3.12.4 What wetland types were identified in the project study area?

Wetlands and waters of the United States were categorized by general types according to various standard classification systems including *The Classification of Wetlands and Deepwater Habitats of the United States.*[93] All of the wetlands and waters of the United States that occur within the project study area are palustrine (freshwater).

Often multiple wetland types can be found in association with each other to form wetland systems. Two major wetland systems found within the project study area are Carolina bays and riparian systems. Carolina bays are generally oval in shape, are oriented roughly northwest to southeast and have a distinctive sand rim along the southeast edge. They are found in the Coastal Plain of North Carolina, South Carolina, and Georgia. Wetland types in Carolina bays can vary and often include evergreen shrub bogs/pocosins, deciduous shrub swamps, and/or bay forests. Fully functional Carolina bays were identified as constraints and were avoided during alternative development. Some of the bays within the study area have been impacted by utility and railroad crossings, and many have been at least partially drained and converted to pine plantations or agricultural fields.

Riparian wetlands are systems associated with rivers and streams and are numerous throughout the project study area. These systems consist of a variety of wetland types such as wooded swamps, bottomland hardwoods, aquatic beds, flooded swamps/beaver ponds, and deciduous shrub swamps. Streams typically do not have wide wetlands near their headwaters where riparian systems tend to be narrow. Evergreen shrub bogs/pocosin wetlands are often found at the headwaters of these riparian systems, especially in the northern portion of the study area. Riparian wetlands in the study area tend to be wider as they near the Great and Little Pee Dee Rivers. Riparian wetland systems within the study area are predominantly wooded swamp.

Lakes and ponds, such as Lake Wallace, McCalls Mill Pond, and Burnt Factory Pond along Crooked Creek, and Drakes Pond along Three Creeks, have been constructed within riparian wetland systems in the study area. While these impoundments are not natural occurrences and are considered impacted wetlands and streams, they do provide foraging habitat for ospreys, eagles, and wading birds. Although most riparian systems have been relatively un-impacted, a review of aerial photography reveals that riparian wetlands within the study area also have been previously impacted by road crossings, utility crossings, and stream channelization.

The types of wetlands and waters of the United States identified within the project study area are described in the following subsections.

[93] L.M. Cowardin, 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).

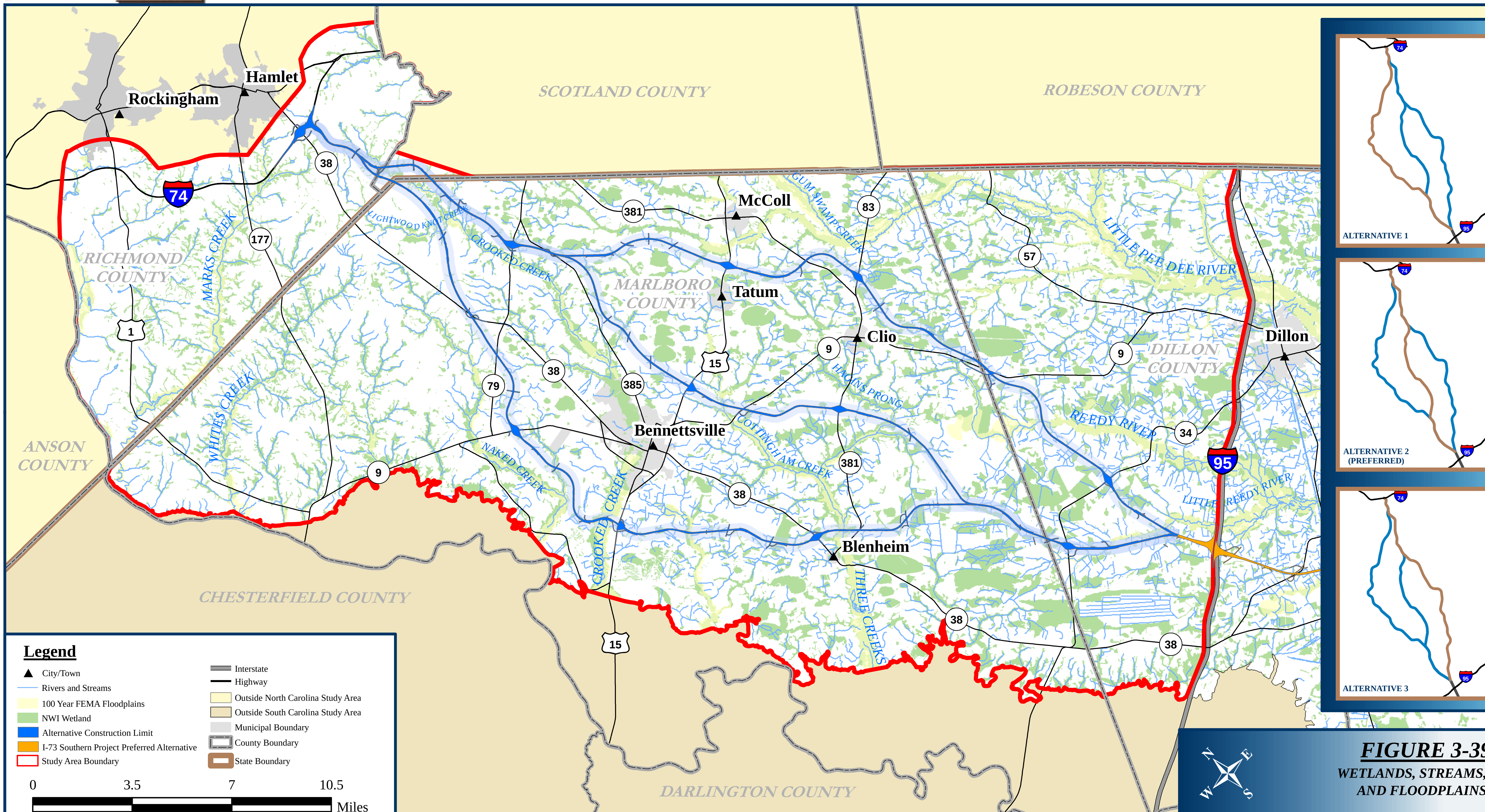
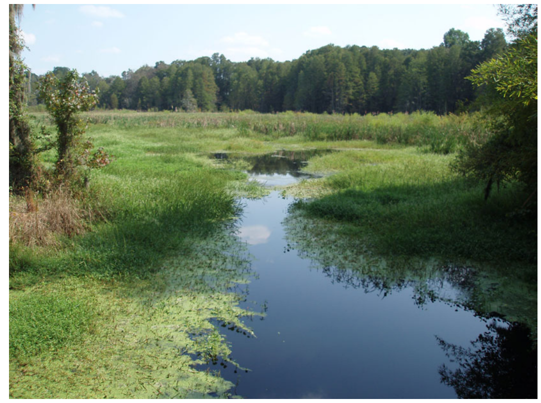


FIGURE 3-39
WETLANDS, STREAMS, AND FLOODPLAINS

3.12.4.1 Aquatic beds



Aquatic bed

Aquatic beds are mostly permanently inundated areas that contain dense mats of vegetation. The vegetation may be rooted in the substrate or free-floating. Typical plant species found in aquatic beds include watermilfoil (*Myriophyllum* spp.), pondweed (*Potamogeton* spp.), bladderworts (*Utricularia* spp.), duckweed (*Lemna* spp.), and water-lily (*Nymphaea odorata*). Aquatic beds most often occur in association with perennial streams that flow through the project study area. They are often located along the margin of flowing streams between the stream channel and the adjacent floodplain wetlands. A total of approximately 102 acres of aquatic beds are found throughout the project study area. Fully functional aquatic beds were assigned a value of 10, whereas partially drained systems received a value of 2.

