



3.18 FLOODPLAINS

3.18.1 What are floodplains?

Floodplains are low-lying areas located adjacent to the channel of a river, stream, or other type of waterbody. These areas are subject to periodic flooding during heavy rains and/or long periods of wet weather. The flood prone area of a stream or river system is twice the height of its maximum bankfull depth. Therefore, in areas of lower topographic relief, such as the Atlantic Coastal Plain of South Carolina, the floodplain would, by definition, be more expansive than in regions of higher elevation.¹³⁸ Coastal Plain rivers, in particular, have been described as broad floodplains within alluvial valleys.¹³⁹

A floodplain provides important functions in the natural environment such as:

- providing temporary storage of flood waters;
- preventing heavy erosion caused by fast moving water;
- providing a vegetative buffer to filter silt and contaminants before entering a waterbody;
- recharging and protecting groundwater; and
- accommodating the natural movement of streams.

3.18.2 What agencies regulate floodplains?

The National Flood Insurance Program is administered by the Federal Emergency Management Agency (FEMA), with the SCDNR serving as the state National Flood Insurance Program Coordinating Office. Through the assistance of FEMA and SCDNR, Dillon, Horry, and Marion Counties have performed Flood Insurance Studies to identify flood hazards for the purposes of floodplain management and insurance determinations. Those portions of floodplain areas that are considered jurisdictional wetlands are additionally regulated by Sections 401 and 404 of the *Clean Water Act*.

National Flood Insurance Program

Congress created the National Flood Insurance Program in 1968 to minimize the taxpayer burden caused by escalating flood costs and to reduce such costs in the future by implementing floodplain protection ordinances and flood insurance that placed a premium on actual flood-related risk.

3.18.3 How were the floodplain boundaries determined for the FEIS?

The National Flood Insurance Program produces map zones of flooding risk, Flood Insurance Rate Maps that can be obtained from FEMA. The limits of floodplains are determined by forecasting the elevation to which flood waters may rise during a 100-year storm event and then overlaying them onto a map showing the existing topography. A 100-year floodplain is the area adjacent to a waterbody that has a one percent

¹³⁸ Rosgen, Dave, *Applied River Morphology* (Pagosa Springs: Wildland Hydrology Books, 1996) p. 19.

¹³⁹ D. Shankman and L. Smith, "Stream Channelization and Swamp Formation in the U.S. Coastal Plain," *Physical Geology* (2004), Vol. 22: 22-38.



chance of flooding in any given year. A floodway is the area within a waterbody that must be free from any type of encroachment (obstacle) to allow the discharge of water during a 100-year flood without raising the water level more than one foot.

Mapping available for the project study area did not differentiate between the floodplains and floodways and all areas within the floodplain were designated as Zone A. Zone A is the flood insurance rate zone that corresponds to 100-year floodplains determined by approximate methods and has a one percent chance of flooding in any given year. Detailed hydraulic analyses are not performed by FEMA for Zone A areas so no Base Flood Elevations or depths are shown within this zone.

3.18.4 What floodplains might be affected by the Preferred Alternative?

Approximately 28 percent of the project study area is within a FEMA designated 100-year floodplain. Table 3.61 lists the rivers, streams, and wetland areas that are within Zone A in the vicinity of the Preferred Alternative. Figure 3-29 (refer to page 3-147) illustrates the extent of floodplains within the project study area.

Flood Insurance Rate Maps identifying the 100-year floodplain were used to determine impacts associated with the Preferred Alternative. Proposed construction limits were used to estimate the impacted area within the floodplain. The Preferred Alternative has five floodplain crossings, with a total of 17,605 feet of linear impacts and 114 acres of floodplain encroachment (refer to Table 3.61).

