C.15 WETLANDS

C.15.1 What types of impacts would occur to wetlands as a result of this project?

Clearing and grubbing is the process of cutting and removing vegetation, including stumps, and then raking the soil to remove roots.

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 allowed to re-vegetate with native wetland vegetation after the side slopes of the road are stable and the silt fencing has been removed.

Permanent clearing of vegetation 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. Additional permanent clearing would be performed for a width of approximately 30 feet along both sides of the bridge for the same reason. This type of impact does not destroy the wetland, but does change the wetland type. For example, if a bridge is constructed through a hardwood swamp, the hardwood swamp could become a deciduous shrub swamp or a fresh water marsh after the removal of the trees.

C.15.2 How were the potential wetland impacts calculated?

To calculate the potential impacts associated with each Build Alternative, the conceptual construction limits for each of the alternatives was overlain onto the GIS 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 of the alternatives; the proposed interchanges; crossover roads, and other roads necessary to maintain access to property. 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 associated with bridges. Upon completion of the hydraulic studies for the Preferred Alternative, appropriately sized pipes or bridges would be installed at wetland crossings to maintain the historic hydrologic connections.

C.15.3 How many acres of wetlands would be impacted by the project?

Table C.27 (refer to page C-81) provides the wetland types that would be impacted, the type of impact, and the wetland value for each alternative. As indicated in Table C.27 (refer to page C-81), Alternative 3 would have the least amount of total wetland impacts, with Alternatives 1, 5, and 6 having basically the next lowest total wetland impacts. Alternatives 6 and 3 reduced in size by the installation of drainage ditches in or near the wetlands, and drainage tile systems. These remnant wetlands received lower values as decided in consultation with the ACT. However, wetland systems associated with the larger streams and rivers that flow through the project study area were considered to be higher value wetlands.

Table C.27
Potential Wetland Impacts in Acres and Wetland Values
Interstate73: I-95 to the Myrtle Beach Region

Wetland Type	Alternatives							
	1	2	3	4	5	6	7	8
Aquatic Beds								
Bridge Impact								
Fill Impact				0.3			0.3	
Bay Forests								
Bridge Impact	1.7		0.1	2.0		0.1	0.3	1.7
Fill Impact	63.4	52.9	49.5	71.5	49.3	53.1	57.4	67.1
Bottomland Hardwoods								
Bridge Impact	1.4	8.0	0.2	1.3	0.2	8.2	0.1	9.4
Fill Impact	50.3	53.0	34.6	44.6	44.4	43.3	38.8	58.9
Deciduous Shrub Swamps								
Bridge Impact		6.2	1.1			7.2		6.2
Fill Impact	4.1	6.0	14.5	8.1	3.0	17.5	7.0	7.1
Evergreen Shrub Bogs/Pocosins								
Bridge Impact		0.3		0.2		0.3	0.2	0.3
Fill Impact	44.3	37.9	34.2	57.6	42.6	29.5	55.9	39.5
Flooded Swamp/ Beaver Ponds								
Bridge Impact	1.8	1.8	1.8	0.2	1.8	1.8	0.2	1.8
Fill Impact	5.5	5.5	2.2	2.8	5.5	2.2	2.8	5.5
Hardwood Swamp								
Bridge Impact	33.3	34.0	26.8	33.2	32.5	27.8	32.4	34.8
Fill Impact	167.9	151.7	171.2	176.1	177.0	145.9	185.2	142.7
Pine Savannahs & Wet Flatwoods								
Bridge Impact				0.2			0.2	
Fill Impact	18.5	58.8	37.3	66.1	33.5	62.5	81.2	43.8
Ponds & Borrow Pits								
Bridge Impact	3.2	2.2		3.2	2.2		2.2	3.2
Fill Impact	18.8	20.5	8.2	18.8	17.3	11.3	17.3	22.0
Rivers & Canals								
Bridge Impact	2.5	2.5	2.4	2.5	2.5	2.4	2.5	2.5
Fill Impact								
Savannahs & Wet Meadows								
Bridge Impact	0.9	0.9		0.9	0.9		0.9	0.9
Fill Impact		0.3	0.3	7.2	0.3		7.1	0.3
Total Bridge Impact	44.8	57.0	32.3	43.9	40.1	47.8	39.2	61.8
Total Fill Impact	372.8	386.6	351.8	453.2	372.9	365.3	453.0	386.8
Total Wetland Impact	**417.6**	**443.6**	**384.1**	**497.1**	**413.0**	**413.1**	**492.2**	**448.6**
Wetland Values								
Bridge Impacts	363.5	460.9	257.6	365.4	334.7	375.9	336.4	490.7
Fill Impacts	2,556.0	2,408.5	2,228.5	2,847.0	2,481.4	2,212.5	2,769.3	2,486.1
Total Wetland Value	**2,919.4**	**2,869.4**	**2,486.1**	**3,212.4**	**2,816.1**	**2,588.4**	**3,105.8**	**2,976.8**

Source: THE LPA GROUP INCORPORATED, 2006

Although wetlands are distributed all along the alternative alignments (refer to Figure C-35, page C-84), there are wetland crossings on some of the alternatives that appear to account for the higher impact totals. All of the alternatives would cross Back Swamp and the Little Pee Dee River swamp. However, Alternatives 3 and 6 would have lower impacts to these systems than the others, which would result in less impacts to these high value hardwood swamp systems than at the U.S. Route 501 crossing of these same systems. A portion of the U.S. Route 501 crossing would be constructed on the existing alignment, however the increase in impacts would be the result of the curve in I-73 at Back Swamp that is required to get onto the existing U.S. Route 501 alignment, and the shift off of U.S. Route 501 through the swamp to avoid impacts to the Galivants Ferry Historic District.

Alternatives 4 and 7, which rank last with the highest wetland impacts and impacted wetland values, both would follow a portion of the U.S. Route 501, located east of Marion. A previously impacted Carolina bay is situated on the west side of the bypass and a partially drained bay forest wetland is situated on the east side of the bypass. Because of the poor quality of these wetlands, they received low wetland values, however there is a substantial impact acreage associated with these systems. Alternatives 4 and 7 would not only impact these large wetlands, but would also cross Back Swamp and the Little Pee Dee swamp at U.S. Route 501.

Each of the Build Alternatives would cross high quality riparian wetland systems; however two significant systems that would be crossed by some of the alternatives are Buck Swamp and Lake Swamp. Buck Swamp would be crossed on new alignment by Alternatives 2, 6, and 8. However, these alternatives rank 5th, 3rd, and 6th, respectively, in wetland impacts, with only five acres between Alternatives 2 and 8. They rank 5th, 2nd, and 3rd in wetland values. Although the impacts associated with the Buck Swamp crossing do not significantly increase the total wetland impacts for these alternatives, Buck Swamp is listed on the 303(d) list as an impaired waterbody and avoiding the crossing of this system would help minimize or avoid further degradation of the system. Although this crossing of the wetland system would be bridged, the opinion of the resource agencies suggested avoiding this crossing as it would contribute to habitat fragmentation.

Lake Swamp would be crossed on new alignment by Alternatives 2, 3, and 6. This crossing would be situated downstream of the existing S-23, and because the proposed new crossing would not be perpendicular to the wetland system, impacts associated with this crossing would increase wetland impacts for these alignments. This crossing would be on new alignment due to a shift in the alignment to avoid impacts to the community of Ketchuptown and a historic structure within it. As with the crossing of Buck Swamp on new alignment, the resource agencies have indicated that the crossing on new alignment would contribute to habitat fragmentation of this riparian wetland system.

All of the Build Alternatives would have impacts to wetlands. However, several alternatives can be grouped together based the similar potential impact acreage. For example, for the increase in impacts from Alternative 3 (the lowest impacts) to the next group of alternatives with lower impacts (Alternatives 5, 6, and 1, respectively), there is a range of impacts of approximately 8 percent. The next group of alternatives with similar impacts (Alternatives 2 and 8) would have a range of approximately 10 percent, and the two alternatives with the highest potential wetland impacts (Alternatives 7 and 4, respectively) would be approximately 10 percent apart. Overall, there is an approximately 30 percent difference in the wetland impacts between the lowest, Alternative 3, and the highest, Alternative 4.

As mentioned earlier, most 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. The riparian wetland systems associated with streams that would be impacted consist of fully functional bottomland hardwoods and hardwood swamps, which were assigned the higher wetland values, and would result in the greatest loss of wetland functions. All of the alternatives would cross riparian wetland systems. As previously mentioned the Little Pee Dee River swamp, and Back Swamp would be impacted by all of the alternatives.

Alternative 1 would impact 12 riparian wetland systems, eight of which would include bridge impacts. Little Reedy Creek, Dawsey Swamp, Tredwell Swamp, Brunson Swamp, and Spring Swamp would be crossed at existing crossings which would minimize impacts, particularly habitat fragmentation. Two unnamed tributaries to Catfish Canal, The Gulley, Maidendown Swamp, Back Swamp, and Mill Branch would be constructed on new alignment and would contribute to habitat fragmentation. The Little Pee Dee River swamp crossing would be constructed partially on existing and new alignment.

Alternative 2 would impact 10 riparian wetland systems, eight of which would include bridge impacts. Cypress Branch and Loosing Swamp impacts would occur at existing crossings. Old Mill Creek, an unnamed tributary to the Little Pee Dee River, Buck Swamp, Back Swamp, and Dawsey Swamp would all be crossed on new alignment. The Little Pee Dee River swamp crossing would be constructed partially on existing and new alignment.

Alternative 3 would impact nine riparian wetland systems, five of which would include bridge impacts. The crossings that would occur at existing alignments include Little Reedy Creek, and the Little Pee Dee River swamp. Crossings on new alignment include two unnamed tributaries to Catfish Canal, The Gulley, Maidendown Swamp, Lake Swamp, and Joiner Swamp.

Alternative 4 would impact 13 riparian systems, seven of which would include bridge impacts. The crossings that would occur at existing crossings include Little Reedy Creek, Smith Swamp, Reedy Creek, Dawsey Swamp, Tredwell Swamp, and Spring Swamp. Two unnamed tributaries to Catfish Canal, Stackhouse Creek, Back Swamp, and Mill Branch crossings would be on new alignment. The Little Pee Dee River swamp crossing would be constructed partially on existing and new alignment.

Alternative 5 would impact nine riparian systems with four of these crossings involving bridge impacts. Impacts to Little Reedy Creek and Loosing Swamp would occur at existing crossings. Two unnamed tributaries to Catfish Canal, The Gulley, Maidendown Swamp, Back Swamp, and Dawsey Swamp crossings would be on new alignment. Impacts to the Little Pee Dee River swamp would be constructed partially on existing and new alignment.

