3.8 What Hazardous Materials and Waste Sites are in the project study area?

3.8.1 What are hazardous materials and waste?

A hazardous material is generally defined as any material that has or will have, when combined with other materials, a harmful effect on humans or the natural environment. Characterized as reactive, toxic, infectious, flammable, explosive, corrosive, or radioactive, a hazardous material may be in the form of a solid, sludge, liquid, or gas. Hazardous waste would be a hazardous material that has been used and discarded. Hazardous materials and waste sites are regulated primarily by the Resource Conservation and Recovery Act (RCRA) of 1976, as amended; the Comprehensive Environmental Response, Compensation, and Liability Act of 1980; and the Superfund Amendments and Reauthorization Act of 1986.

What are examples of potential hazardous material and waste sites?

Potential hazardous material and waste sites include service stations, landfills, salvage yards, and industrial sites, as well as aboveground and underground storage tanks.

3.8.2 Are there any hazardous waste sites located within the project study area?

Potential hazardous waste sites were inventoried based on a review of federal records of regulated sites. In addition, SCDHEC records were reviewed to identify potential hazardous material sites. Table 3.24 below provides a summary of the 516 sites identified within the project study area.

Table 3.24
Summary of Hazardous Material and Waste Sites Identified within the Project Study Area
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Landfills[1]	64
Treatment, Storage, and Disposal Facilities[2]	1
Hazardous Material Facilities[3]	404
Toxic Release Inventory Sites[4]	47
Total Number of Sites within the Project Study Area	**516**

[1] Landfills and solid waste disposal facilities are regulated under Resource Conservation and Recovery Act. SCDHEC maintains the inventory of permitted and inactive landfills in South Carolina.

[2] Treatment, Storage, and Disposal Facilities are regulated under RCRA. These facilities treat, store, or dispose of hazardous waste from permitted generators of the waste.

[3] Hazardous Material Facilities include hazardous waste sites, hazardous waste generators, aboveground storage tanks and underground storage tanks, leaking underground storage tanks, groundwater contaminated sites, releases of oil and hazardous substances and sites proposed to or on the National Priorities List.

[4] The Toxic Release Inventory is maintained by the USEPA of chemical releases from federal and industrial facilities. The inventory provides information on the release and transfer of toxic chemicals from facilities in any given area.

3.8.3 Would the proposed alternatives impact any known potentially contaminated sites?

Identified potentially contaminated sites were overlaid onto existing maps to determine if they may be affected by the proposed alternatives. These known sites include previously identified hazardous materials and hazardous waste sites within the vicinity of the 400-foot corridor for each alternative. Additional field investigations would be completed prior to construction to identify suspected hazardous waste sites and to characterize the extent of possible contamination from all known or suspected sites. Table 3.25 provides a summary of sites identified within the vicinity of the 400-foot corridor for each alternative. For detailed information about hazardous material and waste sites within a half-mile vicinity of each alternative, please refer to the *Hazardous Material Technical Memorandum*.

Alternative 3 would have the least number of potentially impacted hazardous material or waste sites at one, while Alternative 6 would have the greatest at four sites that could be potentially impacted. However, only two of the eight sites are known to have had releases. Given the potential that exists for each alternative to impact these sites, there is little difference between the alternatives.

3.9 Noise

3.9.1 What is noise?

Noise is "any sound that is undesired or interferes with a person's hearing of something".[67] Noise or sound is a pressure on the ear drum and that is measured on a scale from one to one billion. To simplify this scale, engineers and scientists have established a decibel scale (dB) of 1 to 180 through a mathematical process called a logarithm, which is easier to use. The human ear can only hear certain frequencies of noise, so, in order to show only the level or frequencies that can be heard by the human ear, the scale is given an A-weighting, designated by dBA. The scale of 1 to 180 dB provides a range for the sound levels that fall within a human's normal range of hearing for various types of noises. Table 3.26, (page 3-102), provides an overview of several different types of noises and what the sound level is in dBA. The scale provides a better representation of the actual sound levels and how a person would be affected.

Traffic noise, defined as unwanted sound, is associated with highway traffic usually in form of loud or persistent noises from cars and trucks. Traffic noises are generated from engines, mufflers, and from tire contact with the roadway.