Location	Length of Impact (feet)	Area of Encroachment (acres)
Little Pee Dee (S.C. 917)	12,500	82.6
Lake Swamp	2,725	16.3
Joiner Swamp	470	5.1
Maidendown Swamp	810	5.1
Little Reedy Creek	1,110	5.1
Total Impacts	17,605	114.2

As discussed previously, the mapped areas within the project study area are all shown as Zone A, which does not provide base flood elevations. However, an engineering analysis of the floodplain impacts was conducted for the Preferred Alternative. Some bridge lengths were revised based on detailed topographic information from site visits of the Preferred Alternative crossings and comparing those to bridges both upstream and downstream of the proposed crossings. Furthermore, the proposed crossings of the Little Pee Dee River and Lake Swamp were located adjacent to existing road crossings to minimize additional impacts to the floodplain.



Floodplain encroachments are not likely to increase the flooding in the area since bridge structures will be designed to meet FEMA standards, which require less than a one-foot rise in the base flood elevation for certification. Structures would provide the minimum freeboard¹⁴⁰ above the design flood elevation, which, depending on stream size is two feet or greater,¹⁴¹ in order to be above the 100-year storm flood level.

Available FEMA studies were used to comply with Executive Order 11988: *Floodplain Management*, during the analysis of the Preferred Alternative. However, during the final design phase of the project, a detailed hydrological study will need to be completed. Bridge and culvert designs will be conducted as required by 23 CFR 650, Subpart A, *Location and Hydraulic Design of Encroachment on Floodplains*. This analysis will include establishing base flood elevations and adjusting bridge and culvert designs to minimize the risk of flooding upstream to less than one foot of rise, as required by FEMA. Ongoing design efforts and coordination with resource and regulatory agencies will minimize floodplain impacts during the final design process.

3.19 WILD AND SCENIC RIVERS

Would Wild and Scenic Rivers be impacted by the Preferred Alternative?

Wild and Scenic Rivers are rivers and streams that are federally protected under the *Wild and Scenic Rivers Act of 1968* for their scenic, cultural, historic, recreational, wildlife, geologic or other values. Based on a list maintained by the National Park Service, no federally designated wild or scenic rivers exist in the project study area; therefore, no impacts are anticipated to these resources.¹⁴²

In addition, Section 5(d) of the *Wild and Scenic Rivers Act* mandated the USDA (through the U.S. Forest Service) and the U.S. Department of Interior (through the USFWS, Bureau of Land Management, and National Park Service) to assess waterbodies for their wild, scenic, and recreational values. In 1982, a list was published, known as the Nationwide Rivers Inventory, which included rivers and streams in the United States that met the minimum criteria for wild, scenic, and recreational status. Further assessment of these waterbodies would be needed prior to the determination of whether they would be federally designated. A 1979 Presidential Directive stated that federal agencies “shall, as part of its normal planning and environmental review process, take care to avoid or mitigate adverse effects on rivers identified in the Nationwide Inventory...”¹⁴³

¹⁴⁰ Freeboard is “a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. ‘Freeboard’ tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.” From Floodplain Management Association, http://www.floodplain.org/glossary_of_terms.htm (September 24, 2007).

¹⁴¹ Hubert, William H., SCDOT, *Requirements for Hydraulic Design Studies*, May 15, 2000, p. 8. <http://www.dot.state.sc.us/doing/pdfs/requirements.pdf> (September 12, 2007).

¹⁴² NPS, Wild and Scenic Rivers System Website, http://www.rivers.gov/wildriverslist.html#ga_nc_sc (September 20, 2007).

¹⁴³ Council on Environmental Quality, *Wild and Scenic Rivers and National Trails: Memorandum from the President*, August 2, 1979, <http://ceq.eh.doe.gov/nepa/regs/scenicrivers.html> (September 20, 2007).