Alternative 6 would impact ten riparian systems, seven of which would include bridge impacts. Impacts to Cypress Branch and the Little Pee Dee River swamp would occur at existing crossings. Impacts to Old Mill

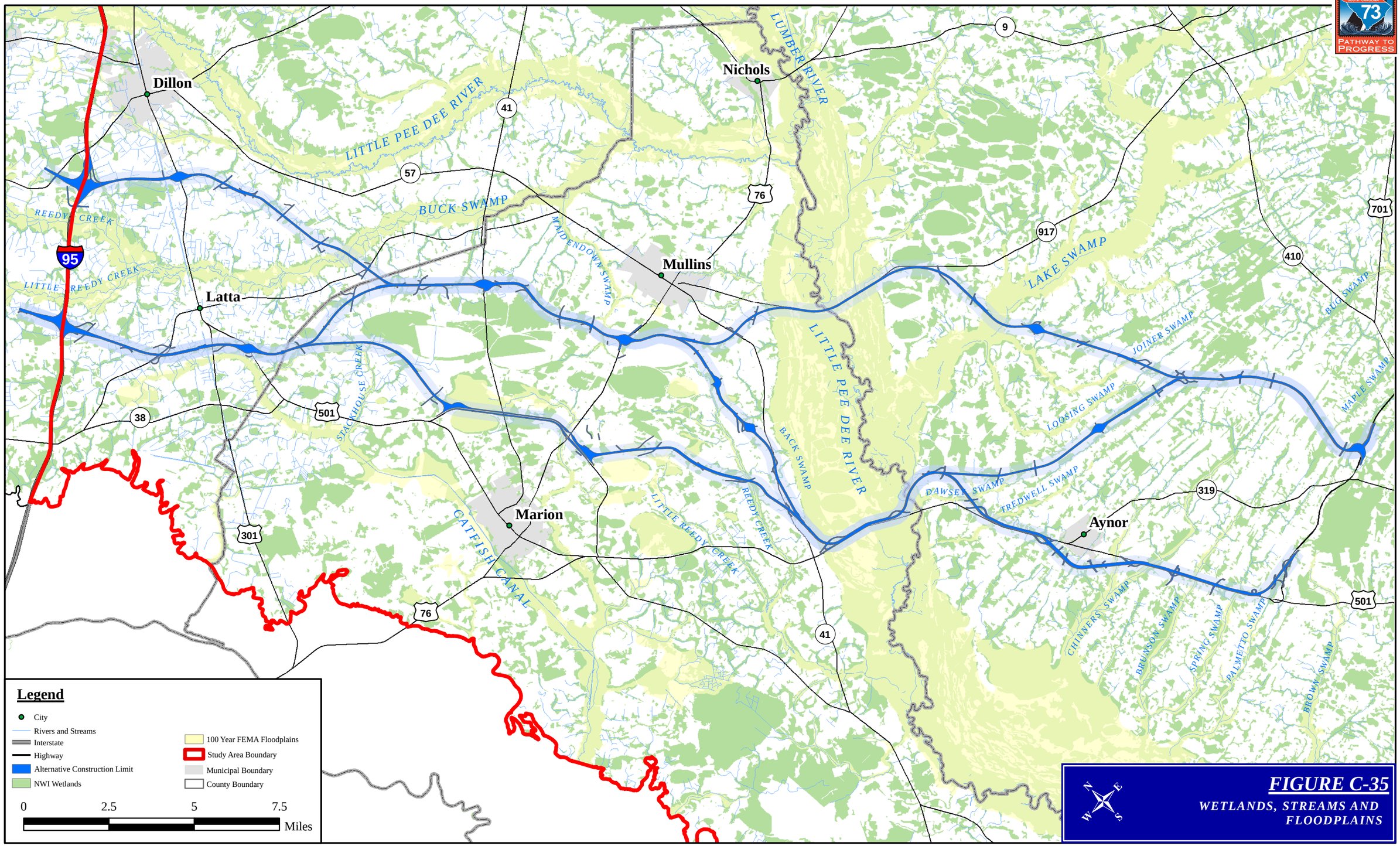

FIGURE C-35

WETLANDS, STREAMS AND FLOODPLAINS

Creek, an unnamed tributary to the Little Pee Dee River, Buck Swamp, The Gulley, Maidendown Swamp, Back Swamp, Lake Swamp, and Joiner Swamp would occur on new alignment.

Alternative 7 would impact ten riparian systems, five of which would include bridge impacts. Impacts to Little Reedy Creek, Smith Swamp, Reedy Creek, and Loosing Swamp would occur at existing crossings. Two unnamed tributaries to Catfish Canal, Stackhouse Creek, Back Swamp, and Dawsey Swamp would be impacted on new location. Impacts to the Little Pee Dee River swamp would occur partially on existing and new alignment.

Alternative 8 would impact 13 riparian systems, ten of which would involve bridge impacts. Cypress Branch, Dawsey Swamp, Tredwell Swamp, Brunson Swamp, and Spring Swamp would be crossed at existing roadways. An unnamed tributary to the Little Pee Dee River, Old Mill Creek, Buck Swamp, The Gulley, Maidendown Swamp, Back Swamp, and Mill Branch would be crossed on new alignment. Impacts to the Little Pee Dee River swamp would occur partially on existing and new alignment.

C.15.4 What kind of impacts would occur in streams as a result of this project?

Impacts to streams would vary depending on the size of the channel and the size of the watershed. Impacts to large streams and rivers with a regulated floodway would generally be minimal as these channels are typically bridged. In many cases, the entire channel could be spanned, however, for wide rivers, such as the Little Pee Dee River, bridge pilings might be required within the channel. For smaller streams where bridges may not be warranted, appropriately sized pipes or box culverts may be installed for the road crossings. The use of pipes or culverts, and bridge lengths is determined by performing hydraulic studies and dependent on several factors, such as watershed size, the presence of FEMA regulated floodplains and floodways.

C.15.5 How much stream impact would result from the project?

Impacts to streams are measured in terms of the length of the stream that would be affected, measured along the centerline of the stream and 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 along the centerline of the channel. Table C.28 (refer to page C-86) provides the estimated number of perennial and intermittent streams crossed and the linear footage of impacts streams for each alternative.

As indicated in Table C.28 (refer to page C-86), Alternative 7 would have the least impacts to first and second order streams followed by Alternatives 4 and 5, respectively. Alternatives 1, 2, and 3 have the next lowest impacts with basically the same impact. Alternatives 6 and 8 would have the highest stream impacts.

Streams with regulated floodplains and floodways would be bridged and it is anticipated that modifications would be minimal. Modifications such as the installation of coffer dams in stream channels in order to construct footings for bridge pilings might be required. However, these modifications would be temporary and would be removed upon completion of the bridge construction.

Table C.28
Potential Stream Impacts
Interstate73: I-95 to the Myrtle Beach Region

	Alternatives							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Perennial Streams								
Number of Crossings	52	54	48	35	49	53	32	57
Linear Feet	17,285	16,188	15,443	12,306	15,076	16,557	10,098	18,396
Intermittent Streams								
Number of Crossings	8	8	10	10	7	11	9	9
Linear Feet	1,852	3,060	3,770	4,761	3,060	3,770	5,969	1,852
Total Number of Crossings	**60**	**62**	**58**	**45**	**56**	**64**	**41**	**66**
Total Stream Impact	**19,137**	**19,249**	**19,213**	**17,068**	**18,137**	**20,327**	**16,068**	**20,247**

Source: THE LPA GROUP INCORPORATED, 2006.

First and second order streams located between the Little Pee Dee River and S-22 generally flow in a westerly direction and eventually flow into the river. Streams between the Little Pee Dee River and I-95 generally flow east or west into the river or into Buck Swamp. Because the alternatives are oriented roughly in a northwest to southeasterly direction, stream impacts would be unavoidable. Based on a review of aerial photography, USGS topographic maps, and limited ground truthing, many of the smaller streams within the project study area have been channelized and straightened. Some have been impacted to the point that the historical connection to their floodplains and adjacent wetlands has been severely altered, such as portions of Catfish Canal. However, many streams, including those referred to in the previous discussion of riparian wetland systems, remain intact.

Based on the preliminary data available, it is anticipated that Alternatives 1 and 3 would have a minimum of 12 bridges, Alternative 3 and 7 would have 9 bridges, Alternatives 4 and 6 would have 14 bridges, Alternative 5 would have 7 bridges, and Alternative 8 would have 17 bridges associated with stream crossings. As previously mentioned in the wetland impacts discussion, bridge impacts are the least damaging method for crossing the streams.

Based on a review of aerial photography and the land use projections, indirect wetland impacts associated with the alternatives would occur at the edges of previously disturbed wetlands and generally would not contribute to the loss of wetlands along the high value riparian wetland systems such as Buck Swamp, Lake Swamp, and the Little Pee Dee River swamp. Development could occur along the edges of these systems that might affect their water quality. Riparian wetland systems could be impacted by the construction of road crossings to access developable lands. Development encroaching into the edges of these systems could affect their water quality. It is not anticipated that indirect impacts would occur to intact Carolina bays within the project study area due to the availability of other suitable development sites and the high level of protection provided by regulatory agencies. However, current definitions of jurisdictional wetlands may leave "isolated" Carolina bays unprotected by state and federal regulations.

The amount of anticipated indirect impacts to wetlands would be relatively consistent among the Build Alternatives with only an approximate 11 percent difference between the lowest and highest impacts. The models indicate that development would be scattered along the alternatives and heavier near Dillon, Latta, Mullins, Marion, Aynor, and between Conway and S.C. Route 22. For all of the Build Alternatives, concentrations of development would potentially occur along U.S. Route 76 between Marion and Mullins with some development along U.S. Route 501 from Marion to Latta. For Alternative 1, most of the development in the southern portion of the project would occur between S.C. Route 22 and Conway; however, for the rest of the Build Alternatives, concentrations would be denser around the S.C. Route 22/U.S. Route 701 interchange.

All jurisdictional streams will be identified and mapped during the wetland delineation for the Preferred Alternative. Hydrologic studies would be performed for the Preferred Alternative to determine where the use of 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.

A review of aerial photography and NWI mapping was performed to determine the presence of sufficient uplands along alternatives for potential borrow pit locations. A corridor extending approximately one-half mile along both sides of the centerline of each Build Alternative was examined. Three areas along the alternatives were identified where suitable uplands were not located immediately adjacent to the alternatives. These areas consisted of the interchange at I-95 for Alternatives 2, 6, and 8, where constraints such a wetlands and the Bethea Historic District are located; the portion of Alternatives 4 and 7 located east of Marion, on existing U.S. Route 501, where a Carolina bay and bay forest wetlands are present on both sides of the alternative; and all alternative crossings of Back Swamp and the Little Pee Dee River. However, potentially suitable uplands were observed on the mapping in the close proximity to these locations where fill materials could be excavated and hauled to the construction site.

A more detailed screening will be performed for the Preferred Alternative and segments with adequate upland borrow areas will be indicated. 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. Wetland delineations would be performed at the borrow pit sites and potential impacts to federally listed species and cultural resources would be evaluated prior to beginning excavation, in accordance with the SCDOT Engineering Directive (EDM – *Borrow Pit Location and Monitoring*).

C.15.6 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 could occur as the result of 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 brought into the I-73 base mapping and potential

impacts to streams and wetlands were calculated. Because these are projected developments and no siteplans are available, stream impacts are reported as the number of potential stream impacts instead of linear feet. Table C.29 provides the results of the analysis.

As shown in Table C.29, Alternative 4 would have the least indirect wetland impacts, followed by Alternatives 3, 1, 2, 6, 7, 8, and 5, respectively. However, the indirect impacts associated with the Build Alternatives are basically the same as there is only an approximately 11-acre difference between the Alternative 4, the lowest, and Alternative 5, the highest. Alternative 4 would have the least number of stream impacts with Alternative 1 following with the next lowest impact. Alternatives 3 and 7 would have the third lowest number of stream impacts followed by Alternatives 2, 6, and 8 having the fourth lowest number of impacts. Alternative 5 would have the highest potential stream impacts. This ranking of alternatives is based on estimated 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.