3.9.2 How are noise impacts estimated?

Noises affect people differently due to their environment and other various factors. Loud noises such as a car honking its horn would bother most people while they were trying to sleep, while a softer noise during the day might bother certain individuals if they were trying to study or concentrate on a difficult task. The FHWA has developed the Noise Abatement Criteria (NAC) to determine how noise from roadway traffic affects the

[67] Webster's New Collegiate Dictionary, 1975. G&C Merriam Company. Springfield, Massachusetts.

Table 3.25
Hazardous Materials and Waste Sites Potentially Impacted, by Alternative
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Site	Description	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
Exxon Mobile Smith Rogers Oil Co., Inc. 3725 U.S. Route 76 E, Mullins	One gasoline UST with 8,000 gallon capacity; currently in use.	X				X			
Kunja Knitting Mill, 36300 U.S. Route 76 E, Mullins (Now Southeastern Millwork, Inc.)	Unknown, it was listed on the S.C. Environmental Facility Information System and USEPA's RCRA Info database	X				X			
Stuckey's Gas Station at I-95 and S.C. Route 34 Interchange, Dillon	Two gasoline USTs with an 8,000 gallon capacity and one gasoline UST with a 4,000 gallon capacity, all of which are currently in use.		X				X		X
Carousel Amoco Gas Station at I-95 and S.C. Route 34 Interchange, Dillon (Now a media/video store)	Two gasoline USTs with an 8,000 gallon capacity, one gasoline UST with a 3,000 gallon capacity, and one gasoline UST with a 1,000 gallon capacity; all abandoned and have been removed.		X				X		X
Webster's 66 Service at I-95 and S.C. Route 34 Interchange, Dillon (Now an auto service shop)	One gasoline UST with an 8,000 gallon capacity, one 8,000 gallon capacity diesel UST, and one 3,000 gallon capacity gasoline UST, all of which have been abandoned and filled with foam. An investigation and risk assessment is being conducted on the site due to a leak reported in December, 1991 from an UST which contained gasoline.		X				X		X
Luther Martin Grocery and C&M Convenience, 3842 Joiner Swamp Rd, Galivants Ferry (Now Harold's Convenience Store)	One 3,000 gallon capacity gasoline UST, and two 2,000 gallon capacity gasoline USTs, all of which have been removed. A LUST was reported in June 2001, but received a status of no further action in November 2001. Currently there are four fuel ASTs present and in use.			X			X		
Marion County Airport, 225 Airport Court, Mullins	One 8,000 gallon capacity gasoline UST and one 8,000 gallon capacity kerosene UST were present, but have been removed. There is one 10,000 gallon capacity gasoline UST and one 10,000 gallon aviation fuel UST which are both currently in use.				X			X	
Wellman Incorporated – Marion Plant, U.S. Route 76 and U.S. Route 501 Bypass in Marion (now vacant)	Unknown, but the site was listed on the South Carolina Environmental Facility Information System and the Aerometric Information Retrieval System/Air Facility Subsystem databases, which is related to tracking the compliance of stationary sources of air pollution.				X			X	
Total Number of Sites by Alternative:		**2**	**3**	**1**	**2**	**2**	**4**	**2**	**3**

Table 3.26
Common Noises and dB Levels
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Outdoor Noise	dBA	Indoor Noise
	110	rock band at 16.4 feet
jet flyover at 984.3 feet		
pneumatic hammer	100	subway train
gas lawn mower at 3.3 feet		
	90	
downtown area of large city	80	garbage disposal at 3.3 feet
		shouting at 3.3 feet
lawn mower at 6.6 feet	70	
commercial area		normal speech at 3.3 feet
air conditioning unit	60	clothes dryer at 3.3 feet
babbling brook		large business office
quiet urban area during the daytime	50	dishwasher in the next room
quiet urban area during the nighttime	40	library
	30	
	20	
	10	
		threshold of hearing
	0	

surrounding environment. NAC were developed through noise level studies, determinations of land uses, and various types of daily activities. These analyses developed a table for determining what dBA levels of noise would disturb people during various activities and at various locations. When dBA levels reach the point that it creates a disruption for an activity, it is considered an impact.

The NAC separates land uses into five categories, which are grouped by the type of activity and includes how sensitive this activity is to noise (Table 3.27). All five types of land uses are located within the project study area; however, the first three land uses (A, B, C) were used for analysis since they compare exterior noises and apply to all types of land uses.