3.12.4.2 Bay forests

Bay forests are wetlands that have high organic content in their soil and remain saturated or are frequently saturated during the growing season. Loblolly bay (*Gordonia lasianthus*), sweet bay (*Magnolia virginiana*), and red bay (*Persea borbonia*) are the "bay" species typically found in the bay forest. Other species typically found in bay forests include swamp tupelo (*Nyssa sylvatica* var. *biflora*), red maple (*Acer rubrum*), pond pine (*Pinus serotina*), fetterbush (*Lyonia lucida*), gallberry (*Ilex coriacea*), and highbush blueberry (*Vaccinium corymbosum*). Vines such as bamboo-vine (*Smilax laurifolia*) and other catbriers (*Smilax* spp.) are also common. This description also applies to some Carolina bays, which are elliptical depressions that are roughly oriented from southeast to northwest. Analysis indicates that bay forests south of Brightsville tend to be large compared to those in the northern portion of the project study area, which tend to be narrow and more closely associated with streams. Many bay forests south of Brightsville are found in Carolina bays or remnants of Carolina bays. A total of approximately 20,372 acres of bay forest are found throughout the project study area. Fully functional Carolina bays were identified as constraints and were avoided during alternative development. Fully functional bay forests were assigned a value of 7, whereas partially drained systems received a value of 4.

Bay forest

3.12.4.3 Bottomland hardwoods

Bottomland hardwood

Bottomland hardwoods are typically associated with floodplains of streams, but may also occur in low areas and along small surface drainages and are temporarily flooded or saturated during the growing season. Flooding or saturation usually occurs in the winter or early spring. Typical tree species include red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), swamp tupelo, and loblolly pine (*Pinus taeda*). Shrubs include red bay, wax-myrtle (*Myrica cerifera*), dog-hobble (*Leucothoe axillaris*), and sweet bay. Vines such as yellow jessamine (*Gelsemium sempervirens*), muscadine (*Vitis rotundifolia*), poison ivy (*Toxicodendron radicans*), and several species of catbrier (*Smilax laurifolia*, S. *glauca*, and *S. rotundifolia*) are abundant. Herbaceous plants such as cinnamon fern (*Osmunda cinnamomea*), netted chain fern (*Woodwardia areolata*), royal fern (*Osmunda regalis*), false nettle (*Boehmeria cylindrica*), lizard's tail (*Saururus cernuus*), jack-in-the-pulpit (*Arisaema triphyllum*), and giant cane (*Arundinaria gigantea*) are common.

While bottomland hardwood wetlands are present throughout the entire project study area, they are primarily concentrated in the southern half. Analysis indicated that bottomland hardwood wetlands south of Bennettsville tend to be more closely associated with the streams than those north of Bennettsville. In the area north of Bennettsville, the wetlands appear to be remnants of larger systems that have been partially drained for agriculture and silviculture practices. A total of approximately 5,415 acres of bottomland hardwood wetlands are estimated to be present in the project study area. Fully functional bottomland hardwoods were assigned a value of 9, whereas partially drained systems received a value of 6.

3.12.4.4 Deciduous shrub swamps

Deciduous shrub swamp

Deciduous shrub swamps are low lying areas dominated by woody vegetation typically less than twenty feet in height. Deciduous shrub swamp habitats are often formed due to some type of disturbance, either natural or manmade. They may be an early successional stage of the forested swamp, or they may be in a stable system. Deciduous shrub swamp habitats along the alternative corridors are primarily the result of clear-cutting, which results in a number of root- or stump-sprouts of the more opportunistic tree species such as sweetgum, red maple, and sweet bay. Also, short-lived woody species such as black and/or Carolina willow (*Salix nigra*, *S. caroliniana*), button-bush (*Cephalanthus occidentalis*), and elderberry (*Sambucus canadensis*) are able to take advantage of the open canopy. Blackberry (*Rubus argutus*) is almost always present, as well as greenbriers (*Smilax* spp.). Marsh dwellers, such as soft rush (*Juncus effusus*) and bulrush (*Scirpus cyperinus*), also occur here, taking advantage of the (temporary) lack of canopy.

Deciduous shrub swamp is one of the least represented wetlands types within the project study area despite the fact that it is often the result of man-made disturbance. This wetland type appears to be predominantly associated with streams. A total of approximately 2,491 acres of deciduous shrub swamp are estimated in the project study area. Fully functional deciduous shrub swamps were assigned a value of 5, whereas partially drained systems received a value of 3.

3.12.4.5 Evergreen shrub bogs/pocosins

Evergreen shrub bogs are commonly referred to as pocosins. Pocosins are palustrine (freshwater) wetlands typically underlain by peat moss and dominated by several evergreen shrub species. These bogs are usually flat, or sometimes slightly depressed, and intermittently flooded or saturated. Canopy trees are sparse or absent completely. It is a fire-maintained habitat and practically all species within this community will sucker-sprout vigorously following fire or other natural disturbance. They are dominated by evergreen species such as sweet gallberry, fetterbush, titi (*Cyrilla racemiflora*), sweet bay, red bay, and zenobia (*Zenobia pulverulenta*).

Evergreen shrub bog/pocosin

There are approximately 6,766 acres of evergreen shrub bogs/pocosin wetlands found throughout the project study area. These wetlands are often found near the headwaters of streams, in the sandhills and coastal plain, and in Carolina bays. Many Carolina bays within the project study area have been drained and converted for other uses such as silviculture and agriculture. Fully functional pocosins were assigned a value of 7, whereas partially drained systems received a value of 4.

3.12.4.6 Freshwater marshes

Freshwater marsh

Freshwater marshes are defined as areas that are flooded for extended periods during the growing season and are dominated by herbaceous plant species. This includes freshwater tidal marshes, marshes within managed impoundments, and naturally occurring nontidal marshes. Typical plant species include sedges (*Carex* spp.), rushes (*Juncus* spp.), sugar cane plumegrass (*Erianthus giganteus*), arrow-arum (*Peltandra virginica*), smartweeds (*Polygonum* spp.), pickerelweed (*Pontederia cordata*), arrowhead (*Sagittaria latifolia*), and cattails (*Typha* spp.).

Freshwater marshes are mostly concentrated in the middle portion of the project study area, in an area roughly between Dunbar and Brightsville. Many freshwater marshes are associated with utility corridors due to the maintenance activities that prevent the growth of woody species. This concentration, therefore, may be an artifact of the high number of utility corridors in the middle portion of the project study area. Some areas of freshwater marsh are located along streams and, like aquatic beds, are likely located along the margin of streams. There is estimated to be approximately 564 acres of freshwater marsh present in the project study area. Fully functional freshwater marshes were assigned a value of 10, whereas partially drained systems received a value of 7.