C.15.7 What would cumulative impacts be to wetlands and streams in the project study area?

Cumulative impacts to wetlands and streams could occur in the project study area. The project study area contains a wide variety of wetland types. However, they can be grouped as Carolina bays, riparian wetlands, pocosins, pine savannahs and wet flatwoods, and pine savannahs and wet meadows. Carolina bays have been identified as important natural resources and many intact bays and impacted bays are located in the project study area. Drained bays would be crossed by many of the Build Alternatives; however, intact bays were avoided in the development of alternatives for the project.

Wetland systems in Carolina bays can vary and often include evergreen shrub bogs/pocosins, deciduous shrub swamps, and bay forests. Some of the bays within the study area have been impacted by utility crossings and many have been drained and converted to pine plantations or agricultural fields. The site of the proposed Inland Port for example, located northwest of Marion, would be constructed in Ellerbe Bay, which has been severely altered and much of it is now planted in pine. According to the NWI maps, remnant wetlands remain in the vicinity and a review of aerial photography indicates that riparian wetland systems are present within the proposed boundaries of the Port. It is anticipated that altered bays, such as Ellerbe Bay, will continue to be used for agricultural, silvicultural, and development purposes. Some have been used as mitigation sites and the potential for future use of others as mitigation exists. However, future development in intact Carolina bays is not likely due to the heightened regulatory awareness of the often unique habitat bays provide.

Riparian wetlands are numerous throughout the project study area and efforts were made in the development of the alternatives to minimize impacts to these systems by crossing on structure where practicable. These wetland systems include a variety of wetland types such as hardwood swamps, bottomland hardwoods aquatic beds, flooded swamps/beaver ponds, and deciduous shrub swamps. Evergreen shrub bogs/pocosin wetlands are often found at the headwaters of these riparian systems. Lakes that have been constructed within these systems, while not natural occurrences, do provide foraging habitat for ospreys and wading birds. Although they have been relatively un-impacted, a review of aerial photography reveals that riparian wetlands within the study area have been previously impacted by road crossings, utility crossings, stream channelization,

Table C.29
Potential Indirect Wetland Acres and Stream Impacts
Interstate73: I-95 to the Myrtle Beach Region

	Alternatives							
Wetland Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Aquatic Beds	1.3	1.2	1.2	1.5	1.2	1.2	1.2	1.3
Bay Forests	59.3	58.1	62.6	60.3	63.7	62.6	63.7	63.5
Bottomland Hardwoods	20.7	21.4	20.7	20.7	21.4	20.6	19.6	20.6
Deciduous Shrub Swamps	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Evergreen Shrub Bogs/Pocosins	24.0	21.6	21.6	23.4	21.6	21.6	21.6	23.3
Flooded Swamp /Beaver Ponds	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Freshwater Marsh	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Hardwood Swamp	89.1	91.7	88.0	88.2	92.2	93.4	91.8	91.9
Lakes	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Pine Savannahs & Wet Flatwoods	5.6	5.1	5.6	5.6	5.6	5.6	5.6	5.6
Ponds & Borrow Pits	58.5	61.6	57.9	57.7	61.0	59.3	59.8	58.9
Savannahs & Wet Meadows	12.5	12.2	11.3	11.0	12.4	11.1	12.3	12.2
Unvegetated Tidal Flats	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total Wetland Impact	**274.5**	**276.4**	**272.4**	**271.9**	**282.6**	**278.9**	**279.1**	**280.8**
Stream Type								
Intermittent	24	26	25	24	26	26	26	26
Perennial	15	16	16	14	17	16	15	16
Total Stream Crossings	**39**	**42**	**41**	**38**	**43**	**42**	**41**	**42**

Source: THE LPA GROUP INCORPORATED, 2006.

impoundments, and logging activities. The most severe impacts to the riparian wetlands have occurred near the headwaters of these systems where it appears that the land has been drained and cleared to the banks of channelized streams. Most of the development associated with these systems occurs along the edges and likelihood of filling them for construction purposes is not practicable, and would require permits and mitigation under the Section 404 permitting process. However, the construction of additional road crossings in the future for access to developable land is a possibility and impacts to the edges of the systems may occur.

Evergreen shrub bogs/pocosin wetlands (pocosins), characterized by the presence of evergreen shrub species in flat areas and depressions, are found throughout the study area. A GIS analysis of the NWI maps indicates that there is approximately 15,270 acres of pocosin in the study area. The I-73 project is anticipated to impact between 30 and 55 acres of pocosin wetlands depending on the alternative that is selected. Many of these wetlands are found near the headwaters of streams and in Carolina bays. As previously mentioned, the headwaters of streams and many Carolina bays within the study area have been drained and converted for other uses such as silviculture and agriculture. Generally these wetlands contain a deep mucky soil that is unsuitable for construction without extensive excavation and back-filling with suitable material to build upon; however the continued draining of pocosins for silviculture and agriculture purposes could occur.

Pine savannahs and wet flatwoods generally occur in flat, poorly drained areas and are found throughout the study area. When wild fires are not suppressed in these areas and where long leaf pines of sufficient maturity are present, they provide habitat for the federally protected red-cockaded woodpecker. GIS analysis of the NWI maps indicate that there is approximately 41,717 acres of pine savannah and wet flatwoods within the study area and the I-73 project would impact between 18 and 81 acres of this habitat. Previous impacts to this wetland type within the study area consist of draining and converting for silviculture and agriculture purposes, and housing developments. Often times irrigation and cattle watering ponds are 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 soil types that are present. Continued conversion of these wetlands to uplands could be expected.

Pine 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. When wild fires are not suppressed in these areas, the edges of these wetlands provide habitat for federally protected species such as American chaffseed and state species of concern such as Venus flytrap. GIS analysis of NWI maps indicates that approximately 5,109 acres of pine savannahs and wet meadows occur in the study area and they are scattered throughout. The I-73 project would impact between 0.3-acre and 7.1 acres of this wetland type. 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 for development purposes. Because of the relative ease with which these wetlands can be drained, conversion to uplands could continue to occur within the project study area.

The No-build Alternative would have substantial impacts to wetlands. The total wetland impacts anticipated to occur due to development by the year 2030 is approximately 222 acres. It is also anticipated that 33 stream crossings, 22 intermittent and 11 perennial, would occur. These impacts were estimated based on the results of the land use model predictions. The wetland impacts anticipated include approximately 1-acre of aquatic bed, 45 acres of bay forest, 17 acres of bottomland hardwoods, 2 acres of deciduous shrub swamps, 20 acres of evergreen shrub bog/pocosin, 1-acre of freshwater marsh, 75 acres of hardwood swamp, 1-acre of lakes, 4 acres of pine savannahs and wet flatwoods, 47 acres of ponds and borrow pits, 8 acres of savannahs and wet meadows, and 1-acre of unvegetated tidal flats.

Although cumulative impacts to wetlands and streams within the project study area could occur, the Section 404 permit and the Section 401 water quality certification process would afford protection of the wetland systems and regulation of wetland impacts identified within the project study area.

C.15.8 What was done to avoid and minimize wetland and stream impacts?

Due to the linear nature of the project and the large areas of wetlands located within the project study area, total avoidance of wetlands and streams was not possible. Many riparian wetland systems associated with streams extend across the study area, such as the Little Pee Dee River, Lake Swamp, and Buck Swamp. As described earlier, efforts were made to produce wetland maps with wetlands accurately depicted and to identify high value wetlands. Intact Carolina bays were identified from aerial photography and were designated as constraints on the GIS data layer which insured that they would be avoided. Values were assigned to the wetland types within the study area and the wetland data layer was given an overall weighted value of 40 percent, which forced the CAT to avoid wetlands where possible and when avoidance was not possible, it crossed the lower valued wetland systems.

After the CAT developed the initial routes that were suitable for construction (based on potential impacts), the routes 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. Centerlines were established and wetland impacts were calculated within 400-foot wide corridors that represented approximated construction limits. Requests for corridor modifications from the ACT were investigated that would further avoid wetlands impacts. These corridors and segments of corridors were presented at the ACT meetings for discussion. Votes were conducted and segments with high impacts, primarily higher wetland impacts, were removed from further consideration or refined corridor alternatives that resulted in a reduction of impacts were discussed and substituted for higher impact corridors.

Five corridor segment shifts were made to portions of Alternative 1 during the process that resulted in a reduction of approximately 132 acres of wetland impacts. Impacts on Alternative 2 were reduced by approximately 80 acres with three alignment shifts. Six shifts were made to segments along Alternatives 3 and 5 that resulted in an approximate 144 acres of impact reduction for each. The shift of 4 segments along Alternative 4 resulted in a 24-acre reduction. Three segment shifts along Alternative 6 resulted in an approximately 80-acre impact reduction. Alternative 7 wetland impacts were reduced by 60 acres after four segments were shifted. And two segment shifts reduced Alternative 8 impacts by approximately 44 acres.

In a couple of instances, shifts were made to avoid community impacts that resulted in slightly higher impacts such as an increase of 24 acres of wetland impacts to a segment located west of Mullins that ultimately affected the total wetland impacts for Alternatives 1, 2, 3, 5, 6, and 8. In order to avoid potential impacts to Carolina bays located near U.S. Route 501 at Back Swamp and Little Pee Dee River crossing, the alignment was shifted onto the existing U.S. Route 501. This increased wetland impacts by approximately 19 acres. This modification affected Alternatives 1, 2, 4, 5, 7, and 8. Although the shift increased the impacts, in addition to avoiding the Carolina bays, it lessened the potential for habitat fragmentation at Back Swamp and a portion of the Little Pee Dee River swamp by placing I-73 in the median of U.S. Route 501.

Once the wetland delineation has been completed, where possible, and where consistent with engineering standards and FHWA and SCDOT requirements, consideration will be given to design modifications to further reduce potential 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 reduces the impact footprint through wetlands and other sensitive areas and thus reduces the impacts. It is anticipated that the hydrologic studies would indicate the size for bridges through some of the higher quality wetland systems such as those associated with the Little Pee Dee River, which would minimize wetland impacts. Properly sized pipes and culverts, as determined by the hydrologic 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 causeway through wetlands to maintain sheet flow through riparian wetlands during high water events.

Wetland impacts would be minimized where wetlands would be crossed by bridges. 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 allowed to re-vegetate naturally. The hydrologic functions of the wetland would not be diminished. Each wetland crossing would be evaluated on an individual basis to determine the most practical method for constructing bridges, depending on the type and amount of wetlands to be impacted and the length, type, and geometry of the structure to be built.

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.

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 wetland. Upon completion of the bridge, the haul road(s) would be removed and the natural grade of the wetland restored and allowed to re-vegetate naturally. 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 appropriate. Other best management practices would be required of the contractor to ensure compliance with the policies of *23 CFR 650B*.

C.15.9 How will the wetland and stream impacts be compensated?

Upon completion of the roadway design for the Preferred Alternative, the total wetland and stream impacts within the construction limits would be calculated. The USACE has established guidance for calculating the number of impact credits 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). 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 mitigation 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.

C.15.9.1 Conceptual Mitigation Plan

Wetland mitigation was discussed at several ACT meetings and the importance of in-kind mitigation and mitigation within the same watershed was emphasized. There has been discussion of not using the SOP for calculating required mitigation credits due to the magnitude of the impacts associated with the project.