3.9.3 How was background noise determined in the project study area?

Sources of the background noise include cars, trucks, farm equipment, and trains. An established network of roadways and, as a result, background traffic noises already exist throughout the project study area. Existing traffic and background noises were measured at 14 different locations within the project study area using a dosimeter. The time and resources it would take to provide existing noise level readings for each receptor in the project study area would be very expensive. In view of this, the FHWA-developed Traffic

Table 3.27
FHWA Noise Abatement Criteria
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Activity Category	dBA	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Developed lands, properties, or activities not included in categories A or B above.
D	-	Undeveloped lands
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: 23 CFR §772, USDOT, FHWA.

Noise Model (TNM) was used to take into account the factors from current and future traffic volumes and composition, topography, buildings, and roadways. The three-dimensional model calculates noise levels for an entire area and can predict both existing and future noise levels using various criteria and information included in the model.

3.9.4 How was TNM tested to ensure accuracy?

The model was tested to ensure that it was accurately predicting noise levels for the project study area. To test the model, existing noise levels were predicted using existing traffic data and were compared to the same locations where ambient noise levels were measured in the field. The comparisons of these measurements determined the accuracy of the model and are shown in Table 3.28, (page 3-104). In most cases, the predicted noise levels were higher than those taken in the field. There were a few locations where the existing noise levels were higher than the predicted noise levels. Additional background noises beyond traffic, such as a train passing, were noted for these locations. On average, the TNM over estimated by approximately 1 dBA what was measured in the field. Generally, it would take at least a 5 dBA difference for the human ear to perceive a difference in sound in most exterior environments. Due to this, the TNM should accurately predict noise levels within 1 dBA or slightly higher than what should occur, which is a reasonable margin of variation.

A noise analysis was performed for the project study area. This analysis was completed in accordance to FHWA's 23 CFR §772.15 "Procedures for Abatement of Highway Traffic Noise and Construction Noise." Noise impacts from roadway traffic can occur in two ways. When noise levels approach, or are within 1 dBA of the NAC criteria for each land use category or meet/exceed the NAC level, then it would be considered to impact a receptor. The second type of noise impact would occur when there has been a substantial increase (by 15 dBA or greater) in the future noise levels to when compared to existing levels.

Table 3.28
Ambient Noise Levels
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Site	Location	Field Measured Noise Level (dBA)	TNM Predicted Noise Level (dBA)	Difference (TNM minus Field Measurement.)	Comments
Site 1	4 miles S of S.C. Route. 9 on U.S. Route 301	67.1	67.0	-0.1	
Site 2	2.4 miles S of S.C. Route 917 on U.S. Route 301	62.4	61.5	-0.9	Locomotive passed nearby
Site 3	1.2 miles S of U.S. Route 301 on U.S. Route 501	62.6	63.9	1.3	
Site 4	1 miles S of exit U.S. Route 76 on U.S. Route 501	64.1	66.0	1.9	
Site 5	1.25 miles E of U.S. Route 501 on U.S. Route 76	61.7	64.1	2.4	
Site 6	On I-95 just south of Exit 190	74.1	74.1	0.0	
Site 7	1.2 miles E of S.C. Route 38 on S.C. Route 917	61.0	63.2	2.2	
Site 8	6 miles S of U.S. Route 301 on S.C. Route 917	60.9	60.9	0.0	
Site 9	3.6 miles W of S.C. Route 917 on S.C. Alt. Route 41	58.1	61.5	3.4	
Site 10	6.2 miles S of U.S. Route 76 on S.C. Route 41	62.4	63.3	0.9	
Site 11	4.5 miles S of U.S. Route 76 on S.C. Route 917	64.8	63.6	-1.2	Joints on Bridge Deck added to measurement
Site 12	3 miles S of State Route 23 on S.C. Route 917	54.8	58.4	3.6	Very low traffic volume
Site 13	6 miles N of State Route 319 on U.S. Route 501	67.0	70.0	3.0	
Site 14	1.1 miles W of U.S. Route 501 on Middle School Rd.	58.0	52.4	-5.6	Very low traffic volume
Site 15	2 miles N of Horry Rd on U.S. Route 501	69.1	70.9	1.8	
Site 16	1 miles E of U.S. Route 501 on Horry Rd	60.3	60.3	0.0	