3.12.4.7 Pine savannahs and wet flatwoods

Pine savannahs and wet flatwoods are palustrine wetlands that have a high water table for a period of time during the growing season and are dominated by pine species, including longleaf pine (*Pinus palustris*), pond pine, and loblolly pine. Generally no understory is present, or if present, it is very sparse. Typical herbaceous species include *Aristida* spp., toothache grass (*Ctenium aromaticum*), nutrushes (*Scleria* spp.), and beak rushes (*Rhynchospora* spp.).

Pine savannah and wet flatwood

Pine savannahs and wet flatwoods, provide habitat for the federally protected red-cockaded woodpecker when wild fires are not suppressed and where long leaf pines of sufficient maturity are present. Pine savannahs and wet flatwoods are scattered throughout the project study area, but appear to be located primarily southeast of Brightsville. They are generally found in flat landscapes with poor drainage. They are sometimes associated with streams and often appear to have the characteristic oval shape of Carolina bays. There are approximately 10,824 acres of pine savannah and wet flatwoods within the project study area. Previous impacts to this wetland type within the project study area consisted of draining and conversion to silviculture and agriculture purposes. Irrigation and cattle watering ponds are often excavated in these areas. Because these systems are typically saturated to the surface and rarely inundated, the excavation of drainage ditches can sufficiently convert them to uplands, depending on the permeability of the soil types present. Fully functional pine savannahs and wet flatwoods were assigned a value of 8, whereas partially drained systems received a value of 4.

3.12.4.8 Ponds and borrow pits

Ponds and borrow pits are typically manmade, open water, or freshwater habitats. These water bodies are generally created by excavation activities, or altering stream or surface drainage flow. According to NWI mapping, and for purposes of this project, water bodies less than 20 acres in size fall into this category. Other freshwater systems are often found associated with ponds and borrow pits in the form of fringe wetlands. A total of approximately 2,097 acres of ponds and borrow pits are found in the project study area. Fully functional ponds and borrow pits that have been converted to fully functional wetlands were assigned a value of 8, whereas partially drained systems received a value of 2.

Mill pond

3.12.4.9 Rivers and canals

Perennial streams and rivers are riverine systems that are permanently flooded. In general, however, the open water areas are either unvegetated, or include occasional beds of submerged or floating aquatic plants such as parrot's feather (*Myriophyllum* spp.), alligator weed (*Alternanthera philoxeroides*), duckweed, and algae. Intermittent streams are riverine systems that consist of streambeds that are seasonally flooded.

Rivers and canals within the project study area include meandering and channelized unnamed intermittent streams and perennial streams with their tributaries. Streams within the project study area include the Little Pee Dee River, Three Creeks, Hagins Prong, Cottingham Creek, Lightwood Knot Creek, Catfish Canal, Reedy Creek, Herndon Branch, Naked Creek, Crooked

Creek, Little Reedy Creek, Beverly Creek, Beaverdam Creek, Marks Creek, and their unnamed tributaries. All of the perennial and intermittent streams within the project study area are tributaries to the Little Pee Dee River and the Great Pee Dee River. A total of approximately 486 linear miles of perennial streams and 896 linear miles of intermittent streams located within the project study area. Natural streams were assigned a value of 8, and artificial canals received a value of 5.

3.12.4.10 Savannahs and wet meadows

Savannahs and wet meadows are herbaceous areas that are flooded only briefly but may be saturated for long periods during the growing season. Species include pitcher plants (*Sarracenia* spp.), sundews (*Drosera* spp.), pipeworts (*Eriocaulon* spp.), meadow-beauties (*Rhexia* spp.), orchids, yellow-eyed-grasses (*Xyris* spp.), asters (*Aster* spp.), and goldenrod (*Solidago* spp.).

Savannah and wet meadow

Savannahs and wet meadows are typically found in the outer coastal plain of South Carolina and are some of the rarer wetland types found in the project study area. The edges of these wetlands provide habitat for federally protected species such as American chaffseed and state species of concern such as awned meadowbeauty when wild fires are not suppressed in these areas. Wet meadows are often formed when forested wetlands are cleared for utility easements. Approximately 1,551 acres of savannahs and wet meadows are scattered throughout the project study area. As with pine savannahs and wet flatwoods, these wetlands are typically saturated to the surface and the excavation of drainage ditches can sufficiently convert them to uplands. Fully functional savannahs and wet meadows were assigned a value of 10, whereas partially drained systems received a value of 7.

3.12.4.11 Wooded swamps

Wooded swamps are palustrine wetlands associated with black or brown water rivers. They may be flooded for several months during the growing season to nearly year round. The well-formed canopy is dominated by bald cypress (*Taxodium distichum*) and/or pond cypress (*Taxodium ascendens*), and swamp tupelo (*Nyssa sylvatica* var. *biflora*) and/or water tupelo (*Nyssa aquatica*). These tree species have adaptations for growing in standing water, including swollen and buttressed bases, and, in the case of the *Taxodium* species, "knees." Other common tree species include water ash (*Fraxinus caroliniana*), red maple, water hickory (*Carya aquatica*), overcup oak (*Quercus lyrata*), sweetgum, sweet bay, red bay, and willow oak (*Quercus phellos*).

Wooded swamp

Wooded swamps within the project study area are concentrated along all of the stream drainages. In addition, isolated remnants appear in association with previously impacted Carolina bays in the southern portion of the project study area. There are a total of approximately 48,017 acres present in the project study area. Fully functional wooded swamps were assigned a value of 9, whereas partially drained systems received a value of 6.

3.12.5 What kind of impacts would occur in wetlands as a result of the proposed project?

Wetland impacts associated with the project would include the placement of clean fill material into wetlands, temporary clearing of vegetation along the proposed roadway, and permanent clearing and grubbing of vegetation within the limits of the project. The fill material would be required to construct the roadbed and would result in the permanent conversion of the portion of the wetlands to uplands within the construction limits. Temporary clearing of wetlands would be required along the toe of the fill material to allow for maintenance of the required silt fencing which protects the adjacent wetlands from siltation during the construction period. The cleared areas would be reseeded with native wetland vegetation after the side slopes of the road are stable and the silt fencing has been removed.

Permanent clearing of trees would be performed where wetlands would be bridged. This would be done to prevent trees from growing under the bridges and potentially damaging the structures. Trees would be removed for a width of approximately 30 feet along both sides of each bridge. The areas would be maintained to prevent trees from growing there. This type of impact does not destroy the wetland, but does change the wetland type. For example, if a bridge is constructed through a wooded swamp, the wooded swamp could become a deciduous shrub swamp or a fresh water marsh after the removal of the trees.

3.12.6 How many acres of wetlands would be impacted by the proposed project?

To calculate the potential impacts associated with each Build Alternative, the conceptual construction limits for each was overlain onto the wetland mapping and the areas of the "footprint" of the road within wetlands were calculated. The conceptual construction limits included the main lines and associated frontage roads, the proposed interchanges, crossover roads, and other roads necessary to maintain access to properties. It was assumed that all wetlands within the footprint would be filled, unless they are located within the 100-year floodplain associated with a stream or river, in which case an approximate bridge length was used to estimate the potential clearing impacts. Upon completion of the hydraulic studies for the Preferred Alternative, appropriately sized pipes, box culverts, or bridges would be installed at wetland crossings to maintain the historic hydrologic connections.

