Meeting and a total of twelve comment forms were returned. A letter from the CORE Coastal Region MPO was also received after the formal comment period was expired. A copy of the newspaper announcement, comments received, and the sign-in sheet are included in **Appendix M**. Analysis of the comments resulted in the classification of the comments into the following categories:

- Praise/Support the project.
- Request for a traffic signal and intersection improvements at the U.S. 17 and S.C. 315 intersection.
- Request for longer turning lanes.

- Request for bike lanes or a multi-use path along the U.S. 17 corridor.
- Inquiry about future plans to widen S.C. 315.
- Concern about property impacts to the Oakwood Subdivision.
- Concern about safety due to truck traffic and speed.

Additional public hearings/meetings will be held following the announcement of the availability of the EA.

CHAPTER FIVE: LIST OF PREPARERS

5.1 FEDERAL HIGHWAY ADMINISTRATION

Shane Belcher, South Carolina Division, Environmental Coordinator, responsible for review of the EA.

Michelle Herrell, South Carolina Division, Environmental Protection Specialist, responsible for review of the EA.

5.2 SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

Joy Riley, PE, Program Manager, responsible for project coordination.

Heather Robbins, AICP, Director of Environmental Services, responsible for review of the EA.

Chad Long, NEPA Division Manager, responsible for review of the EA.

Ed Frierson, Biologist/NEPA Coordinator, responsible for BA review and agency coordination.

Will McGoldrick, Permits Coordinator, responsible for coordination with the USACE.

Nicole Riddle, Assistant NEPA Coordinator, responsible for EFH assessment review and agency coordination.

5.3 MICHAEL BAKER INTERNATIONAL, INC.

Gordon Murphy, Environmental Planning Manager, Project Manager, responsible for overall management of project and project coordination, review of the EA and provided input on natural resources and permitting sections of the EA.

Danielle Cemprola, Environmental Specialist II, responsible for review of the EA and primary author of the Environmental Assessment.

Jennifer Kennelly, Senior Project Manager, responsible for review of the EA.

Andy Kuchta, Noise Technical Manager, responsible for preparation of the noise analysis.

Robyn Hartz, Air Quality and Acoustic Scientist, responsible for preparation of the air quality assessment.

Renée Flinchum-Bowles, Environmental Specialist II, responsible for natural resources field work, preparation of the natural resources sections of the EA, and the Biological Assessment.

Ed Smail, Environmental Technical Manager, responsible for natural resources field work and preparation of Indirect and Cumulative Impact sections of the EA.

Lee Williams, PWS, Environmental Specialist II, responsible for preparing the EFH assessment.

Troy McNall, Senior Designer, responsible for preparation of graphics.

Reneé Tison, PE, Roadways Operations Manager, responsible for the development of supplemental roadway design.

Chris Gossett, PE, Senior Project Manager, responsible for the development of supplemental roadway design.

Bill Ruhsam, PE, PTOE, Traffic Services Manager, responsible for assistance in the preparation of traffic analysis sections

Stephen Ross, PE, Structures Operations Manager, responsible for the development of the conceptual bridge plans.

Ginger Booker, Administrative Assistant, responsible for reproduction of the EA.