3.9.5 What happens when impacts occur?

When traffic noise impacts occur, an evaluation must be completed to determine if minimization is possible. Methods used to reduce noise levels must be practicable to build, as well as cost effective. Methods cannot be used if they are determined to be unsafe to construct or if the methods are too costly when compared to the benefits. The most common method of reducing noise is construction of a noise wall, which is built parallel to a roadway to minimize the amount of noise. SCDOT and FHWA have determined that a noise wall or other noise reduction methods are practicable if they would reduce the noise by at least 5 dBA and cost-effective if it would not cost more than $25,000 per benefited receiver. In addition, if a noise wall is constructed, the wall cannot be higher than 25 feet based on specifications by SCDOT and FHWA. The 5 dBA reduction is used since it usually takes at least a 5 dBA change in the noise level for the average person to hear the difference in an exterior setting.

Traffic data for 2005 and 2030 peak-hour volumes, which would generate the most noise, were used to provide a worst-case scenario. Noise levels were predicted for all of the alternatives, including the No-build Alternative, and compared to the NAC and the existing noise levels to determine if there were potential impacts.

Since the project study area was so large, locations were picked throughout to provide a uniform representation as to what the sound levels would be and what potential areas would be impacted. These sites were chosen because of their distance to the existing and proposed roadways and due to the number of structures that were around them and the types of land uses for each of the locations. The approximate distance to the different land use categories in the NAC are shown in Table 3.29, (page 3-106). Table 3.30, (page 3-107) lists the approximate distances to each of these land uses for the various alternatives.

3.9.6 What are the anticipated noise impacts for the proposed alternatives?

Detailed land use data and structural information for the project study area has been collected in a GIS format. In order to analyze and compare specific categories of noise impacts associated with the eight Build Alternatives, contour distances were extrapolated from the TNM model and applied to the GIS data. This provided the ability to calculate the number and types of structures that fell within the contours associated with each NAC category for each of the proposed alternatives. The two contours of concern are the 66dB contour (Category B) and the 71 dB contour (Category C); no Category A receivers were identified adjacent to the proposed alignments. The GIS analysis provided a more detailed picture as to where impacts are located along the alignments. Noise impacts from this analysis are summarized in Table 3.31, (page 3-108) and shown on Figure 3-34 (page 3-109).

Table 3.29
Approximate Distance to Activity Category Impact
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Roadway	A (56 dBA) (feet)	B (66 dBA) (feet)	C (71 dBA) (feet)
I-95			
Existing (2005)	1,300	380	220
No-build (2030)	1,350	410	230
Build (2030)	1,400	440	250
U.S. Route 301			
Existing (2005)	300	110	80
No-build (2030)	420	160	100
Build (2030)	420	160	100
U.S. Route 501 (North of S.C. Alt. Route 41)			
Existing (2005)	250	90	60
No-build (2030)	350	120	75
Build (2030)	380	130	80
U.S. Route 501 (North of U.S. Route 76)			
Existing (2005)	320	125	75
No-build (2030)	430	160	100
Build (2030)	580	260	130
U.S. Route 501 (South of U.S. Route 76)			
Existing (2005)	470	150	90
No-build (2030)	540	170	100
Build (2030)	630	220	140
U.S. Route 501 (South of S.C. Route 41)			
Existing (2005)	560	180	110
No-build (2030)	560	180	110
Build (2030)	550	170	100
U.S. Route 76			
Existing (2005)	380	140	90
No-build (2030)	430	160	100
Build (2030)	480	180	110
S.C. Route 41			
Existing (2005)	180	70	50
No-build (2030)	240	100	60
Build (2030)	260	110	70
S.C. Route 917 (Near Little Pee Dee River)			
Existing (2005)	80	n/a	n/a
No-build (2030)	120	n/a	n/a
Build (2030)	320	60	20