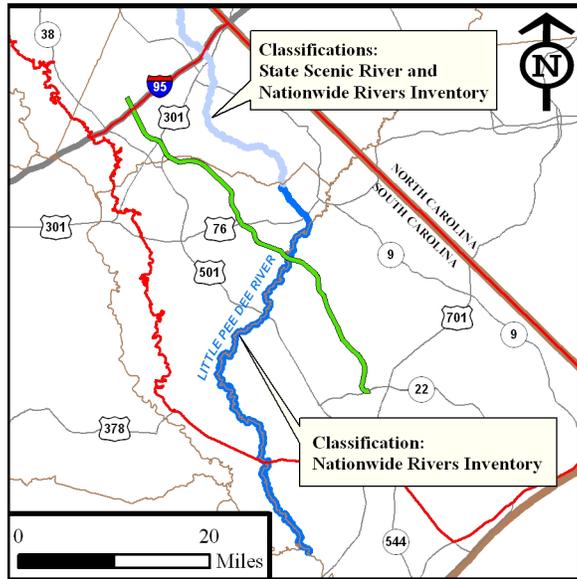


Figure 3-34: Wild and Scenic Rivers in Project Study Area

An 83-mile stretch of the Little Pee Dee River from the S.C. Route 57 crossing to its confluence with the Great Pee Dee River was listed on the Nationwide Rivers Inventory in 1982 for its scenic, recreational, fish, wildlife, cultural, and historical values (refer to Figure 3-34).¹⁴⁴ The Preferred Alternative would cross the section of the river listed on the Nationwide Rivers Inventory. The portion of the Little Pee Dee River listed on the Nationwide Rivers Inventory already contains bridges and has major access points, so it would not meet federal wild or scenic status, based on the eligibility requirements.¹⁴⁵ While it is not currently under study for federal recreational status, based on its recreational values, it could be studied for this designation at some point in the future.

The Preferred Alternative would cross the Little Pee Dee River parallel to the existing S.C. Route 917 crossing, which would reduce impacts to the recreational value of the river by not adding an additional crossing. Due to the existing crossings along the Little Pee Dee River and the utilization of an existing corridor to reduce impacts, the Preferred Alternative is not likely to impact the recreational values of the Little Pee Dee River.

In South Carolina, rivers may also be protected under the South Carolina Scenic Rivers Act of 1989 for their scenic, cultural, historic, recreational, botanical, geologic, or wildlife values. The SCDNR’s South Carolina Scenic Rivers Program website identified portions of the Little Pee Dee River as a state scenic river (refer to Figure 3-34). The Little Pee Dee River has two designated areas. A fourteen-mile stretch located from U.S. Route 378 to the Little Pee Dee River’s confluence with the Great Pee Dee River has been designated.¹⁴⁶ The other area is a 48-mile section located in Dillon County between the Marlboro County line and the Marion County line.¹⁴⁷ The Preferred Alternative crosses the Little Pee Dee River outside the limits of the South Carolina State Scenic Designated areas; therefore, no State Scenic Rivers would be impacted by the Preferred Alternative.

¹⁴⁴ National Park Service, Rivers, Trails, and Conservation Program Website, <http://www.nps.gov/ncrc/programs/rtca/nri/states/sc.html> (September 20, 2007).

¹⁴⁵ National Park Service, Rivers, Trails & Conservation Assistance Program Website, “Eligibility Descriptions,” <http://www.nps.gov/ncrc/programs/rtca/nri/eligib.html> (September 20, 2007).

¹⁴⁶ South Carolina General Assembly Website, http://www.scstatehouse.net/sess116_2005-2006/bills/3782.htm (September 20, 2007).