However, the USACE offered to provide assistance with working through the mitigation worksheets. Additional discussions revolved around the use of riparian systems as well as landscape scale mitigation with linked upland/riparian systems and possibly isolated wetland systems, such as Carolina bays. The use of commercial wetland mitigation banks was brought up during the discussions and it was suggested that they be used only as a last resort.

Based on a review of aerial photography, USGS topographic maps, and limited field visits, 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 consist of remnants of larger wetlands that have been drained or partially drained for agricultural or timber production purposes. Because 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 considered ideal wetland mitigation sites. However, large wetland areas and associated with the high quality riparian wetland systems would be considered as suitable for mitigation purposes.

There are several Carolina bays within the study area 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 450 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 500 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.

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 adjacent to Heritage Trust Preserves along the Little Pee Dee River, ranging from small 200-acre out-parcels located within the existing preserves to over 1,000-acre parcels could be purchased and incorporated into the existing Heritage Preserves. Enhancement for these sites could be in the form of including upland buffers and the removal of roads that are evident on the aerial photographs, from the wetlands.

Many of the streams within the study area have been channelized and have no vegetated buffers. These stream reaches are generally associated with agricultural operations. Additional, 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 and replanting native vegetation along a stream buffer. These vegetated areas provide movement corridors for wildlife. They also provide water quality enhancement by filtering pollutants from surface water runoff before in enters the receiving stream as well as providing shade which keeps the water cool, thereby promoting the health of aquatic animal species. Spoil piles can be removed from stream

banks and in-stream structures could be installed within the channels to allow streams to overflow into the adjacent riparian wetlands during rain events. 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 would be to provide monetary support to property acquisitions and habitat restoration for specific properties being sought or already acquired by SCDNR, such as the Woodberry Tract, located along the Little Pee Dee River in Marion County. Members of the ACT indicated that sites such as this as mitigation that provides important habitat for wildlife and has an opportunity for wetland restoration, has good potential for acceptance by the agencies.

Once the impacts to streams and wetlands have been determined for the Preferred Alternative, coordination with the ACT concerning mitigation will continue and a suitable site(s) 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.

C.16 GROUNDWATER

C.16.1 How would groundwater resources be impacted by the proposed project?

It is not likely that this project would impact groundwater. The Middendorf Aquifer and Black Creek Aquifer are deep below the surface of the ground, and would not be impacted by construction or reached by pollutants filtering through sediment and rock to reach the aquifers. The Black Creek Aquifer does have recharge/discharge areas throughout the Little Pee Dee River and its associated swamp systems. However, this project would not be constructed in wetlands (which are in essence recharge/discharge areas), so mixing of pollutant runoff into the aquifers at these sites is not likely to occur.

Impacts could occur to the Surficial Aquifer due to its proximity to the surface. During construction, the Surficial Aquifer could be exposed, leading to sediment entering the aquifer. Soluble materials such as petroleum products could be leaked or spilled during construction and enter these exposed areas and may cause contamination. However, best management practices would be in place, so if during construction, groundwater was encountered, a spill prevention control and countermeasures plan would be in place to manage spills and leaks of soluble materials.

While the majority of drinking water in the project study area is supplied through surface waters, induced growth and development in the project study area could increase the amount of groundwater needed for drinking water. Any additional groundwater wells would need to be permitted prior to drilling, and due to the abundant supply of water in the Black Creek Aquifer, it is unlikely that there would be a major drawdown of groundwater resources in the project study area. Three watershed units (03040206-120, -130, -140) are within the Waccamaw Capacity Use Area and are predicted to have development under the No-build Alternative. Any additional groundwater wells would need to be permitted, and be in accordance with the guidelines of the Use Area.

C.17 SURFACE WATERS

C.17.1 How would watersheds in the project study area be impacted by the proposed project?

Water quality impacts could result due to pollutant buildup in new areas of the project study area from the increase in traffic volumes. Inorganic materials, volatile compounds (from petroleum products), dust from vehicle brakes and exhaust, and heavy metals can build-up on roadways and runoff into streams and wetlands due to rain.

In addition, water quality impacts could occur during normal operation and maintenance of the roadway from spraying of herbicides or use of paint and other materials. Best management practices would be used for maintenance of the road and the use of herbicides in the right-of-way. The implementation of best management practices would ensure that these maintenance activities would not have an impact to water quality in the project study area.

C.17.2 How much pollutant would run off into streams in the project study area as a result of the alternatives?

An analysis was done using the FHWA's "Constituents of Highway Runoff" to estimate the amount of pollutant that would enter streams after a twenty-day buildup period, assuming there were no structures such as retention basins or ditches to filter sediment.[12] The volume of traffic and the estimated length for each alternative within a watershed unit was used to calculate the pollutant load for one point per watershed unit. Standard equations were used to calculate the constituents in the pollutant load, which were developed based on studies completed on a rural interstate highway in Pennsylvania. In general, more pollutant would drain into streams that are in urbanized areas rather than those located in rural areas. This is due to the amount of vegetation along the sides of roadways that would filter pollutant prior to it draining into a stream. The results of this model and the constituent listing[13] are shown in Table C.30. While this is a general model for constituent loading into streams without filtering or retention structures, a more detailed analysis of pollutant runoff will be done for the Preferred Alternative.

Based on the calculated estimates from the model, Alternative 1 would have the lowest amount of pollutants discharged after a twenty-day build up period, while Alternative 7 would have the highest. Alternatives 2, 3, and 6 would have the same estimated amount, while Alternatives 4 and 5 would be estimated to have approximately the same amount of total solids. In terms of constituents, no alternatives would result in detectable levels of copper, cadmium, chromium, or mercury being deposited into streams. As for nutrient build up, Total Nitrogen and Total Kjeldahl Nitrogen would be similar among all alternatives, while Alternatives 3, 4, 6, and 7 would result in more total phosphorus running off into streams. Lead and Zinc runoff from the roadway would be similar among all alternatives, while Alternatives 1 and 8 would have the least amount of Iron running off into streams. The Chemical Oxygen Demand in streams as a result of pollutant runoff would be the least for

[12] FHWA, 1981. FHWA/RD-81/042: "Constituents of Highway Runoff". Washington, D.C., 1981

[13] Using the model's equations, the sum of the constituents does not equal the amount of total solids for each alternative.

Table C.30
Pollutant Discharge by Pounds in Year 2030
Interstate 73 EIS: I-95 to the Myrtle Beach Region

	No-build	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
Total Solids	**3047**	**3060**	**3207**	**3231**	**3553**	**3089**	**3222**	**3382**	**3361**
Suspended Solids	435	437	475	664	670	461	646	611	531
Total Organic Carbon	115	118	125	159	166	122	156	153	137
Chemical Oxygen Demand	277	277	291	289	318	280	288	303	303
Total Nitrogen	7	7	7	7	7	7	7	7	7
Total Kjeldahl Nitrogen	19	19	20	17	18	19	17	18	20
Total Phosphorus	3	2	2	4	4	2	4	4	3
Lead	1	1	1	1	1	1	1	1	1
Zinc	1	0	1	1	1	1	1	1	1
Iron	19	19	20	29	29	20	28	26	23
Chloride*	458	457	480	467	513	464	466	493	498
Other Heavy Metals†	-	-	-	-	-	-	-	-	-

†No detectable levels of Copper, Cadmium, Chromium, and Mercury were found to accumulate over a 20-day period based on the model.
* The equation is based on an interstate in a northern area where salts and deicers are used for roadways, unlike the proposed project which more than likely will never have any road salt or deicing materials spread on it. It is likely this number is greater than the actual amount of chloride due to the basis of the model.

Alternative 1, while Alternative 7 would result in the highest levels of Chemical Oxygen Demand. The Total Organic Carbon in the streams from pollutant runoff would be the least in Alternative 1, while Alternative 3 would result in the largest amount into streams.

All ditches and canals that were jurisdictionally linked to waters of the United States were included in this analysis and counted as crossings. Ditches and canals will be verified for linkage to jurisdictional waters during the wetland delineation of the Preferred Alternative. Most all direct stream crossings are of streams, with very few being crossings of ditches.

C.17.3 How would the alternatives impact water quality?

C.17.3.1 No-Build Alternative

The No-build Alternative would result in no additional pollutants entering in at listed stream crossings of this project. However, traffic volumes would be expected to increase on other roadways in the project study area over time, and pollutant loading would occur into different portions of the watershed units, depending on the locations of stream crossings (refer to Figure C-36, page C-99). The pollutant runoff model was used to estimate the pollutant load that would enter stream crossing on U.S. Route 501 in 2030 without the project. (This is assuming that the pollutants are not being filtered through grass, sediment

basins, or other stormwater treatment structures). The model estimated that the amount of pollutants washing off of U.S. Route 501 into streams was roughly equal to the amounts of Alternatives 1 and 5. The watershed units in the project study area are natural blackwater systems, with low dissolved oxygen levels and pH, most of which have impaired water quality monitoring stations except the station located at the Lake Swamp watershed unit. These systems would continue to have low dissolved oxygen levels and pH due to their natural conditions, irregardless of pollutant runoff into the streams.

Cumulatively, the No-build Alternative would result in additional stream impacts throughout the aforementioned watershed units except the Lake Swamp watershed unit (03040204-080), along with the following additional watershed units listed below (refer to Figure C-36). The stream impacts for the No-build Alternative were based on projected land use growth and the establishment of the inland port in Marion County.

Pee Dee River Watershed Unit 03040201-120 - The No-build Alternative would have 33 *Freshwater* stream impacts in this watershed unit, mainly due to the inland port.

Catfish Creek Watershed Unit 03040201-150 - With the addition of growth projected in the No-build Alternative, nine *Freshwater* streams would be impacted due to development.

Pee Dee River Watershed Unit 03040201-170 - The Waccamaw National Wildlife Refuge is located in a portion of this watershed unit, and would be federally protected from development. The No-build Alternative would result in additional development which would impact two *Freshwater* streams in this watershed unit.

Bull Creek is within this watershed and a major source of drinking water, provided by the Grand Strand Water and Sewer Authority. It is used as drinking water for the City of Conway, the Town of Little River, and additional rural and contracted users.[14] As development increases throughout the eastern portion of the project study area, greater demand for water service would be anticipated.

Little Pee Dee River Watershed Unit 03040204-030 - The No-build Alternative would impact three additional *Freshwater* streams in the watershed unit.

Buck Swamp Watershed Unit 03040204-050 - The No-build Alternative would result in one stream crossing in the watershed unit, which is classified as a *Freshwater* stream.

Little Pee Dee River Watershed Unit 03040204-070 - The No-build Alternative would result in additional impacts to 12 *Freshwater* streams, four *Freshwater* streams with specific standards, and one stream classified as an outstanding resource water in the watershed unit.

Brunson Swamp Watershed Unit 03040204-090 - The No-build Alternative would impact an additional six *Freshwater* streams and 12 *Freshwater* streams with specific standards.

[14] Grand Strand Water and Sewer Authority. Water page, .http://www.gswsa.com/ext/index.asp?main=water Last accessed May 9, 2006.