Wetlands are distributed throughout the study area and each Build Alternative would impact wetlands. Table 3.47 provides the wetland types that would be impacted, the type of impact, and the wetland value for each Build Alternative. As indicated in Table 3.47, Alternative 2 and Alternative 3 would have essentially the same amount of wetland impact. Alternative 1 would have the highest wetland impact, while Alternative 2 would have approximately two acres less than Alternative 3.

Many of the wetlands that would be impacted by the Build Alternatives consist of remnants of what were historically larger wetlands that have been reduced in size by the installation of drainage ditches in or near the wetlands. These previously impacted wetlands received lower values as decided in consultation with the ACT (refer to Chapter 2). However, riparian wetland systems associated with the larger streams that flow through the project study area were considered to be higher value wetlands. Alternative 3 would have the lowest wetland value (729.3), Alternative 2 would have a wetland value of 768.1, and Alternative 1 would have the highest wetland value (1,205.2).

As mentioned earlier, many of the impacts associated with the Build Alternatives would be to remnants of larger wetlands that have been previously impacted either by ditching or have been converted to managed timberland. Although these wetlands have been impacted and still meet the basic criteria for jurisdictional wetlands, many of the important functions that wetlands provide, such as flood storage and water quality functions have been diminished. Many of these wetlands are remnants of Carolina bays that have been converted to managed pine stands or are under partial cultivation for agricultural crops. The riparian wetland systems associated with streams that would be impacted consist of fully functional bottomland hardwoods and hardwood swamps, which were assigned high wetland values, and would result in the greatest loss of wetland functions.

The use of bridges at these major riparian crossings would help minimize wetland and stream impacts. Alternative 3 would have fewer crossings of major riparian systems than the other Build Alternatives. The four major riparian wetland systems crossed by Alternative 3 are Little Reedy Creek, Reedy Creek, Marsnip Branch, and Crooked Creek. One crossing is located at a section of Reedy Creek that would be approximately 1,500 feet wide. The other three crossings are approximately 900 feet or less wide. Impacts associated with these crossings would total approximately 27 acres, 1.6 acres of which would be bridge impacts.

Table 3.47
Potential Wetland Impacts in Acres and Wetland Values

Wetland Type	Build Alternatives			Total Acres Present in the Project Study Area
	1	2 (Pref.)	3	
Aquatic Beds (Total)	**0**	**0.1**	**0**	**102**
Clear/Bridge Impact	0	0	0	
Fill Impact	0	0.1	0	
Bay Forests (Total)	**30.1**	**10.4**	**8.7**	**20,372**
Clear/Bridge Impact	0	0	0	
Fill Impact	30.1	10.4	8.7	
Bottomland Hardwoods (Total)	**8.7**	**5.2**	**0.8**	**5,415**
Clear/Bridge Impact	0	0	0	
Fill Impact	8.7	5.2	0.8	
Deciduous Shrub Swamps (Total)	**3.8**	**8.0**	**3.2**	**2,491**
Clear/Bridge Impact	0	0	0	
Fill Impact	3.8	8.0	3.2	
Evergreen Shrub Bogs/Pocosins (Total)	**10.6**	**5.2**	**23.6**	**6,766**
Clear/Bridge Impact	0	0	0	
Fill Impact	10.6	5.2	23.6	
Freshwater Marsh (Total)	**0**	**4.8**	**0**	**564**
Clear/Bridge Impact	0	0	0	
Fill Impact	0	4.8	0	
Pine Savannahs & Wet Flatwoods (Total)	**0**	**0.4**	**12.4**	**10,824**
Clear/Bridge Impact	0	0	0	
Fill Impact	0	0.4	12.4	
Ponds & Borrow Pits (Total)	**2.6**	**4.9**	**3.6**	**2,097**
Clear/Bridge Impact	0	0	0	
Fill Impact	2.6	4.9	3.6	
Savannahs & Wet Meadows (Total)	**1.7**	**1.6**	**2.5**	**1,551**
Clear/Bridge Impact	0	0	0	
Fill Impact	1.7	1.6	2.5	
Wooded Swamp (Total)	**110.2**	**73.7**	**61.1**	**48,017**
Clear/Bridge Impact	5.8	7.3	1.6	
Fill Impact	104.4	66.4	59.5	
Total Wetland Impact	**167.7**	**114.3**	**116.0**	**98,199**
Total Clear/Bridge Impact	5.8	7.3	1.6	
Total Fill Impact	161.9	107.0	114.4	
Wetland Values				**N/A**
Total Wetland Value Impact	**1,205.2**	**768.1**	**729.3**	
Clear/Bridge Impact	47.6	31.9	14.7	
Fill Impact	1,157.6	736.2	714.6	

Source: THE LPA GROUP INCORPORATED, 2007

Alternative 2 would cross six major riparian wetland systems including Little Reedy Creek, an unnamed tributary to Little Reedy Creek, Hagins Prong, Cottingham Creek, Beverly Creek, and Crooked Creek. The Hagins Prong crossing is located at a relatively wide section of this riparian system, at approximately 2,100 feet wide. The remainder of the crossings are approximately 900 feet or less wide. Riparian system impacts associated with Alternative 2 would be approximately 39 acres, 7.3 acres of which would be bridge impacts.

Alternative 1 would cross seven riparian systems including Little Reedy Creek, an unnamed tributary to Little Reedy Creek, Three Creeks, Muddy Creek, Crooked Creek, Herndon Branch, and Lightwood Knot Creek. Three of the crossings are located at relatively wide sections of the riparian systems with the crossing of Crooked Creek being approximately 3,300 wide, Three Creeks approximately 2,100 feet wide, and Muddy Creek approximately 1,500 feet wide. The rest of the crossings are approximately 600 feet or less wide. Riparian system impacts due to the construction of Alternative 1 would be approximately 64 acres, 5.8 acres of which would be bridge impacts.

What other wetland impacts could occur from construction?

A review of aerial photography and NWI mapping was performed to determine the presence of sufficient uplands along the Build Alternatives for potential borrow pit locations. A corridor extending at least 2,500 feet wide along each Build Alternative was examined. All developed areas were eliminated from consideration, as well as all wetlands and surface waters surrounding each Build Alternative. Generally, each alternative was surrounded by sufficient undeveloped uplands, such as timberlands and agricultural fields, to provide adequate borrow material within the 2,500-foot wide corridor. Each Build Alternative crosses significant stream drainages such as Crooked Creek, Hagins Prong, Beverly Creek, and Little Reedy Creek where there are no potential areas for borrow material immediately adjacent to the corridor. In addition, several relatively unimpacted Carolina bays are located throughout the project study area and are to be avoided by road construction. This eliminates them from consideration as available acreage for borrow material. However, potentially suitable uplands were observed in close proximity to these locations and fill material could be hauled to the construction site. Other constraints identified along the alternatives that could affect the availability of borrow sites include: Alternative 1 passes near the Marlboro County Airport, the Appin historic district located west of Bennettsville, and Hilson Bay, all of which affect access to potential sites for borrow material; Alternative 2 also passes near Hilson Bay and several unnamed bays, and the community of Bingham; and, Alternative 3 passes near Indigo Bay, Donohoe Bay, Newton Bay, several unnamed bays, and the town of Tatum.