¹⁴⁷ *Ibid.*



3.20 UNIFORMLY AFFECTED RESOURCES

3.20.1 Coastal Zone Resources

3.20.1.1 Who protects the coastal zone?

The *Coastal Zone Management Act of 1972*, as amended, requires that projects within the coastal zone comply, to the maximum extent practicable, with approved state coastal management programs.¹⁴⁸ The *South Carolina Coastal Zone Management Act* gives SCDHEC-OCRM the authority to promote the economic and social welfare of the citizens, while protecting the sensitive and fragile areas of the coast. SCDHEC-OCRM has direct permitting authority over development in the critical areas of the coastal zone, which includes coastal waters, tidelands, beaches, and the oceanfront beach/dune system (refer to Figure 3-35, page 3-235). In addition, SCDHEC-OCRM reviews and certifies all state/federal permit applications and activities, as well as issues state stormwater and sediment reduction permits within the coastal zone counties.¹⁴⁹

3.20.1.2 Where is the coastal zone?

The coastal zone of South Carolina encompasses coastal waters and submerged areas seaward to the state's jurisdictional line (refer to Figure 3-35, page 3-235). Lands and waters of the eight coastal counties, which include Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry, and Jasper, are within the coastal zone of South Carolina. Horry County is the only coastal county within the project study area.

The South Carolina Coastal Management Plan¹⁵⁰ lists the following twelve Geographical Areas of Particular Concern that should be avoided during development, when possible:

- Heritage Trust Program Preserves;
- State Wildlife Preserves;
- State Parks;
- Scenic Rivers;
- Marine and Estuarine Sanctuaries;
- Shellfish Areas;
- Ground Water Resources;
- Threatened or Endangered Species Habitats;
- Navigation Channels;
- State Ports;

¹⁴⁸ 16 U.S.C. §1456(c).

¹⁴⁹ SCDHEC, Coastal Laws and Regulations Website, <http://www.scdhec.gov/environment/ocrm/regs/enforcement.htm> (September 11, 2007).

¹⁵⁰ SCDHEC-OCRM, "Policies and Procedures of the South Carolina Coastal Management Program," <http://www.scdhec.gov/environment/ocrm/regs/docs/CZMP95.pdf> (September 20, 2007).



- Mining Operations; and,
- Areas of Special Historic, Archeological or Cultural Significance.

The South Carolina Coastal Management Plan recommends that consideration be given to the enhancement and protection of scenic vistas and preservation of unique tree canopies and natural areas along the roadway projects. In addition, it also encourages the study of mass transit alternatives in urban areas and a comprehensive study of the potential for secondary growth inducement from new road construction.

3.20.1.3 What direct impacts would occur to the coastal zone as a result of the Preferred Alternative?

The Preferred Alternative would not impact any critical areas of the coastal zone since these areas are mostly located along the coastline in the project study area, while the Preferred Alternative would be constructed further inland. Geographical Areas of Concern may be impacted by this project. SCDHEC-OCRM, as an ACT member, took part in alternative development and efforts were made to adhere to the policies and recommendations of the South Carolina Coastal Management Plan. In addition, Geographical Areas of Concern that were within the project study area were designated as constraints and avoided to the extent possible during alternative development.