Dillon
Little Pee Dee River (03040204-030)
Little Pee Dee River (03040204-060)
Nichols
Buck Swamp (03040204-050)
Latta
Mullins
Lake Swamp (03040204-080)
Kingston Lake (03040206-130)
Catfish Creek (03040201-150)
Marion
Great Pee Dee River (03040201-120)
Little Pee Dee River (03040204-070)
Aynor
Brunson Swamp (03040204-090)
Little Pee Dee River (03040204-070)

95 9 41 57 76 917 701 410 38 501 301 319

Legend

- City

SCDHEC Water Quality Stations

- Impaired
- Not Impaired
- NPDES Permitted Site
- Interstate
- Highway

SCDHEC Water Quality Classifications

- Freshwater
- Freshwater - Specific Standard
- Outstanding Resource Waters

- County Boundary
- Watershed Units Not Directly Impacted
- Alternative Construction Limit
- Study Area Boundary

0 2.5 5 7.5 Miles

N E W S

FIGURE C-36

POTENTIALLY IMPACTED WATERSHED UNITS

Waccamaw River Watershed Unit 03040206-120 - Three water quality monitoring stations in this unit (CSTL-553, CSTL-554, and CSTL-555) are listed as impaired on the 2004 303(d) List due to a fish consumption advisory for high mercury levels. One NPDES permitted facility, one landfill, and four mines are located in this watershed. The No-build Alternative would be projected to impact 33 *Freshwater* streams (or ditches).

Kingston Lake Watershed Unit 03040206-130 - The No-build Alternative is predicted to have an additional 42 streams impacted by future growth and development.

Waccamaw River Watershed Unit 03040206-140 - There are six impaired monitoring stations that are listed on the 2004 303(d) list, five of which (Stations CSTL-556, CSTL-558, MD-136, MD-144, and MD-145) are listed due to high levels of mercury resulting in a fish consumption advisory, and the other station (PD-638) which is listed as impaired for aquatic life due to its macroinvertebrate community. TMDL programs are in place for the Atlantic Intracoastal Waterway, and for the area around station MD-136 on the Waccamaw River. There are nine NPDES permitted facilities, two landfills, and eleven mines in this watershed unit. The Waccamaw National Wildlife Refuge is located in a portion of this watershed unit, and would be federally protected from development. The No-build Alternative predicts that development would impact two *Freshwater* streams.

C.17.3.2 Alternative 1

Alternative 1 would cross 60 streams in five watershed units, including Catfish Creek (-150), Buck Swamp (-050), Little Pee Dee River (-070), Lake Swamp (-080), and Brunson Swamp (-090) (refer to Figure C-35, page C-97). The Buck Swamp watershed unit would have the most crossings at 27, while the Alternative would not impact the Little Pee Dee River (-030) or Kingston Lake (-130) watershed units. (refer to Table C.31, page C-101). Ten outstanding resource waters and 14 *Freshwater*s with specific standards would be crossed.

Alternative 1 would cross impaired sites for aquatic life twice, at Station PD-042 and Station PD-349, and it would cross an impaired site for recreational use once (refer to Table C.32, page C-102). The contributing factor at station PD-352 for impaired recreational use is high fecal coliform levels. The roadway is not expected to contribute to direct increases in fecal coliform levels in streams, based on the pollutant runoff model. Alternative 1 would cross 0.52 miles upstream of station PD-042, which is impaired for aquatic life due to high copper levels in the stream. According to the pollutant runoff model, no detectable amounts of copper would be entering into streams as a result of runoff from the roadway. Therefore, the roadway is not expected to contribute to direct increases in copper levels, nor should it contribute to further impairment in the streams. Alternative 1 would also cross within a five-mile distance of PD-349, which is impaired for aquatic life use 4.6 miles upstream of the station. Pollutants could flow into stream in this area, increasing the nutrient and organic carbon levels, and further reducing the levels of dissolved oxygen.

In terms of indirect impacts, Alternative 1 would be expected to have two impacts to outstanding resource waters, five impacts to *Freshwater* streams with specific standards, and 24 impacts to *Freshwater* streams

Table C.31
Stream Crossings by Alternative
Interstate 73 EIS: I-95 to the Myrtle Beach Region

			Number of Stream Crossings							
			Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
Water Quality Classification	Freshwater		36	38	49	22	38	46	24	36
	Freshwater with Specific Standards		14	15	5	14	8	15	8	21
	Outstanding Resource Waters		10	10	4	9	10	4	9	10
Watershed	Great Pee Dee River 03040201	Catfish Creek 150	9	0	9	17	9	0	17	0
	Little Pee Dee River 03040204	Little Pee Dee River 030	0	8	0	0	0	8	0	8
		Buck Swamp 050	27	35	27	5	27	35	5	35
		Little Pee Dee River 070	10	10	2	9	10	2	9	10
		Lake Swamp 080	1	7	17	1	7	17	7	1
		Brunson Swamp 090	13	2	2	13	2	2	2	13
	Waccamaw River / AIWW 03040206	Kingston Lake 130	0	1	1	0	1	1	1	0
		Total	60	63	58	45	56	65	41	67

Table C.32
Impaired Stream Crossings* by Alternative
Interstate 73 EIS: I-95 to the Myrtle Beach Region

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
PD-187 Aquatic Life Impairment/ DO				X			X	
PD-187 Recreational Use Impairment/ FC				X			X	
PD-320 Aquatic Life Impairment/ DO				X			X	
PD-320 Recreational Use Impairment/ FC				X			X	
PD-030 Aquatic Life Impairment/ DO		X				X		X
PD-030 Recreational Use Impairment/ FC		X				X		X
PD-030A Fish Consumption Advisory/ Hg		X				X		X
PD-030A Recreational Use Impairment/ FC		X				X		X
PD-037 Aquatic Life Impairment/ DO			X			X		
PD-037 Recreational Use Impairment/ FC			X			X		
PD-042 Aquatic Life Impairment/ Cu	X	X		X	X		X	X
PD-352 Recreational Use Impairment/ FC	X			X				X
PD-349 Aquatic Life Impairment/ DO	X	X	X		X	X		X

DO – Dissolved Oxygen
FC – Fecal Coliform
Hg – Mercury
Cu – Copper

* Crossing is within 5 miles of impaired site; List is based on 2004 303(d) List of impaired stations.

due to induced development (refer to Table C.33, page C-103). These impacts would be spread among five different watershed units, and be in addition to the stream impacts from the No-build Alternative.

C.17.3.3 Alternative 2

Alternative 2 would cross 63 streams in six different watershed units, including Little Pee Dee River (-030), Buck Swamp (-050), Little Pee Dee River (-070), Lake Swamp (-080), Brunson Swamp (-090), and Kingston Lake (-130) (refer to Figure C-36, page C-99). The most stream crossings would be in the Buck Swamp watershed unit at 35 (refer to Table C.31). This alternative would not cross the Catfish Creek watershed unit. There would be 10 stream crossings of outstanding resource waters and 15 crossings of *Freshwater*s with specific standards.

Table C.33
Streams Impacted by Predicted Development in the Project Study Area
Interstate 73 EIS: I-95 to the Myrtle Beach Region

		No-Build	Alt. 1	Alt.2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
Great Pee Dee River 03040201	Pee Dee River 120	33FW								
	Catfish Creek 150	9FW	9FW	6FW	8FW	10FW	9FW	4FW	10FW	6FW
	Pee Dee River 170	2FW								
Little Pee Dee River 03040204	Little Pee Dee River 030	3FW	7FW	8FW	3FW	7FW	4FW	5FW	3FW	6FW
	Buck Swamp 050	1FW	8FW	12FW	5FW	5FW	9FW	9FW	2FW	11FW
	Little Pee Dee River 070	12FW 4FW* 1ORW	2ORW	1ORW		1ORW				1ORW
	Brunson Swamp 090	6FW 12FW*	5FW*	5FW*	5FW*	5FW*	5FW*	5FW*	5FW*	5FW*
Waccamaw River/ AIWW 03040206	Waccamaw River 120	33FW								
	Kingston Lake 130	42FW		4FW	3FW		4FW	4FW	4FW	4FW
	Waccamaw River 140	2FW								

FW – *Freshwater*
FW*- *Freshwater* with specific standards set by SCDHEC
ORW- Outstanding Resource Waters

Alternative 2 would cross four impaired sites, two of which (PD-030 and PD-030A) are impaired for recreational use due to high fecal coliform levels (refer to Table C.32, page C-102). Based on the pollutant runoff model, direct increases to fecal coliform levels would not be as a result of runoff from the roadway. Therefore, Alternative 2 is not likely to contribute to further impairment of Stations PD-030 and PD-030A for fecal coliform levels. Alternative 2 would also cross within five miles of Stations PD-030 and PD-349, which are impaired for aquatic life use due to low dissolved oxygen levels. The water quality at PD-030 may be further degraded as a result of the project given that any project-related pollutants would be entering the streams 1.24 miles upstream. Station PD-349 is located 4.6 miles downstream of the stream crossing; however, as stated in the prior paragraph, and nutrients and organic runoff from the project could further impact the water quality at this station. In addition, Alternative 2 would cross near Station PD-042, which is impaired for aquatic life due to high levels of copper, and Station PD-030A, which is under a fish consumption advisory due to high levels of mercury. Based on the pollutant runoff model, neither copper nor mercury was being discharged at detectable levels. Alternative 2 should not contribute to increased levels of these metals, or cause further impairments at the stations.

Alternative 2 would have indirect impacts to streams in six different watershed units (refer to Table C.33) due to projected induced development based on the land use model. Stream impacts would be to one outstanding resource water, five *Freshwater*s with specific standards, and 30 *Freshwater* streams.

C.17.3.4 Alternative 3

Alternative 3 would cross 58 streams in six different watershed units, including Catfish Creek (-150), Buck Swamp (-050), Little Pee Dee River (-070), Lake Swamp (-080), Brunson Swamp (-090), and Kingston Lake (-130). The most crossings would occur in the Buck Swamp watershed unit, while the second highest number of crossings would occur in the Lake Swamp watershed unit (refer to Table C.31, page C-101). The Little Pee Dee River watershed unit (-030) would not be crossed by this alternative. The alternative would result in the lowest number of crossings of outstanding resource waters (four) and only five crossings of *Freshwater*s with specific standards.

Alternative 3 would cross within a five-mile distance of two impaired sites (refer to Table C.32, page C-102). While Station PD-037 is impaired for both aquatic life and recreational uses, the station is upstream of where Alternative 3 crosses, and is not likely to further contribute to the impairment at the monitoring station. Alternative 3 would also cross within 4.6 miles upstream of Station PD-349, which is impaired for aquatic life use due to low dissolved oxygen. Based on the pollutant runoff model, it is likely that nutrients could runoff into the crossing which may contribute to lower dissolved oxygen levels in the naturally blackwater stream.

Due to predicted induced development based on the land use model, Alternative 3 would indirectly impact streams in five different watershed units (refer to Table C.33). It is expected that five *Freshwater*s with specific standards and 19 *Freshwater*s would be impacted, in addition to the stream impacts from the No-build Alternative.

C.17.3.5 Alternative 4

Alternative 4 would cross 45 streams in five different watershed units, including Catfish Creek (-150), Buck Swamp (-050), Little Pee Dee River (-070), Lake Swamp (-080), and Brunson Swamp (-090) (refer to (refer to Figure C-36, page C-99, and Table C.31, page C-101). This alternative would not cross Little Pee Dee River (-030) or the Kingston Lake (-130) watershed units. The most crossings of an individual watershed unit would occur in the Catfish Creek watershed unit, with 17. Alternative 4 would cross nine outstanding resource waters and14 *Freshwater*s with specific standards.