A more detailed screening will be performed within a one-mile wide corridor along the Preferred Alternative and segments with adequate upland borrow areas will be indicated on mapping. Wetland areas that should not be used for borrow areas will also be indicated. If enough upland areas are not available for any given segment, the wetlands that have been altered or have lower functions and values will be identified. Borrow activities will be done in accordance with the SCDOT Engineering

Directive (EDM – *Borrow Pit Location and Monitoring*). This requires that wetland delineations will be performed at the borrow pit sites and potential impacts to federally listed species and cultural resources will be evaluated prior to beginning excavation.

3.12.7 What kind of and how much impact would occur in streams as a result of this project?

The degree of stream impacts due to roadway crossings is dependant on its location of the crossing within the watershed and the width of the roadway. Impacts to smaller streams located at higher elevations of the watershed, nearer the headwaters, would consist of the installation of pipes or culverts to channel the water under the road. Whether a pipe or a culvert is used depends upon the size of the channel being crossed and the size of the watershed it drains. Unlike bridge crossings, pipe and culvert crossings prevent sunlight penetration, can affect flow and velocity characteristics, can prevent fish passage when improperly designed/installed, and prevent accumulation of food sources in the form of detritus due to scouring effects. In some instances streams may be relocated in order to provide a perpendicular crossing which would reduce the length of streams that would be impacted by pipes or culverts that the stream would flow through.

Wide streams that are typically located at lower elevations in the watershed, closer to rivers, are typically bridged, as dictated by the presence of a floodplain and/or floodway. Therefore, impacts to large streams with regulated floodways would generally be minimized. In many cases, the entire channel could be spanned by the bridge and no impacts would occur to the stream channel. However, for wide braided streams such as the Alternative 1 crossing of Crooked Creek and Three Creeks, bridge pilings might be required within the channels. For smaller streams where bridges may not be warranted, appropriately sized pipes or box culverts may be installed for the road crossings to prevent a restriction of flow. The use of pipes, culverts, and/or bridges is determined by the results of hydraulic studies performed during the final design. The type of structure used is dependent on factors such as watershed size and the presence of FEMA regulated floodplains and floodways.

Twelve perennial streams that have major riparian wetland systems associated with them would be crossed by the Build Alternatives. However, these streams have been previously impacted by road crossings, utility line crossings, railroad crossings and ponds. Table 3.48, (refer to page 3-191) provides a listing of the streams and the type and number of previous impacts to the main channel of each stream.

Many of the tributaries to the streams that make up the watershed also have similar impacts. The Build Alternatives would not cross any mainline channel more than once; therefore, I-73 would add one additional road crossing to the main channel of these streams.

Table 3.48
Existing Stream/Riparian Wetland Crossings

	IMPACT TYPE				
	Road Crossings	Utility Crossings	Railroad Crossings	Ponds/Lakes	TOTAL
Beverly Creek	6	0	0	2	**8**
Cottingham Creek	6	0	1	2	**9**
Crooked Creek	18	2	0	7	**27**
Hagins Prong	9	0	0	0	**9**
Herndon Branch	8	0	0	0	**8**
Lightwood Knot Creek	5	1	0	2	**8**
Little Reedy Creek	4	0	0	0	**4**
Little Reedy Creek Tributary	3	0	0	0	**3**
Marsnip Branch	1	0	0	0	**1**
Muddy Creek	6	3	0	0	**9**
Reedy Creek	7	0	0	0	**7**
Three Creeks	3	2	0	1	**6**

Source: The LPA Group Incorporated, 2007

For Section 404 and Section 401 permitting purposes, impacts to streams are measured in terms of the length along the centerline of the stream that would be affected. They are reported as linear feet of impact. As with the wetland impact calculations, the length of the stream sections that lay within the conceptual construction limits were measured. Table 3.49 provides the estimated number of perennial and intermittent streams crossed and the linear footage of impacts streams for each Build Alternative. As described in Section 3.12.6, page 3-186, stream crossings that would have a pipe or culvert installed would represent a more severe impact to streams than would bridges that span larger streams.

As indicated in Table 3.49, Alternative 1 would have the least impacts to intermittent and perennial streams followed by Alternatives 2 and 3, respectively. Streams with regulated floodplains and floodways would be bridged and it is anticipated that modifications to these channels would be minimal. Temporary modifications such as the installation of coffer dams in stream channels in order to construct footings for bridge pilings might be required in the braided streams. However, since these modifications would be temporary and would be removed upon completion of the bridge construction, minimal impacts would occur.

Based on an analysis of preliminary data available, it is anticipated that Alternative 1 would have a minimum of five bridges. These are planned at Little Reedy Creek, a Little Reedy Creek tributary,

Table 3.49
Potential Stream Impacts

	Build Alternatives			Total Linear Feet Present in Project Study Area
	1	2 (Preferred)	3	
Perennial Streams				
Number of Crossings	6	10	6	
Linear Feet	1,666	3,778	3,555	2,564,336
Intermittent Streams				
Number of Crossings	9	14	17	
Linear Feet	2,900	4,365	6,507	4,731,797
Total Number of Crossings	**15**	**24**	**24**	
Total Stream Impact	**4,566**	**8,143**	**10,062**	**7,296,133**

Source: THE LPA GROUP INCORPORATED, 2007.

Three Creeks, Muddy Creek, and Crooked Creek. Alternative 2 would have four bridges including Little Reedy Creek, a Little Reedy Creek tributary, Hagins Prong, and Cottingham Creek. Alternatives 3 would have two bridges, one at Little Reedy Creek and the other at Reedy Creek. Alternative 1 would have more bridges than the other Build Alternatives because it crosses streams at a lower elevation in the watershed. As previously mentioned in the wetland impacts discussion, bridge impacts are the least damaging method for crossing the streams.

All jurisdictional streams will be identified and mapped during the wetland delineation for the Preferred Alternative and the results will be reported in the Final EIS. Hydrologic studies would be performed for the Preferred Alternative to determine where the use of bridges, pipes or box culverts would be appropriate. The installation of pipes or box culverts would require water body modification and could affect aquatic species movement. Where practicable, stream channels could be relocated outside of the fill limits of the roadway and cross pipes and culverts could be placed perpendicular to the roadway to reduce the length of pipe or culvert required. This would not only be a cost effective measure from a construction standpoint, but would also reduce the distance that aquatic species would have to travel through the structures. Additionally, pipe and culvert bottoms would be recessed below the bottom of the perennial stream channels to help maintain movement of aquatic species through the structure.

3.12.8 What indirect impacts to wetlands and streams would occur as the result of the project?

Based on a review of the projected land use maps generated by the land use models, indirect impacts to wetlands and streams were estimated that could result from development of currently vacant lands along the Build Alternatives. Similarly, indirect impacts associated with the No-build Alternative could also occur, according to the models. The areas of projected development were analyzed using the I-73 base mapping. Potential impacts to streams and wetlands were estimated. Because these are projected developments and no site plans are available and no delineations have been performed, stream impacts are reported as the number of potential stream impacts instead of in linear feet. Table 3.50 provides the results of the analysis. This analysis is based on projected impacts to tracts identified by the land use models and does not take into consideration any avoidance or minimization requirements that would be required for obtaining Section 404 permits and Section 401 water quality certifications prior to construction on the sites, so in that sense would be a worst-case analysis.