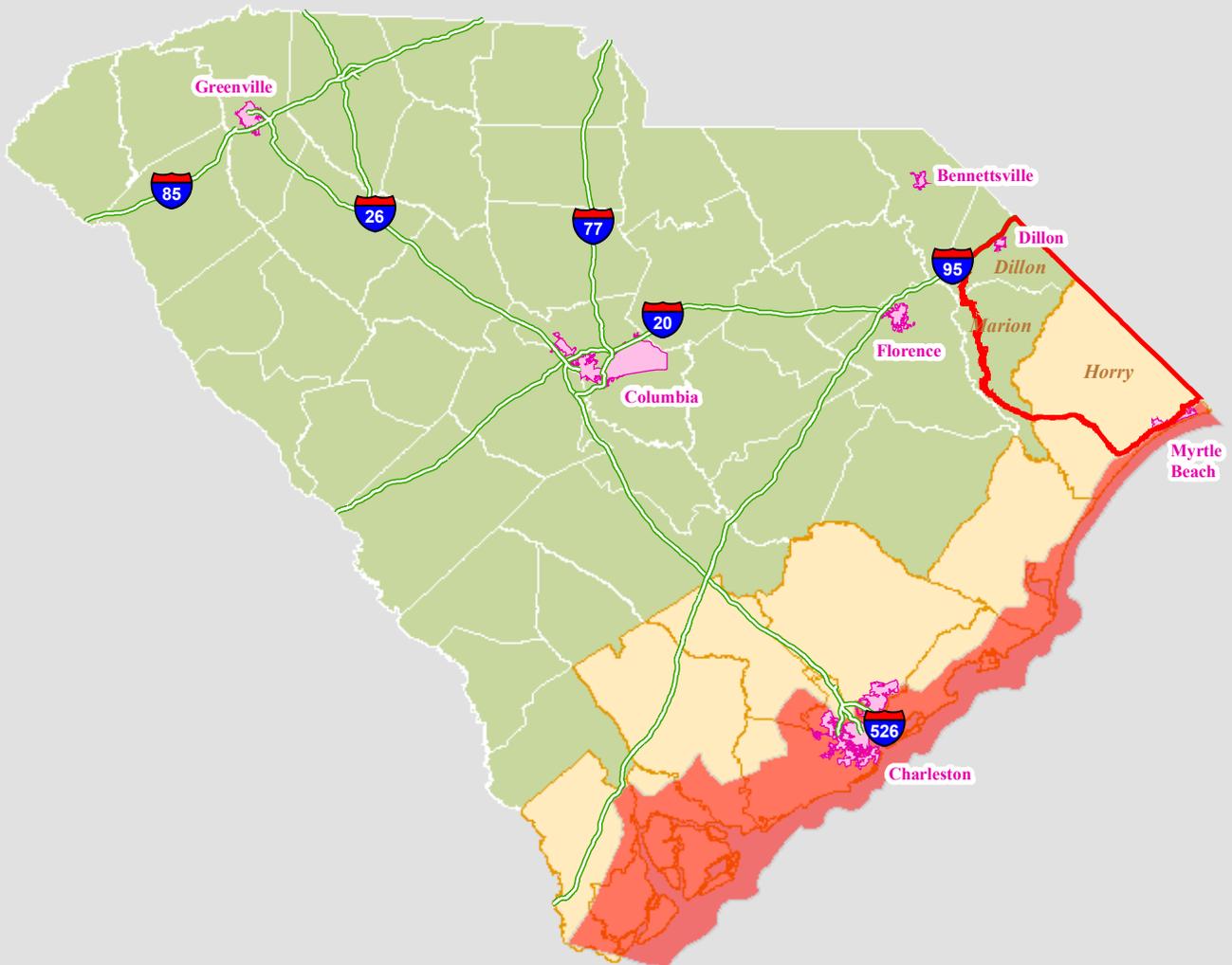
SCDHEC-OCRM will issue permits and will review and certify the permits to be issued by the USACE within Horry County, based on their guidelines for certification of highway projects. The guidelines include recommendations and policies to minimize impacts to wetlands, navigable waters, hydrologic characteristics of streams, and barrier islands.

3.20.1.4 What indirect and cumulative impacts are anticipated to occur to the coastal zone?

Horry County has experienced substantial growth and change over the last 40 years. However, the vast majority of that growth and development has occurred in the immediate coastal areas of Horry County, which are beyond the boundary of the project study area (refer to Chapter 1). According to the Horry County Comprehensive Plan, substantial development is anticipated to occur on land surrounding the City of Conway and an area extending from the coastline inward approximately eight to ten miles. Development due to the No-build Alternative has been estimated, based upon existing growth trends with land use modeling. This shows substantial development in Horry County (refer to Land Use, Section 3.1, page 3-1).

3.20.1.5 Would there be any Coastal Barriers impacted by the Preferred Alternative?

Under the *Coastal Barrier Resource Act of 1982*, agencies are prohibited from using federal funds that would impact undeveloped coastal barrier units in the Coastal Barrier Resource System. No coastal barriers exist in the project study area; therefore none would be impacted by the proposed project.