Table 3.30
Approximate Distance to Activity Category Impact (feet)
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Location	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
I-95 to U.S. Route 301								
A (56 dBA)	440	540	490	390	460	540	390	520
B (66 dBA)	150	180	160	130	150	180	130	170
C (71 dBA)	90	110	100	80	90	110	80	100
U.S. Route 301 to S.C. Alt. Route 41								
A (56 dBA)	510	530	510	520	520	540	520	530
B (66 dBA)	160	180	160	180	160	190	180	180
C (71 dBA)	90	120	90	110	90	120	110	110
S.C. Alt. Route 41 to U.S. Route 76								
A (56 dBA)	530	430	540	580	540	540	620	430
B (66 dBA)	190	170	190	130	190	190	140	170
C (71 dBA)	120	110	120	70	120	120	70	110
U.S. Route 76 to S.C. Route 41								
A (56 dBA)	570	460	650	640	580	670	650	460
B (66 dBA)	190	170	220	220	190	220	220	170
C (71 dBA)	120	110	130	140	120	130	130	110
S.C. Route 41 to State Routes S-99/S-308								
A (56 dBA)	680	570	640	680	570	640	570	680
B (66 dBA)	170	200	220	170	200	220	200	170
C (71 dBA)	90	120	130	90	120	130	120	90
State Routes S-99/S-308 to S.C. Route 22								
A (56 dBA)	780	560	590	780	560	590	560	780
B (66 dBA)	170	190	200	170	190	200	190	170
C (71 dBA)	90	120	120	90	120	120	120	90

A more detailed analysis of noise impacts will be complete for the Preferred Alternative when more detailed design and survey information is available

3.9.7 How could impacts be mitigated?

Due to the rural setting of the project study area, areas of high density development were avoided to the extent possible during the development of the Build Alternatives. Alternatives were adjusted to avoid, as much as possible, the smaller communities and neighborhoods. The avoidance of developed areas reduced potential noise impacts.

Table 3.31
Noise Impacts Based on GIS Analysis
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Location	Category	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
I-95 to US 301	66 dBA	0	2R	0	0	0	2R	0	2R
	71 dBA	0	0	0	0	0	0	0	0
US 301 to SC 41-Alt.	66 dBA	3R	5R	3R	5R	3R	5R	5R	5R
	71 dBA	0	0	0	0	0	0	0	0
SC 41-Alt. to US 76	66 dBA	2R	0	2R	0	2R	2R	0	0
	71 dBA	0	0	0	0	0	0	0	0
US 76 to SC 41	66 dBA	10R, 1C	5R	1R	8R	10R, 1C	1R	8R	4R
	71 dBA	0	0	0	0	0	0	0	0
SC 41 to S-99/S-308	66 dBA	1R	2R	25R	2R	2R	25R	2R	2R
	71 dBA	0	0	0	0	0	0	0	0
S-99/S-308 to SC 22	66 dBA	2R	5R	6R	2R	5R	6R	5R	2R
	71 dBA	0	0	0	0	0	0	0	0
Total Impacts		18R, 1C	19R	37R	17R	22R, 1C	41R	20R	15R

Note: R=residence, C=church

The following noise abatement measures were evaluated for areas with the highest potential for noise impacts. The various noise abatement measures were studied to determine the feasibility and reasonableness of their implementation.

Highway Alignment

Highway alignment selection involves the horizontal or vertical orientation of the proposed project in such a way as to minimize impacts and costs. The selection of alternative alignments for noise abatement purposes must consider the balance between noise impacts and other engineering and environmental parameters. For noise abatement, a horizontal alignment selection is primarily a matter of placing the roadway at a sufficient distance from noise sensitive areas. As stated above, this method was used during the development of Build Alternatives and has been implemented through the entire process.

Noise Barriers

Noise barriers involve constructing solid barriers to effectively diffract, absorb, and/or reflect highway traffic noise. These may include earth berms and/or noise walls. The evaluation of the reasonableness and feasibility of noise wall construction is based on many factors, some of which include constructability, cost, height, anticipated noise increase, noise reduction obtained, number of receptors benefited, residents' views, land use type, and whether land use changes are expected. For this analysis, noise barriers were studied for areas where there are more than two or three isolated receptors located within approximately 400 feet of a potential alternative. Table 3.32, (page 3-110), explains the potential cost and benefit information

Marlboro
Dillon
Dillon
Marion
Horry
38
38
34
95
95
917
301
38
501
4 residences
2 residences
917
41
9
76
301
501
9
2 residences
76
917
41
6 residences
1 church
2 residences
576
9 residences
3 residences
2 residences
7 residences
4 residences
410
917
501
701
319
908
2 residences
22
41

Legend

- Impacted Buildings
- Interstate
- US Highway; State Highway
- Minor Road
- Alternative
- Project Study Area
- County Boundary

0 1 2 3 Miles

N W E S

FIGURE 3-34

CATEGORY B POTENTIAL NOISE IMPACT

about the barriers analyzed. A construction cost of 20 dollars a square foot was used for the cost analysis, with the exception of barrier number 6 which was priced at $28 per square foot since it would be located on a bridge. The cost of the benefited receptors was calculated by dividing the cost of the noise wall by the number of receptors benefited by the wall.