Table 3.50
Potential Indirect Wetland Acres and Stream Impacts

	Alternatives			
	No-build	1	2 (Preferred)	3
WETLAND TYPE				
Bay Forests	0	0.1	0.2	0.3
Bottomland Hardwoods	2.4	2.4	5.2	5.2
Evergreen Shrub Bog/Pocosin	0	0	0.1	0
Pine Savannahs & Wet Flatwoods	0.1	0.2	1.6	1.5
Savannah & Wet Meadow	0	0	0.1	0.1
Wooded Swamp	0.6	4.9	2.5	2.5
Total Wetland Impact	**3.1**	**7.6**	**9.7**	**9.6**
STREAM TYPE				
Intermittent	0	27	22	23
Perennial	1	1	1	1
Total Stream Crossings	**1**	**28**	**23**	**24**

Source: THE LPA GROUP INCORPORATED, 2007.

The No-build Alternative would have minimal indirect impacts to wetlands and streams as indicated in Table 3.50. Of the Build Alternatives, Alternative 1 would have the least amount of indirect wetland impacts. Potential indirect wetland impacts are essentially the same for Alternatives 2 and

3. However, there would be less than five acres separating the lowest impact (Alternative 1) from the highest impact (Alternative 2). Potential indirect stream impacts for the Build Alternatives are essentially the same with Alternative 2 having the least number of stream impacts followed by Alternatives 3 and 1, respectively. The majority of the potential indirect stream impacts are anticipated to occur to intermittent streams.

Based on a review of aerial photography and the land use projections, indirect wetland impacts associated with the Build Alternatives would not occur within the higher value riparian wetland systems described earlier, but would be adjacent to and in close proximity to them. Development along the edges of these systems could affect their water quality over time. It is not anticipated that induced development impacts would occur to intact Carolina bays within the project study area due to the availability of other suitable development sites, the effort needed to drain these sites to make them developable, and the high level of protection provided by regulatory agencies.

The results of the land use models show that some of the projected development for the Build Alternatives would occur in Blenheim, Bennettsville, Clio, McColl, and along S.C. Route 9 and S.C. Route 177 North, north of Bennettsville. Projected development outside of the town limits would be clustered around the proposed interchanges and would occur predominantly in agricultural fields and forested uplands. Wetland impacts would typically occur at the edge of wetlands. The projected development associated with the No-build Alternative would generally be in the vicinity of I-95 in the southern portion of the project study area and I-74 in North Carolina. Based on a review of aerial photography overlain with the projected development, it is anticipated that impacts to wetlands as the result of projected growth would be predominantly wetland habitat degradation, not direct loss or fragmentation of habitat.

3.12.9 What would cumulative impacts be to wetlands and streams in the project study area?

Cumulative impacts to wetlands and streams, such as loss and degradation of quality, could occur in the project study area, which contains a wide variety of wetland types. A GIS analysis of the wetlands indicated on the NWI maps within the project study area was performed to determine the magnitude of the potential wetland impacts compared with the total amount of each wetland type found in the study area. For the purposes of this analysis, the projected impacts were added to the direct impacts associated with each of the Build Alternatives. The results of this analysis are presented in Table 3.51, (refer to page 3-195).

The purpose of Table 3.51 (refer to page 3-195) is to put into context the acreage of impacts associated with each of the Build Alternatives relative to the overall resource type present within the study area. None of the wetland types would be substantially diminished by the project in this context. However, there would be a decrease in acreage for all these listed wetland types.

Table 3.51
Potential Cumulative I-73 Wetland Impacts Relative to Project Study Area Wetlands (in Acres)

	Build Alternatives			Project Study Area Total
	1	2 (Preferred)	3	
WETLAND TYPE				
Aquatic Beds	0	0.1	0	102
Bay Forests	30.2	10.6	9.0	20,372
Bottomland Hardwoods	11.1	10.4	6.0	5,415
Deciduous Shrub Swamps	3.8	8.0	3.2	2,491
Evergreen Shrub Bogs/Pocosins	10.6	5.3	23.6	6,766
Freshwater Marsh	0	4.8	0	564
Pine Savannahs & Wet Flatwoods	0.2	2.0	13.9	10,824
Ponds & Borrow Pits	2.6	4.9	3.6	2,097
Savannahs & Wet Meadows	1.7	1.7	2.6	1,551
Wooded Swamp	115.1	76.2	63.6	48,017
TOTAL	**175.3**	**124.0**	**125.5**	**98,199**

Source: THE LPA GROUP INCORPORATED, 2007.

Previously constructed road projects have contributed to cumulative stream and wetland impacts in the project study area. The construction of 17 miles of I-74 in North Carolina resulted in approximately 16 acres of wetland and 2,895 linear feet of stream impacts. Other constructed projects such as S.C. Route 22 resulted in a total of 110.5 acres of impacts to wetlands, and widening along S.C. Route 38 resulted in a total of 10.92 acres of impacts wetlands, 491 linear feet of perennial stream impacts and 480 linear feet of intermittent stream impacts. According to the Draft EIS, the construction of the 44-mile long southern portion of I-73 would impact approximately 384.1 acres of wetlands, 15,443 linear feet of perennial streams and 3,770 linear feet of intermittent streams. Environmental documentation for the construction of the widening along S.C. Route 9/S.C. Route 38 in Marlboro County has not been completed therefore potential wetland and stream impacts are not known at this time. However, it is anticipated to contribute to cumulative wetland and stream impacts within the project study area.

Each of the aforementioned projects involved or will involve the use of federal funding; therefore, NEPA documentation was or will be prepared for each project. Section 404 permits were or will be obtained where required, and wetland mitigation was or will be provided to compensate for stream and wetland impacts. It is anticipated that the required alternative analysis for these projects would minimize impacts to the wetland systems within the project study area.

A planned privately operated military training facility that could contribute to cumulative impacts to wetland and streams would be located near the town of Wallace in the northwestern portion of the I-73 North project study area. Approximately 1,800 acres of a 3,100-acre tract would be developed. The tract appears to include White Creek and several of its unnamed tributaries. A review of NWI maps and aerial photography indicates that riparian wetland systems primarily consisting of hardwood swamps occur along the onsite streams. Site development plans are not available for analysis of potential impacts.

Although cumulative impacts to wetlands and streams are anticipated, all public and private development projects that would impact greater than 0.1-acre of wetlands and/or greater than 100 linear feet of stream would require a Section 404 permit and a USACE approved mitigation plan to compensate for the impacts prior to beginning construction. Additionally, projects that disturb greater than one acre of land require an NPDES permit, also referred to as a Land Disturbance Permit. The permit is obtained through SCDHEC in South Carolina and the NCDENR Division of Land Resources, Land Quality Section in North Carolina. The NPDES permit requires that measures to contain/pre-treat stormwater runoff prior to discharging into receiving waters be implemented and requires that a Stormwater Pollution Prevention Plan be developed for the project which would minimize potential impacts during construction. For projects constructed in any region of South Carolina or in a coastal county in North Carolina that disturb greater than five acres of land, the development and approval of permanent water quality BMPs and a signed maintenance agreement to insure continued water quality protection are required.