Alternative 4 would cross within a five-mile distance of four impaired sites (refer to Table C.32, page C-102). Stations PD-187, PD-320, and PD-352 are impaired for recreational use due to high fecal coliform levels. Based on the pollutant runoff model, it is not likely that direct increases to fecal coliform levels would be caused by the roadway. Alternative 4 would cross within a mile upstream of Station PD-042, which is impaired for aquatic life use due to high levels of copper. Detectable levels of copper are not likely to be from the runoff from the roadway, based on the pollutant runoff model. Therefore, it is not likely that runoff would contribute to or further impair this station due to high copper levels. Alternative 4 would also cross within 2.5 to 4 miles of Stations PD-187 and PD-320, both of which are impaired for aquatic life due to low dissolved oxygen levels. Runoff of nutrients is possible from the crossing, and may cause further impairment to water quality at these stations.

Alternative 4 would indirectly impact streams in five watershed units due to induced growth (refer to Table C.33, page C-103). One impact to an outstanding resource water, five impacts to *Freshwater*s with specific standards, and 22 impacts to *Freshwater* would be expected based on the land use model, in addition to the stream impacts from the No-build Alternative.

C.17.3.6 Alternative 5

Alternative 5 would cross 56 streams over six watershed units, including Catfish Creek (-150), Buck Swamp (-050), Little Pee Dee River (-070), Lake Swamp (-080), Brunson Swamp (-090), and Kingston Lake (-130) (refer to Figure C-36, page C-99). The Buck Swamp watershed unit would have the most crossings at 27 (refer to Table C.31, page C-101). This alternative would not cross the Little Pee Dee River (-030) watershed unit. In addition, the alternative would cross 10 outstanding resource waters and eight *Freshwater*s with specific standards.

Alternative 5 would cross within a five-mile distance of two impaired stations, both of which are impaired for aquatic life (refer to Table C.32, page C-102). Alternative 5 would cross within a mile downstream of Station PD-042, which is impaired due to its high levels of copper. Based on the pollutant runoff model, copper was not present in detectable levels to runoff into streams. Therefore, this crossing is not likely to further contribute to the high levels of copper at this monitoring station. Station PD-349, which is impaired due to low dissolved oxygen levels, would be located 4.6 miles downstream of the nearest crossing. Based on the pollutant runoff model, nutrients could wash into streams which may contribute to lowering dissolved oxygen levels further.

Indirect impacts would occur due to induced growth from Alternative 5 in five different watershed units (refer to Table C.33, page C-103). Based on land use model projections, five *Freshwater* streams with specific standards and 26 *Freshwater* streams would be impacted due to induced development, in addition to the No-build Alternative.

C.17.3.7 Alternative 6

Alternative 6 would cross 65 streams over six different watershed units including Little Pee Dee River (-030), Buck Swamp (-050), Little Pee Dee River (-070), Lake Swamp (-080), Brunson Swamp (-090), and Kingston Lake (-130) (refer to Figure C-36, page C-99). This alternative does not cross Catfish Creek (-150) watershed unit (refer to Table C.31, page C-101). The Buck Swamp watershed unit would have the most crossings at 36. This alternative would cross four outstanding resource waters and 15 *Freshwater*s with specific standards.

Alternative 6 would cross within a five-mile distance of four impaired stations (refer to Table C.32, page C-102). Stations PD-030, PD-030A, and PD-037 are all impaired for recreational use due to high fecal coliform levels. Alternative 6 should not result in a direct increase of fecal coliform levels, based on the pollutant runoff model. Station PD-037 is impaired for aquatic life use due to low dissolved oxygen levels. However, Station PD-037 is located upstream of where the alternative is crossing; therefore, due to the stream direction flow, the roadway is not likely to further decrease the dissolved oxygen levels at this station. Alternative 6 would also cross 4.6 miles upstream of Station PD-349, and 1.24 miles upstream of Station PD-030, both of which are impaired for aquatic life due to low dissolved oxygen levels. The pollutant runoff model estimates that constituents such as nutrients would runoff into the stream, which could further lower the dissolved oxygen levels of the stream at the impaired stations. Alternative 6 would also cross over a mile away from Station PD-030A, which has a fish consumption advisory due to high levels of mercury. The pollutant runoff model estimated that no detectable amounts of mercury would result as runoff from the roadway. Therefore, the crossing is not likely to further contribute to the high mercury levels at this station.

Alternative 6 would indirectly impact streams in five different watershed units due to induced growth (refer to Table C.33, page C-103). Five *Freshwater* streams with specific standards and 22 *Freshwater* streams are anticipated to be impacted based on projections from the land use model.

C.17.3.8 Alternative 7

Alternative 7 would cross a total of 41 streams over five watershed units, including Catfish Creek (-150), Buck Swamp (-050), Little Pee Dee River (-070), Lake Swamp (-080), Brunson Swamp (-090) with the most crossings occurring in the Catfish Creek watershed unit (refer to (refer to Figure C-36, page C-99, and Table C.32, page C-101). Eight *Freshwater*s with specific standards and nine outstanding resource waters, would be crossed by this alternative.

Alternative 7 would cross within a five-mile distance of two impaired sites (PD-187 and PD-320), both of which are located on Smith Swamp (refer to Table C.32, page C-102). The sites are impaired for recreational use due to high fecal coliform levels and are impaired for aquatic life use due to low dissolved oxygen levels. Based on the pollutant runoff model, the crossing, while upstream, is not likely to directly increase the amount of fecal coliform at these stations. The pollutant runoff model does estimate a certain amount of nutrients loading into the stream crossing, which may lower dissolved oxygen levels even further in this naturally blackwater system. However, due to the distance of these stations from the crossing being between 2.5 and 4 miles, dilution of these nutrients is likely over the distance and should not further contribute to the low dissolved oxygen levels at these sites.

Alternative 7 would indirectly impact five different watershed units due to induced growth, based on projections from the land use model (refer to Table C.33, page C-103). Indirect impacts are expected to occur to five *Freshwater* streams with specific standards and 19 *Freshwater* streams, in addition to the impacts projected to occur under the No-build Alternative.

C.17.3.9 Alternative 8

Alternative 8 would cross 67 streams over five watershed units, and have the highest number of stream crossings (refer to Table C.31, page C-101). Most crossings would occur in the Buck Swamp watershed unit (36 crossings). In addition, this alternative would cross 21 *Freshwater*s with specific standards, and 10 outstanding resource waters.

Alternative 8 would cross within a five-mile distance of five impaired sites (refer to Table C.32, page C-102). Three sites, Stations PD-030, PD-030A, and PD-352, are all impaired for recreational use due to high fecal coliform levels. Based on the pollutant runoff model, fecal coliform levels are not likely to directly increase as a result of the roadway. Stations PD-030 and PD-349 are impaired for aquatic life use due to low dissolved oxygen levels. While the pollutant runoff does contain some nutrients, it is not anticipated that water quality at PD-030 would be further degraded as a result of the project given that any project related pollutants would be entering the streams 1.24 miles upstream and either utilized by aquatic organisms or diluted before passing through the station. Station PD-349 is located 4.6 miles downstream of the stream crossing; however, as stated in the prior paragraph, due to the distance of the crossing from the impaired station, any pollutant entering the stream would likely be used by aquatic organisms or become diluted prior to reaching the monitoring station, and would have minimal impact to the natural blackwater system. Alternative 8 would also cross within a five-mile distance of Stations PD-042, which is impaired for aquatic life due to high copper concentrations, and PD-030A, which has a fish consumption advisory due to high mercury levels. Based on the pollutant runoff model, copper and mercury were not found to occur in the runoff from roadways; therefore, it is not likely that the roadway would further contribute to the impairments of high levels of copper and mercury at these stations.

Indirect impacts would occur to six different watershed units as a result of induced growth from Alternative 8 (refer to Table C.33, page C-103). Stream impacts are anticipated to occur to one outstanding resource water, five *Freshwater* streams with specific standards, and 27 *Freshwater* streams due to development projected by the land use model.

The number of ditches and streams were counted per alternative, since most of the projected growth is due to occur in upland areas that are drained by ditches. All alternatives had at least twice the number of ditches being crossed when compared to streams.

C.17.4 What best management practices and measures would be used to minimize the amount of runoff pollution into streams?

This project would be located in mainly rural areas, so the roadway design would consist of grassy swales and vegetated slopes on the sides of the pavement which would filter pollutants from the runoff. The runoff would be collected in grassy ditches, and as it moves through the ditches it would continue to be filtered prior to entering streams. Retention ponds would be in place in some areas to allow pollutants to settle prior to entering streams. These best management practices, along with those found in the SCDOT and FHWA guidelines,[15] would be used during design and construction to minimize the amount of runoff pollution from streams.

This project was designed to minimize impacts to wetlands in the project study area. Wetlands provide a natural function of filtering pollutants from waters before they enter stream systems. By preserving wetlands, additional areas of filtration would be in place for highway runoff prior to it entering streams.

The feasibility of using a closed drainage system where runoff would be piped from bridges was analyzed for the project. The four largest bridges among the alternatives (Lake Swamp crossing, Buck Swamp crossing, and both Little Pee Dee River crossings) were used for analysis. It was determined that the bridges are flat, without much arcing, and have low points within the structures. Since the drainage system would be closed, regular routine maintenance would be required to clean out the drainage system structures and ensure they are working properly. The amount of pollutant estimated from the pollutant runoff model was for the entire length of the project, approximately 44 to 48 miles depending on alternative. The pollutant load on bridges would be a small fraction of what was estimated for the entire length of the roadway. The pollutant washing off bridges would enter into streams untreated if closed drainage systems were not installed. Due to the cost and maintenance of the closed drainage systems, along with the complex design of the systems so that they would drain, it can be concluded that closed drainage systems would not be cost-effective.

C.18 Floodplains

C.18.1 What floodplains might be affected by the project?

Approximately 28 percent of the land area within the project study area is within a FEMA designated 100-year floodplain. Table C.34, (refer to page C-109), lists the rivers, streams, and wetland areas within Zone A in the vicinity of the proposed alternatives. Figure C-35 (refer to page C-84), illustrates the extent of floodplains within the project study area.

[15] South Carolina Highway Department Standard Specifications for Highway Construction.

Table C.34
National Flood Insurance Program Regulated Floodplains
Potentially Affected by I-73 Alternatives
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Waterway	County	HUC Code (Watershed/ Tributary of)
Old Mill Creek	Dillon	03040204-050 (Buck Swamp/ Little Pee Dee River)
Little Pee Dee River	Dillon, Marion	03040204-030 (Little Pee Dee River)
Reedy Creek	Marion	03040204-050 (Buck Swamp/ Little Pee Dee River)
Maidendown Swamp	Marion	03040204-050 (Buck Swamp/ Little Pee Dee River)
Little Reedy Creek	Marion	03040204-050 (Buck Swamp/ Little Pee Dee River)
Reedy Creek	Marion	03040204-050 (Buck Swamp/ Little Pee Dee River)
Little Horsepen Bay	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Little Horsepen Bay	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Smith Swamp	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Grassy Bay	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Stackhouse Creek	Marion	03040201-150 (Catfish Creek/ Pee Dee River)
Lake Swamp	Horry	03040204-080 (Lake Swamp/ Little Pee Dee River)
Joiner Swamp	Horry	03040204-080 (Lake Swamp/ Little Pee Dee River)
Mill Branch	Horry	03040204-080 (Lake Swamp/ Little Pee Dee River)
Chinners Swamp	Horry	03040204-090 (Brunson Swamp/ Little Pee Dee River)
Brunson Swamp	Horry	03040204-090 (Brunson Swamp/ Little Pee Dee River)
Spring Swamp	Horry	03040204-090 (Brunson Swamp/ Little Pee Dee River)
Dawsey Swamp	Horry	03040204-070 (Little Pee Dee River)
Tredwell Swamp	Horry	03040204-070 (Little Pee Dee River)

C.18.2 How do the alternatives affect floodplains?