A review of Table 3.32 shows that, based on preliminary analysis, none of the noise barriers would be reasonable based on cost per benefited receptor. A more detailed analysis may be needed in the Final EIS. SCDOT has defined a reasonable cost for noise abatement as $25,000 dollars per benefited receptor. In order to be effective, a noise wall must be tall enough to block the "line of sight" between the

Table 3.32
Noise Barrier Analysis
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Barrier Number	Location	Alt.	Impacted Receptors Studied	Number of Receptors Benefited	Length (feet)	Average Height (feet)	Cost	Cost per Benefited Receptor
1	North of U.S. Route 301	2, 6, 8	10	10	2,774	14	$769,000	$76,900
2	South of U.S. Route 301	2, 6, 8	10	10	2,875	14	$783,000	$78,300
3	North of S.C. Alt. Route 41	1, 2, 3, 5, 6, 8	7	7	1,200	21	$496,000	$70,900
4	North of S.C. Alt. Route 41	1, 2, 3, 5, 6, 8	12	12	1,750	22	$754,000	$62,800
5	North of U.S. Route 76	1, 2, 3, 5, 6, 8	23	13	1,856	17	$612,000	$47,100
6	South of S.C. Route 41	3, 6	9	8	1,026	12	$340,000	$42,500
7	South of S.C. Route 308	3, 6	11	5	3,223	15	$986,000	$197,200
8	North of U.S. Route 301	1, 3, 4, 5, 7	7	3	2,627	13	$702,000	$234,000
9	South of U.S. Route 301	4, 7	7	4	2,197	18	$796,000	$199,000
10	North of U.S. Route 76	4, 7	5	3	2,400	18	$860,000	$286,700
11	South of U.S. Route 76	4, 7	14	12	2,855	13	$768,000	$59,100
12	South of S.C. Route 308	1, 4, 8	7	6	2,100	16	$652,000	$108,700
13	South of S.C. Route 308	1, 4, 8	10	6	2,588	19	$985,000	$134,200
14	South of U.S. Route 76	1, 2, 5, 8	7	6	1,460	13	$385,000	$64,200
15	South of S.C. Route 308	2, 5, 7	26	11	2,200	20	$878,000	$79,800

Note: Barrier 6 includes cost for a portion of the barrier on a bridge.

human ear and the noise source, and long enough to block the "line of sight" from a length of roadway approximately six to eight times the distance between the receptor and roadway. The distance between receptors and the distance between the roadway and many of the receptors studied, contribute to the need for the noise walls to be of such great length and height as to render them cost ineffective. The lowest cost obtained for any wall studied was over $42,000 dollars per benefited receptor, and is not considered reasonable due to cost.

3.10 How is air quality measured?

The USEPA established the National Ambient Air Quality Standards (NAAQS) for atmospheric pollutants that are considered harmful to public health in accordance with the Clean Air Act of 1970 (as amended). The SCDHEC Bureau of Air Quality is responsible for regulating and ensuring compliance with the Clean Air Act in South Carolina.

The criteria pollutants that are measured under NAAQS are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.[68] In Table 3.33, these pollutants are listed, along with their attainment standards, description, sources, and the potential effects they may have on human health. Transportation projects only contribute to four of the six criteria pollutants listed: ozone, carbon monoxide, particulate matter, and nitrogen dioxide.[69]

The United States is divided into geographical areas that are classified as either in non-attainment or attainment for air quality. If an area has exceeded the NAAQS levels for any of the six criteria pollutants, then it is in non-attainment. In these areas, the USEPA requires states to develop a State Implementation Plan to address regional goals for attaining NAAQS. Each plan includes measures to reduce transportation pollutant emissions. Geographic areas that have all six criteria pollutants below NAAQS standards are considered to be in attainment. All three counties in the project study area are considered to be in attainment of the NAAQS.