Legend

-  Interstate
-  Critical Area
-  Coastal Zone
-  City
-  Project Study Area



FIGURE 3-35
COASTAL ZONE COUNTIES AND
CRITICAL AREA BOUNDARY



3.20.2 Energy

Transportation accounts for 27.7 percent of both direct and indirect energy consumption in the United States.¹⁵¹ Direct consumption includes energy that is consumed by vehicles traveling on the roadways, while indirect energy consumption refers to the energy consumed during the construction and maintenance of a new facility. Energy consumption for vehicle operation and facility maintenance represents long-term energy impacts while construction energy is typically a large one-time energy expenditure.

3.20.2.1 How much energy would be consumed during the construction of the Preferred Alternative?

Construction of the Preferred Alternative would initially require the consumption of energy and resources that would not be used if the project were not built. Completion of the facility, however, would more than compensate for the energy lost during construction by increasing the efficiency of automotive traffic through the area. While construction would use energy resources for a short timeframe, the savings would be realized over the life of the facility. The primary categories of energy consumption during construction are:

- excavation of rock and soil, and the transport and compaction of roadway embankment materials;
- manufacture, transport, and utilization of various construction materials (aggregate, concrete, street, etc.); and,
- manufacture, transport, and installation of various manufactured items (guard rail, signs, lighting, etc.).

In general, the amount of expended energy during construction would be a function of construction cost.

3.20.2.2 How much energy would be consumed once the Preferred Alternative was operational?

Additional energy would be expended throughout the operational life of a transportation facility, mostly for vehicular travel in the form of fuel. Other lesser, but accumulative, energy uses include tires, oil, and miscellaneous vehicular maintenance items. Energy consumption due to travel would be directly proportional to project usage. In addition, roadway maintenance would require an ongoing expenditure of energy in the form of maintenance materials and the fuel required for roadway, bridge, and drainage repairs. In general, energy consumption for maintenance would be relatively constant and independent of project usage.

¹⁵¹ Department of Energy, Energy Information Administration Website, <http://www.eia.doe.gov/neic/brochure/infocard01.htm> (September 11, 2007).



An estimate of change in VMT was made regarding potential impact with and without the Preferred Alternative based on the project travel demand model. By comparing change in VMT of the Preferred Alternative from comparable estimates for the No-build Alternative, it is possible to derive percent change in VMT for motorists throughout the proposed project study area. In reviewing the Preferred Alternative, it was found that there would be a total net decrease in energy consumption statewide of 0.22 percent in the design year 2030. For further information about VMT, please refer to Chapter 2, page 2-1.

3.20.2.3 What is the conservation potential of the Preferred Alternative?

Energy conservation would come from one or more of the following factors:

- reduced vehicle-miles of travel;
- more efficient vehicle operation speeds;
- reduced accident potential;
- reduced construction effort; and,
- reduced traffic volume on existing area roadways.

3.21 PERMITS

3.21.1 Section 404 of the Clean Water Act

The USACE is authorized under Section 404 of the *Clean Water Act* to issue permits for the placement of dredged or fill material in waters of the United States, including jurisdictional wetlands. Jurisdictional wetlands exist onsite and have been delineated according to the *1987 Corps of Engineers Wetlands Delineation Manual*.¹⁵² Impacts to waters of the United States and jurisdictional wetlands will be quantified and will require USACE authorization under Section 404. A Section 404 permit application has been submitted to the USACE. For further information, please refer to Wetlands, Section 3.12 (page 3-144).

3.21.2 Section 401 Water Quality

Applicants for state and federal permits for projects that would result in a discharge to wetlands and waters of the United States must obtain a Section 401 Water Quality Certification from SCDHEC. It involves a review of the proposed project and analyzes its potential impact to water quality. This review is performed to ensure that any discharge into jurisdictional areas is in accordance with State water quality standards.

¹⁵² U.S. Army Engineer Waterways Experiment Station Environmental Laboratory, *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1 (1987).