Flood Insurance Rate Maps identifying the 100-year floodplain were used to determine impacts associated with the alternatives for the I-73 project. The No-build Alternative was also reviewed as part of the impact analysis. Proposed construction limits for each alternative was used to estimate the impacted area within the floodplain. Table C.35 lists the floodplain crossings for each alternative.

C.18.3 What direct impacts would there be to floodplains?

There are 26 different potential crossing points for the eight alternatives. The maximum number of crossings for an alternative was 16 for Alternative 4, while the minimum of crossings was 5 for Alternative 3. The area of floodplain impacts was totaled for each alternative, and it was found that Alternative 3 would have the least amount of floodplain impacts with 94 acres, while Alternative 7 would have the highest impacts with 323 acres. Impacts for each alternative are summarized in Table C.36, (refer to page C-111). The No-build Alternative would not have an effect on the floodplains in the project study area.

Table C.35
Floodplain Crossings Locations and Impact Areas
Interstate 73 EIS: I-95 to Myrtle Beach Region

Location	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8	Length of Impact (ft)	Acres of floodplain encroachment
Little Pee Dee (U.S. 501)	X	X		X	X		X	X	15,381	157.4
Little Pee Dee (S.C. 917)			X			X			12,100	83.5
Lake Swamp			X			X			1,357	3.1
Joiner Swamp			X			X			0	0
Chinners Swamp (Mill Branch)	X			X				X	0	0
Chinners Swamp	X			X				X	0	0
Brunson Swamp	X			X				X	0	0
Spring Swamp	X			X					0	0
Dawsey Swamp	X			X				X	464	3.2
Dawsey Swamp (Trib A)		X			X		X		500	2.8
Dawsey Swamp (Trib B)		X			X		X		870	6.1
Tredwell Swamp	X			X				X	363	3.3
Reedy Creek (near Fox Bay)	X	X			X			X	290	2.4
Maidendown Swamp	X	X	X		X	X		X	702	4.5
Reedy Creek Main Channel				X			X		623	5.2
Little Reedy Creek				X			X		558	3.6
Little Horsepen Bay				X			X		3,190	29.4
Smith Swamp				X			X		1,016	9.4
Grassy Bay				X			X		9,700	98.2
Stackhouse Creek 1				X			X		360	2.2
Stackhouse Creek 2				X			X		600	4.1
Stackhouse Creek 3				X			X		370	2.7
Little Reedy Creek	X		X	X	X		X		1,100	2.5
Buck Swamp		X				X		X	0	0.00
Old Mill Creek		X				X		X	530	6.6
Reedy Creek		X				X		X	3,400	13.3
Total Crossings	10	8	5	16	6	7	12	11		

Table C.36
Summary of Floodplain Impacts
Interstate 73: I-95 to the Myrtle Beach Region

Alternative #	Number of Crossings	Total Impacted Area (acres)
1	10	173
2	8	193
3	5	94
4	16	321
5	6	176
6	7	111
7	12	323
8	11	191

Engineering analysis of the floodplain impacts were conducted to further avoid and reduce impacts by bridging where possible. The use of bridges serves a dual function by reducing wetland disturbance, while minimizing the impact of construction within the floodplain. Bridge piers would, however, have to be placed in regulatory floodways and/or floodplains for the construction of these structures. Furthermore, where feasible the proposed crossings are located adjacent to existing road crossings where the additional impact would be minimized.

The preliminary level of design for the bridges and culverts did not include detailed hydrology studies at this stage of project development. Additionally, the mapped areas within the project study area are all shown as Zone A, which does not provide base flood elevations. However, floodplain encroachments are not likely to increase the flooding in the area since bridge structures would need to be designed to FEMA standards and result in less than a one-foot rise in the base flood elevation. Furthermore, structures would provide the minimum freeboard above the design flood elevation and would not be exceeded by the 100-year storm.

In order for a transportation project to comply with Executive Order 11988, a detailed hydrological study of the Preferred Alternative must be completed. Bridge and culvert designs must be conducted, as required by 23 CFR 650, Subpart A, *Location and Hydraulic Design of Encroachment on Floodplains*. This analysis would include establishing base flood elevations and adjusting bridge and culvert designs to minimize the risk of flooding upstream to less than one foot, as required by FEMA. Ongoing design efforts and coordination with resource and regulatory agencies will ensure that floodplain impacts are minimized during the design process.

C.19 Federally-protected Species or State Species of Concern

C.19.1 What are threatened and endangered species?

The *Endangered Species Act of 1973,* (ESA) as amended, requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species. Furthermore, the ESA requires that actions are not likely to result in the destruction or adverse modification of critical habitat of such species. The USFWS determines whether a species should be listed or not. Once listed, the species

is protected under the ESA until its population has recovered to the point that it can be taken off the list, or delisted. If a federally-protected species is present in a project study area, the federal agency responsible for the project must consult with the USFWS or NOAA. These agencies determine whether the proposed actions are not likely to adversely impact the species or its habitat, which may lead to further decline or extinction.

C.19.2 What federally-listed species are potentially found in the project study area?

The *South Carolina Distribution Records of Endangered, Threatened, Candidate, and Species of Concern*, July 2005, was obtained from the USFWS. This is a list of known and possibly occurring threatened, endangered, candidate, and species of concern in South Carolina.

Of the 15 species listed for Dillon County, Marion County, and Horry County, five are found primarily in marine or estuarine aquatic habitats while two additional species require saltmarsh and/or beachfront dune habitat. No marine or estuarine aquatic, saltmarsh, or beachfront dune habitats exist in the project study area except along the shore, east of where the alternatives would be located; therefore, these species will not be discussed further in this section.

C.19.3 How could federally-protected species be affected by the proposed project?

The proposed alternatives avoid all known locations of federally-protected species. However, once the Preferred Alternative is selected, intensive field surveys for federally-listed species will be performed in the identified suitable and marginally-suitable habitats in conjunction with the wetland delineation. If federally-protected species are found during the field surveys, informal consultation with the USFWS would occur. If it is determined that unavoidable impacts would occur to a federally-protected species, formal consultation with the USFWS would occur.

Suitable habitat for American chaffseed was not identified along the Build Alternative corridors. Marginally-suitable habitat was identified for pondberry and Canby's dropwort. Suitable habitat for the bald eagle, wood stork, Kirtland's warbler, red-cockaded woodpecker, and shortnose sturgeon was identified along the Build Alternatives. None of these species were observed during the preliminary site visits.

A review of the SCDNR species occurrence database indicates that pondberry has not been previously documented in Dillon, Horry, or Marion Counties. According to the list of federally-protected obtained from the USFWS, it could possibly occur in Horry County. Areas of marginally suitable habitat were observed adjacent to the inundated forested wetlands found along all of the Build Alternatives. Pondberry was not observed during the preliminary site visits. Therefore, it is anticipated that the proposed project would not affect the species.

According to the SCDNR species occurrence database, Canby's dropwort has not been previously documented in the project study area. According to the list of federally-protected obtained from the USFWS, Canby's dropwort possibly occurs in Horry County. Marginally suitable habitat occurs within the construction limits of the Build Alternatives; however, Canby's dropwort was not observed during the preliminary field visits. Therefore, it is anticipated that the proposed project would not affect the species.

Suitable habitat for the bald eagle is present along the Little Pee Dee River within the project study area; however, no nests were observed at the proposed river crossings during the preliminary site visits. Therefore, it is anticipated that the proposed project would not affect the species.

Potentially suitable habitat for the wood stork exists in the cypress-tupelo swamps along major drainages such as the Little Pee Dee River and Buck Swamp in the project study area. However, no areas within the project study area have been documented as stork nest sites, and there may be an insufficient amount of shallow marshy foraging habitat in the area for the Little Pee Dee River swamp to attract them. Therefore, it is anticipated that the proposed project would not affect the species.

Suitable habitat that the Kirtland's warbler uses during migration exists in the project study area. However, nesting and over-wintering habitat would not be lost as a result of the proposed project. In addition, suitable temporary habitat is common in South Carolina for transient migrants of this species and is therefore not a limiting factor. Therefore, it is anticipated that the proposed project would not affect the species.

Red-cockaded woodpeckers are known to nest within the project study area. However, no old-growth pine forests free of hardwood undergrowth was observed within the construction limits of the Build Alternatives. Most of the pine stands present within the construction limits are less than 30 years of age or have dense undergrowth present due to fire suppression and therefore not suitable for nesting or foraging habitat. No red-cockaded nest cavities or woodpeckers were observed during the preliminary site visits. It is anticipated that the proposed project would not affect the species.

Suitable habitat was identified for the shortnose sturgeon. The proposed project would cross the Little Pee Dee River as well as streams identified as nursery habitat. For projects that involve bridge crossings of rivers used by the shortnose sturgeon for spawning migrations, the SCDOT has agreed to implement a seasonal moratorium for all in water work between February 1 and April 30, and work will not impede more than 50 percent of the channel during the months of January through April. Filling wetlands associated with the smaller streams identified as nursery habitat would result in a direct loss of potentially suitable nursery habitat. The project may affect, but is not likely to adversely affect, the shortnose sturgeon.

With the exception of the shortnose sturgeon, it is anticipated that the proposed project would not affect any federally listed species. However, thorough field surveys will be conducted at the suitable and marginally suitable habitats that have been identified for the Preferred Alternative. It is anticipated any of the alternatives may affect, but not likely to adversely affect the shortnose sturgeon.

C.19.4 What would happen if a federally-protected species was affected by the proposed project?

Section 7 of the ESA requires federal agencies ensure that their activities will not jeopardize the continued existence of federally protected species. If it is determined during the development of the project that the action may jeopardize the continued existence of federally listed threatened or endangered species or its designated critical habitat, formal Section 7 consultation would begin and the USFWS would prepare a biological opinion in which practicable alternatives would be identified that could allow the completion of the project. If it is determined that the proposed project would jeopardize the continued existence of a species or modify its

critical habit with the implementation of the practicable alternatives the USFWS may issue an incidental take statement.

C.19.5 What would indirect and cumulative impacts to federally-protected species be?

Known locations of red-cockaded woodpecker nesting colonies were avoided by the I-73 project. A GIS analysis was performed to determine if impacts to known occurrences of federally-protected species within the project study area would occur as the result of induced development associated with the I-73 project. The analysis indicated that development associated with all of the Build Alternatives and the No-build Alternative, as predicted by the land use models, would encroach into the red-cockaded woodpecker 0.5-mile buffer. No other federally protected species are anticipated to be indirectly impacted by the project.