3.12.10 What is mitigation?

Mitigation has been defined in NEPA regulations to include efforts which: a) avoid; b) minimize; c) rectify; d) reduce or eliminate; or e) compensate for adverse impacts to the environment (40 CFR 1508.20 [a-e]). Section 404(b) (1) Guidelines of the CWA stresses avoidance and minimization as primary considerations for protection of wetlands. Practicable alternatives analysis must be fully evaluated before compensatory mitigation can be discussed.

Federal Highway Administration policy stresses that all practicable measures should be taken to avoid and minimize impacts to wetlands which will be affected by federally funded highway construction. A sequencing (step-down) procedure is recommended in the event that avoidance is impossible. This step-down procedure includes impact avoidance, minimization, and finally, compensation for unavoidable impacts.

Compensation traditionally takes three basic forms: restoration, preservation, and creation, or can be a combination of the three. Restoration is the return of functions and/or values to a wetland that have been lost because of alteration of the natural vegetation, soil, and/or hydrology. Preservation refers to the protection without disturbance of existing wetlands that are particularly valuable. Creation is the making of wetlands from non-wetlands. Restoration and preservation are the preferred forms of mitigation due to the uncertainty of the success of wetland creation.

3.12.11 What was done to avoid and minimize wetland and stream impacts?

3.12.11.1 Avoidance

Due to the linear nature of the project and the large areas of wetlands and streams located within the project study area, total avoidance of wetlands and streams was not possible for the Build Alternatives. Many riparian wetland systems associated with streams extend across the study corridor, such as Crooked Creek and Marks Creek. As described earlier, efforts were made to avoid wetland and stream impacts.

After the initial corridors were developed, those that were suitable for further consideration (based on potential impacts) were further refined to avoid wetland impacts. A field review was conducted during which the ACT members were given the opportunity to view the wetlands that would potentially be impacted within the corridors and provide comments. A second field review was conducted with representatives of North Carolina state and federal resource and regulatory agencies, NCDOT, and FHWA in the North Carolina portion of the study area and comments were solicited from them.

Centerlines were established and wetland impacts were calculated within construction limits obtained from the conceptual designs of the Build Alternatives. Requests for corridor modifications from the ACT and North Carolina participants were investigated that would further avoid wetland and stream impacts. A major concern identified by the federal and North Carolina state resource and regulatory agencies was the potential impact to Marks Creek that a western interchange with I-74 could cause. Alignment shifts, crossover segments, and design modifications were presented at the ACT meetings for discussion. Agreement was reached on these and other modifications that resulted in a reduction of impacts.

Once three reasonable Build Alternatives were identified, the alignments were additionally modified and evaluated to reduce environmental impacts. Shifts to avoid community or cultural resource impacts sometimes resulted in reduced wetland and/or stream impacts. Two changes that were made to Alternative 1 resulted in a reduction of impacts. An alignment shift at the Oakley Plantation reduced wetland impacts by approximately 3.2 acres and the rerouting of I-73 to utilize the eastern interchange with I-74 reduced wetland impacts by 37 acres and reduced stream impacts by 2,190 linear feet.

The elimination of the western interchange with I-74 also affected Alternative 2. It resulted in a reduction of 44 acres of wetland impact and 2,391 linear feet of stream impact. An alignment shift was made to avoid impacts to the Minturn community that also reduced wetland impacts for Alternative 2 by 15.2 acres. Another modification that was made to Alternative 2 consisted of connecting it to Alternative 3 east of Crooked Creek, thereby eliminating the crossing of Lightwood Knot Creek and changing the Crooked Creek crossing to a location where the riparian wetland crossing is substantially narrower. This resulted in a 15.5-acre reduction in wetland impacts.

A shift was made on Alternative 3 to avoid impacts to the Alford Plantation that resulted in a reduction in wetland impacts of approximately 11.6 acres.

Upon completion of the wetland delineation within a 600-foot wide study corridor for the Preferred Alternative, the alignment would be evaluated to determine how wetland impacts could be further avoided and minimized.

3.12.11.2 Minimization

Where possible, and where consistent with engineering standards and FHWA and SCDOT requirements, design modifications would be incorporated to further reduce impacts. Design modifications may include slight shifts in the alignment away from wetlands and the use of 2:1 side slopes where practicable. The use of 2:1 side slopes would reduce the impact footprint through wetlands and other sensitive areas and thus reduce the impacts. Detailed hydraulic studies would be performed during the final roadway design phase to determine the appropriate bridge lengths at stream crossings with higher quality wetland systems and floodplains, which would minimize wetland impacts. Properly sized pipes and culverts, as determined by the final hydraulic study would be installed under the roadway to maintain the historic hydrologic connections of wetlands and prevent the drainage or excessive flooding of jurisdictional areas. Additional cross pipes and culverts could be installed in new causeways through wetlands to maintain sheet flow through riparian wetlands during high water events.

Where appropriate, wetland impacts would be minimized by crossing wetlands with bridges. Each wetland crossing, where a bridge is warranted, would be evaluated on an individual basis to determine the most practical method for constructing bridges. This would be evaluated depending on the type and amount of wetlands to be impacted and the length, type, and geometry of the structure to be built. Although the vegetation would be cleared within the construction limits and there would be temporary impacts to the hydrologic function and soil of the affected wetland, permanent impacts to bridged wetlands would be minimal. Permanent impacts would result from the decrease of vegetation beneath the bridge. Upon completion of the bridges, the temporary means of access would be removed and the area reseeded with a riparian seed mix of native species to reduce the risk of habitat degradation by colonization by invasive species. The hydrologic functions of the wetland would not be diminished.

Typical construction techniques considered as possible options for building bridges over wetlands are:

- Construction on existing grade;
- Temporary haul roads;
- Timber mats or barges;
- Temporary trestles; and,
- Top-down construction.


Temporary haul road through wetland


Wetland 6 months after temporary haul road removed


Wetland 11 months after temporary haul road removed

Construction on existing grade would be done in wetlands where the soil is stable enough to support construction equipment loads bearing directly on the ground surface. Typically, this method would be utilized in wetlands that are not saturated or inundated during a majority of the year. Temporary haul road(s) would be constructed parallel to a proposed structure in wetlands containing soils incapable of supporting heavy construction equipment without permanent damage to the wetlands. Upon completion of the bridge, the haul road(s) would be removed and the natural grade of the wetland restored and re-seeded with an herbaceous wetland vegetation seed mix. The use of timber mats or barges for constructing bridges in wetlands is similar in concept, and in resulting impacts, to using haul roads. This technique could be used in wetlands where standing water or saturated soil conditions would not support heavy construction equipment or temporary haul roads. The temporary trestle would be constructed adjacent to the proposed bridge location. The structure would be constructed on driven piles, either steel or timber, and a superstructure of steel girders and timber mats. The temporary trestle would act as a work platform and haul road for materials and impacts would consist of temporary clearing of vegetation under the trestle.

Top-down construction technique would utilize components of the bridge already under construction to either support a temporary platform for building new spans or to serve as the work platform itself. The previously built substructure would support the temporary working platform, allowing piles to be driven for the next span. Simultaneously, the permanent structure's bridge deck would be formed and poured for the previous span, behind the work platform.