3.21.3 Coastal Zone Consistency Certification

Section 307(C) of the *Coastal Zone Management Act of 1972* requires that development projects in the coastal zone comply to the maximum extent practicable with approved state coastal management programs. SCDHEC-OCRM is the federally-approved coastal management authority in South Carolina. Horry County is one of eight counties in South Carolina that are subject to coastal zone regulations. Any project located within the coastal zone that requires a state and/or federal permit must be certified by SCDHEC-OCRM that the proposed project is consistent with the policies of the coastal zone management program.

3.21.4 Stormwater Management and Sediment Reduction Act of 1991

The *Stormwater and Sediment Reduction Act of 1991* applies to any land disturbing activity over two acres. The regulation was implemented to reduce the adverse effects of stormwater and sediment run-off and requires completion of a site plan illustrating controls. The application must be sealed by a Professional Engineer to obtain the permit.

The SCDHEC Bureau of Water acts as the administrator, but the regulation of the program is delegated to SCDHEC-OCRM in the eight coastal counties. Written authorization from SCDHEC-OCRM is required before any land disturbance can take place.

3.21.5 Section 9 and Section 10 of the Rivers and Harbors Act of 1899

Section 9 of the *Rivers and Harbors Act of 1899* regulates obstruction of navigable waters by bridges and causeways. The authority granted to the USACE to issue permits for the construction of bridges over, and causeways in, navigable waters for Section 9, was transferred to the USCG by the *U.S. Department of Transportation Act of 1966*. Bridge construction over navigable waters would require a USCG Section 9 permit. The vertical and horizontal clearances of the structures that would be constructed over the Little Pee Dee River would match the existing bridges, at a minimum, and a permit would not be required. However, coordination with the USCG may be required.

Section 10 of the *Rivers and Harbors Act of 1899* authorizes the Secretary of the Army, acting through the Chief of Engineers and administered by the USACE, to issue permits for activities which affect the navigable waters of the United States. The Act prohibits unauthorized obstruction or alteration of any navigable waters of the United States; the construction of any structure in or over any navigable water of the United States; the excavation from, or deposition of material in, such waters, or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters is unlawful unless permitted by the USACE. Placing permanent fill material into navigable waters during the construction of bridges would require a USACE Section 10 permit.



3.21.6 State Navigable Waters

Article 14, Section 4 of the S.C. Constitution, 49-1-10 1976 Code of Laws of S.C., requires a permit for dredging or construction in state designated navigable waters. State navigable waters are defined as “waters which are navigable, have been navigable, or can be made navigable by removal of incidental obstructions by rafts of lumber or timber or by small pleasure or sport fishing boats. These waters are below the mean high water line in tidally influenced areas or below the ordinary high water mark in nontidal areas.” When a Section 404/401 permit is required, a separate navigable waters permit application is not required as the Section 404/401 application serves as the state navigable water permit application. The Little Pee Dee River and Catfish Canal are the only state navigable waters located within the project study area. The Little Pee Dee River is designated as state navigable waters for its entire length throughout the project study area. Catfish Canal is designated as state navigable waters from U.S. Route 301 in Dillon County south to its confluence with the Great Pee Dee River. The Little Pee Dee River would be crossed by the Preferred Alternative and would require a State Navigable Water permit from SCDHEC.

3.22 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The potential impacts of the Preferred Alternative must be weighted against the need for the interstate facility. Although potential adverse impacts may occur, the implementation of various mitigation measures would limit the extent of impacts that are deemed unavoidable. The local short-term impacts would be primarily associated with site preparation and construction of the interstate facility. Many of the potential impacts would only occur during construction and would be considered short-term, including run-off from cleared areas. Other potential impacts such as permanent changes to the existing land use, loss of wetlands, loss of farmlands, and loss of habitat would be considered long-term. As discussed previously, the proposed project would provide long-term enhancement opportunities for economic development and provide transportation system linkage.