The proposed project may affect, but is not likely to adversely affect the shortnose sturgeon. No direct impacts to the bald eagle or wood stork would occur as a result of the project. However, cumulative impacts could occur to these species. Shortnose sturgeon threats include pollution, incidental take by commercial fisheries, impingement at hydroelectric and nuclear power intakes, poaching, and alteration of habitat due to damming of rivers. The bald eagle originally declined primarily due to low reproductive success caused by man's use of the pesticide DDT. Today the biggest threats are habitat disturbance by humans, illegal shooting, electrocution, and impact injuries. Since the 1930's, the decline in the population of wood storks in the United States has been attributed in large part to alteration of foraging and nesting habitat, particularly in historic rookery areas in south Florida. As development begins to encroach on the riparian wetland and upland habitat along the Little Pee Dee River and the Pee Dee River, habitat for the eagle and wood stork could be lost, and water quality degradation could impact the shortnose sturgeon. As discussed previously, cumulative impacts to these linear systems are anticipated to occur along the edges. Currently there are approximately 10,136 acres of riparian habitat protected along the Little Pee Dee River within the Little Pee Dee River Heritage Preserve, Little Pee Dee State Park, and the Little Pee Dee State Park Heritage Bay Preserve. Additionally, the riparian wetlands associated with these rivers are protected to a certain degree by the Section 404 permit process.

C.19.6 What state species of concern may be in the project study area?

A list of state listed rare, threatened, and endangered species that are known to occur in Dillon, Horry, and Marion Counties was obtained from the SCDNR. Most state species occur in Horry County, while only a few occur in Dillon and Marion Counties. Suitable habitat may be present in the project study area for any of these species. Alternatives 1, 4, and 8 would encroach on a 300 foot buffer around a known Venus' fly-trap population. These are the only Build Alternatives with the potential to impact known locations of state species of concern.

C. 20 Wildlife

C.20.1 What direct impacts could occur to wildlife as a result of the proposed project?

Wildlife along the Build Alternatives could be directly impacted by the proposed action as a result of the following: habitat displacement from construction of the proposed new roadway, disruption from noise and

vehicle activity, wildlife movement barriers, wildlife/vehicle collisions, and construction impacts including noise disruption and hazards to small animals during clearing and grading. Mammals, amphibians, and reptiles would most likely be impacted by wildlife/vehicle collisions. The nesting and feeding habitats of birds, mammals, amphibians, and reptiles could be reduced as a result of the proposed road construction. Fish and invertebrates would be most sensitive to degradation of water quality conditions potentially caused by the addition of impervious surfaces. In order to provide a method for comparison of potential wildlife impacts, Table C.37 provides the total acres of forested habitat that would potentially be impacted along each of the Build Alternatives.

Table C.37
Potential Wildlife Habitat Impacts in Acres
Interstate73: I-95 to Myrtle Beach Region

	Alternatives							
	1	2	3	4	5	6	7	8
Total Wetland Area	417.6	443.6	384.1	497.1	413.0	413.1	492.2	448.6
Total Natural Uplands	533.4	513.9	446.6	488.8	484.6	475.9	439.9	562.8
Total Habitat Impact	**951.0**	**957.5**	**830.7**	**985.9**	**897.6**	**889.0**	**932.1**	**1,011.4**

Source: THE LPA GROUP INCORPORATED, 2006.

As indicated in Table C.37, Alternative 3 would impact the least amount of potential wildlife habitat followed impact by Alternatives 6, 5, 7, 1, 2, 4, and 8, in ascending order of impacts. This ranking is based on the total amount of potential habitat available along the alternative corridors and does not take into consideration poor quality habitats such as isolated woodlots surrounded by agricultural fields or housing developments. However, these poorer quality areas do provide refuge and nesting habitat for some species of birds, mammals, reptiles, and amphibians.

All of the Build Alternatives would cross Back Swamp and the Little Pee Dee River. The crossings of Alternatives 1, 2, 4, 5, 7, and 8 would be located at the existing U.S. Route 501 crossing. Although a portion of I-73 would be situated in the median of U.S. Route 501, where it would cross Back Swamp the mainline of the roadway and associated access ramps, and the shift to avoid impacts to Galivants Ferry Historic District, would contribute to fragmentation of riparian habitats. Alternatives 3 and 6 would cross Back Swamp and the Little Pee Dee River immediately adjacent to the existing S.C. Route 917 crossing and would not contribute to habitat fragmentation. Because of the extent of bridges that would be constructed over the wetland and aquatic habitats at each of these crossings, terrestrial species would have unobstructed passage along the corridors.

Alternatives 2 and 6 would cross Buck Swamp and Lake Swamp on new alignment. Alternative 3 would cross Lake Swamp and Alternative 8 would cross Buck Swamp. Although these crossings of riparian habitat on new alignment would be on structure, they could contribute to riparian habitat fragmentation.

Potential impacts to wildlife could be minimized by the appropriate timing of construction activities to avoid fish breeding periods, bridging suitable aquatic spawning and feeding areas where feasible, and limiting clearing

outside the fill limits. Although the project would reduce the amount of available wildlife habitat, large undeveloped tracts and potential wildlife corridors remain along streams within the project study area.

C.20.2 What indirect and cumulative impacts would occur to wildlife?

Indirect impacts to wildlife could occur due to the loss of habitat associated with development that would occur as the result of the construction of the Build Alternatives and the No-build Alternative. Table C.38 provides potential indirect impacts to wildlife habitat associated with each alternative based on the predictions of the land use models.

Table C.38
Potential Indirect Wildlife Habitat Impacts in Acres
Interstate73: I-95 to the Myrtle Beach Region

	Alternatives								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**No-build**
Total Wetland Area	274.3	276.3	272.3	272.1	282.7	279.0	278.0	280.7	218.7
Total Natural Uplands	1,092.9	1,025.6	1,074.5	1,059.7	1,091.9	1,077.5	1,073.3	1,076.5	887.8
Total Habitat Impact	**1,367.2**	**1,301.9**	**1,346.8**	**1,331.8**	**1,374.6**	**1,356.5**	**1,351.3**	**1,357.2**	**1,106.5**

Source: THE LPA GROUP INCORPORATED, 2006.

As shown in Table C.38, the potential indirect impacts to wildlife habitat would be basically the same for all the Build Alternatives. The difference between the lowest impact, Alternative 2, and the highest impact to wildlife habitat, Alternative 5, would be approximately 73 acres. The No-build Alternative would have less indirect impacts. However the difference in habitat impacts between the No-build Alternative and the lowest Build Alternative, Alternative 5, would be less than 200 acres.

Based on the results of the land use models, most of the projected development would occur in the fragmented forested upland areas with some impacts to fragmented wetland habitats. Many amphibian species rely on seasonally wet depressions, located in uplands, for breeding and development. Often times these wetland depressions are considered "isolated" and would not be protected by state and federal regulations, therefore could be more vulnerable to habitat loss. Impacts to the riparian wetland and upland habitats are anticipated to occur along the edges of the systems with the highest potential for upland habitat loss because of the protection provided by the Section 404 permit process. These impacts could restrict the movement of terrestrial wildlife species along the forested corridors and would result in the loss of nesting and foraging habitat for migratory birds.

Cumulative impacts to wildlife species could occur regardless of the alternative that is selected as the Preferred Alternative. The Horry County population of black bears appears to have the highest density south of Conway as indicated by automobile/bear collision data obtained from SCDNR. All of the collisions within the I-73

project study area have occurred south of Conway. Several of these occurred along S.C. Route 22 and it is anticipated that increased traffic on this roadway could increase the number of automobile/bear collisions. Additionally, as the area between Conway and the Atlantic Intracoastal Waterway continues to develop, bear habitat would be lost and/or fragmented. The increased traffic on S.C. Route 22 could result in an increase in the number of collisions with other species, such as white tailed deer and raccoons.

SCDNR's Little Pee Dee Heritage Preserve would offer protection for a portion of the riparian habitats. However, there are gaps between preserves that have no protection other than the Section 404 permit and mitigation process. Other Heritage Preserves, state parks, and natural areas are present in the project study area; however, isolated "islands" of habitat are less than ideal for supporting healthy wildlife populations.

Another potential for cumulative impacts to birds would result from the construction of cell towers along I-73. Studies indicate that migratory birds frequently collide with lighted cell and radio towers that are greater than 200 feet in height when flying at night and during inclement weather when visibility is hindered. It is likely that towers would be constructed along the Preferred Alternative; however there is no way to predict at this point how tall the towers would be.

Cumulative impacts associated with the introduction of nonnative invasive plant species could occur as a result of the project. Highways tend to serve as conduits for the spread of invasive plant species which out-compete native species and eventually dominate a habitat. Once these plants become established at one location along a roadway, they can spread into surrounding woodlands and along the length of the roadway, and the plants continue to spread long after the road construction is complete. Invasive plant species can be introduced and spread in a variety of ways during road construction. One common source for the introduction of seeds or plants that root easily is from the construction equipment itself. Construction equipment that has not been properly washed-off to remove seeds and plant material before leaving the previous construction site is an invasive plant vector. Additionally, the spread of invasive plants that already occur at the road construction site is possible when topsoil is stripped at home sites where invasive species, such as Chinese privet, were used as ornamental plants. The top soil is generally stockpiled, since it is not suitable for construction purposes, and used as top-dressing for shoulders and medians. Dormant seeds, and roots and tubers in the soil could then be spread along the new roadway. FHWA and SCDOT best management practices would be implemented to reduce the likelihood of the spread of non-native invasive plant species along the Preferred Alternative.

C.21 Wild and Scenic Rivers

The National Inventory of Rivers did not contain any listed or eligible rivers within the project study area; therefore, no impacts to federal Wild and Scenic Rivers would occur.

The potential alternatives cross the Little Pee Dee River outside the limits of the South Carolina Scenic Rivers-designated areas of the Little Pee Dee River. Therefore, designated areas of rivers listed under the South Carolina Scenic Rivers Act of 1989 would not be impacted by the proposed alternatives.

C.22 Coastal Zone Resources

C.22.1 What direct impacts would occur to the coastal zone as a result of this project?

This project 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 project 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.

C.22.2 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 in land surrounding the City of Conway and an area extending from the coastline inward approximately eight to ten miles. The No-build development pattern has been estimated, based upon existing growth trends. This shows substantial development in Horry County.

C.23 Coastal Barriers

No coastal barriers exist in the project study area; therefore, no impacts are anticipated to this resource.

C.24 Energy

Transportation accounts for 27.7 percent of both direct and indirect energy consumption in the United States.[6] 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.

C.24.1 What energy consumption would occur during construction of the project?

Construction of the proposed project 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.

C.24.2 What energy consumption would occur as a result of the operation of the project?

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.

An estimate of change in VMT was made regarding potential impact with and without the proposed alternatives based on the project travel demand model. By comparing change in VMT in the build conditions 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 proposed alternatives, it was found that there would be a total net decrease in energy consumption statewide of 0.22 percent in the design year 2030.

C.24.3 What is the conservation potential of the project?

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.

C.25 Permits

C.25.1 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 would be delineated according to the *1987 Corps of Engineers Wetlands Delineation Manual*. Impacts to waters of the United States and jurisdictional wetlands will be quantified and will require USACE authorization under Section 404.

C.25.2 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.

C.25.3 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.

C.25.4 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.

C.25.5 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.