A variation of the top-down construction technique would use the previously built bridge deck as the working platform construction of the substructure and superstructure of subsequent bridge spans would be performed from the completed, permanent structure. Top-down construction would cause the least amount of temporary impact as no fill material or temporary structures would be required since the work would be performed from the permanent structure.

Efforts to minimize wetland impacts would also be incorporated in the construction phase of the project. Construction activities would be confined within the permitted limits to prevent the unnecessary disturbance of adjacent wetland areas. During construction, potential temporary impacts to wetlands would be minimized by implementing sediment and erosion control measures to include seeding of side slopes, silt fences, and sediment basins, as required by the NPDES permit. Other best management practices would be required of the contractor to ensure compliance with the policies of *23 CFR 650B*.

Silt fencing and seeding of side slopes

3.12.12 How will compensation be determined for wetland and stream impacts?

The USACE has established guidance for calculating mitigation that would be needed to compensate for unavoidable wetland and stream impacts. This guidance is contained in the Charleston District Compensatory Mitigation Guidelines (or Standard Operating Procedures). Mitigation credits are calculated for proposed impacts. The number of mitigation credits required is based on several factors such as the type of wetland being impacted, the condition of the area to be impacted, the type of impact that will occur, and the duration of the impact (permanent vs. temporary).

The Standard Operating Procedures (SOP) also contains guidance for calculating the number of credits that a proposed mitigation site will generate. The number of credits received for a mitigation site is determined by several factors such as the net improvement to the area for proposed restoration or enhancement; the wetland type, existing condition, and the degree of threat to the area proposed for preservation; and the vegetation establishment (planted vs. natural re-vegetation) and the soil type present for the area proposed creation sites. The proximity of the mitigation site to the impact site, the type of protection the site will receive, and whether the mitigation wetland is the same type as the impacted wetland are considered regardless of the mitigation type that is proposed.

There was early discussion with the ACT of not using the SOP for calculating required mitigation credits due to the magnitude of the impacts associated with the project. However, it was agreed by the members of the ACT that the SOP would provide a method for assuring that adequate mitigation would be provided. On February 22, 2007, the ACT voted in agreement to quantify the wetland and stream mitigation by watershed and apply the SOP for each watershed.

After the wetland and stream boundary delineations have been approved by the USACE for the Preferred Alternative, the area of impact would be calculated for each wetland type identified. Field data collected for each wetland would be used to evaluate the condition of each wetland and stream being impacted and the SOP worksheets would be completed to determine the number of mitigation credits that would be required for the project.

It is anticipated that one Section 404 permit would be obtained for both I-73 projects in South Carolina and one mitigation plan would be prepared for those impacts. The NCDOT would prepare the permit application package and mitigation for the North Carolina portion of the project. Wetland mitigation was discussed at several ACT meetings and the importance of in-kind mitigation and mitigation within the same watershed was emphasized. Discussions have continued concerning the use of riparian systems as well as "landscape scale" mitigation with linked upland/riparian systems.

This type of mitigation would involve the acquisition of a single large tract of land that provides stream and wetland restoration and enhancement opportunities. It would also include the preservation of upland habitat acreages beyond the 50- to 100-foot wide upland buffer generally provided in a mitigation plan. This large scale mitigation approach provides preservation of adjacent upland habitats that are important to some reptile and amphibians that utilize uplands as well as wetlands during their life cycle. A tract such as this could be purchased and management responsibilities could be turned over to the appropriate entity. The use of commercial wetland mitigation banks was brought up during early mitigation discussions and it was suggested that they be used only as a last resort.

A review of aerial photography, USGS topographic maps, and limited field visits, indicates there are many opportunities for restoration mitigation for both wetland and stream impacts within and adjacent to the project study area. Many of the wetlands within the study area are previously impacted that have been drained or partially drained for agricultural or timber production purposes. Because of their small size (five to ten acres) and the fact that they are isolated from wildlife movement corridors by agricultural fields, these areas would not necessarily be given top priority as wetland mitigation sites. However, large wetland areas and those associated with the high quality riparian wetland systems would be considered to be suitable for mitigation purposes.

3.12.12.1 Wetlands

There are several Carolina bays within the I-73 North and South study areas that appear to have a hydrologic connection to waters of the United States that could be used for wetland mitigation. Some of these bays, ranging in size from approximately 100 acres to 1,300 acres, appear to be intact and could be purchased and dedicated as preservation mitigation. The inclusion of the upland sand rim and other adjacent uplands would provide enhancement for the preserved wetland systems. Other Carolina bays are present that range in size from approximately 200 acres to 1,000 acres and have been impacted primarily by drainage and conversion to other uses. They could be restored for mitigation credit. Based on reviews of the aerial photography, restoration for these bays could range from simply filling drainage ditches and restoring the hydrology where soils and vegetation are already present, to restoring the hydrology by removing drainage tiles, blocking ditches, and planting the site with wetland vegetation. The issue of blocking drainage, thus “isolating” these wetlands from the surface water system, would need to be addressed in the context of the regulatory concerns for isolated wetlands.

The potential for large areas of preservation, enhancement, and restoration are available along the Little Pee Dee River, the Great Pee Dee River and other previously mentioned riparian wetland systems within the study area. Tracts of land along the Little Pee Dee River, ranging from small 200-acre parcels located within existing Heritage Trust preserves to over 1,000-acre parcels could be purchased. Enhancement for these sites could be in the form of upland buffers and/or the removal of roads in the wetlands.

3.12.12.2 Streams

As previously mentioned, many of the streams within the study area have been channelized and are located in agricultural fields where they have no vegetated buffers. Additionally, many of the channelized streams have limited contact with adjacent wetlands due to spoil piles left behind during the channelization effort. Restoration and enhancement of these impacted streams for mitigation credits can include reshaping stream channels utilizing natural stream design techniques and replanting native vegetation to create a stream buffer. These vegetated areas are important because they provide movement corridors for wildlife and provide water quality enhancement. The vegetation filters pollutants from surface water runoff before it enters the receiving stream as well as provides shade which keeps the water cool, thereby promoting the health of aquatic animal species that are not tolerant of high water temperatures. Spoil piles can be removed from stream banks and in-stream structures could be installed within the channels to raise the elevation of deeply incised channels which would allow streams to overflow into the adjacent riparian wetlands during rain events. This would not only restore or enhance wetland hydrology, but it would also restore the flood force attenuation and flood storage functions to the wetland. The latter stream restoration type is one that must be approached carefully such that flooding of adjacent property owners does not occur.

Another avenue for obtaining wetland and stream mitigation that has been discussed at ACT meetings would be to provide monetary support for property acquisitions and habitat restoration for properties with natural areas that have the opportunities for preservation, enhancement or restoration. Members of the ACT indicated that the use of those type sites has good potential for mitigation. It is anticipated that wetland restoration and enhancement would be evaluated for any proposed landscape scale mitigation site and the SOP would be used to calculate potential mitigation credits provided by large tracts to insure that the USACE required ratio of restoration/ enhancement credits to preservation credits is met.

Discussions are currently ongoing concerning the type of mitigation and the means of acquiring mitigation.

Once the impacts to streams and wetlands have been determined for the I-73 North Preferred Alternative, coordination with the ACT concerning mitigation will continue and a suitable mitigation will be identified. At that point, a final mitigation plan would be prepared, included in the FEIS, and submitted along with the Section 404 permit application.