In 1997, the USEPA determined that the 1-hour "peak" NAAQS standard for ground-level ozone was not adequately protecting human health and changed it to an 8-hour average standard of 0.08 parts per million.[70] This standard would be phased in, and once an area has reached this 8-hour average standard for three years, it would continue using it. However, if geographical areas were already meeting the 1-hour standard, they could voluntarily enter into an Early Action Compact with the USEPA through their state's State Implementation Plan to set milestones to meet the more stringent 8-hour standard. As long as these areas worked to reach milestones set in the compact, then the USEPA would defer requiring the ozone 8-hour average standard. Geographical areas, consisting of local, county, and state officials, worked to develop milestones and submitted them in 2002. Once the USEPA approved these compacts, and the milestones were reached, these areas would receive deferrals from the 8-hour average standard.

[68] USEPA. What are the Six Common Air Pollutants? http://www.epa.gov Last accessed March 16, 2006.
[69] FHWA. Air Quality Planning for Transportation Officials. http://www.fhwa.dot.gov Last accessed March 17, 2006.
[70] USEPA. USEPA's Revised Ozone Standards. http://www.epa.gov Last accessed March 16, 2006.

Table 3.33
Criteria Pollutants Measured Under the NAAQS
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Pollutant	Standard				Description	Possible Effects to Human Health
	Averaging Time	PPM†	µG/M³ *	Type of standard¥		
Carbon monoxide	1 hour 8 hours	35 9	40,000 10,000	Primary Primary	Carbon monoxide forms when carbon is not completely burned in fuel. It is an odorless and colorless gas that is mainly formed from vehicle exhaust.	Breathing carbon monoxide reduces the body's ability to deliver oxygen to vital organs in the body. It can affect the heart, lungs, and central nervous system. Inhaled in high amounts, it can cause poisoning or death.
Lead	1 quarter	-	1.5	Primary & Secondary	Lead is usually released into the environment as a result of processing metals. Utilities, waste incinerators, and lead-acid battery manufacturers are sources of lead.	Lead can cause damage to major organs such as the brain, liver, and kidneys. It can cause seizures, mental disorders, reproductive problems, high blood pressure, anemia, and osteoporosis.
Nitrogen dioxide	1 year	0.053	100	Primary & Secondary	Nitrogen dioxide is an odorless and colorless gas that comes from various sources such as vehicle, industrial, and utility emissions.	It is a component of ozone, which causes numerous respiratory problems.
Ozone	8 hours	0.08	157	Primary & Secondary	Ozone is created when nitrogen oxide compounds mix with volatile organic compounds in the presence of sunlight. Sources of the compounds creating ozone include vehicle and industrial emissions, gasoline vapors, and chemical solvents.	Ozone causes respiratory problems such as decreased lung function, asthma, wheezing, coughing, pain when breathing, and higher susceptibility to respiratory illnesses such as pneumonia and bronchitis.
Particulate Matter diameter less than/equal to 10 µm	24 hours 1 year	- -	150 50	Primary & Secondary Primary & Secondary	Particulate matter forms when small solid particles combine with liquid droplets to form dust, dirt, haze, soot, or smoke. These can be emitted from primary sources such as unpaved roads, construction sites, fields, or smokestacks. They can also be emitted as a result of secondary reactions of gases released from automobiles and industrial plants.	Particulate matter causes a variety of respiratory problems, from asthma and bronchitis, to decreased lung capacity and function. If particulate matter is very small, it can be transferred to the cardiovascular system and cause irregular heartbeat and even non-fatal heart attacks.
Particulate Matter diameter less than/equal to 25 µm	24 hours 1 year	- -	65 15	Primary & Secondary Primary & Secondary		
Sulfur oxides	3 hours 24 hours 1 year	0.50 0.14 0.03	1,300 365 80	Secondary Primary Primary	Sulfur dioxide is formed when fuel such as coal and oil is burned and sulfur is released into the atmosphere and mixes with oxygen. Main sources of sulfur dioxide include fuel burning utility plants, petroleum refineries, large ships and locomotives, and metals processing plants.	Sulfur dioxide can cause respiratory illnesses such as asthma, decreased lung function, and susceptibility to other illnesses such as pneumonia and bronchitis. It can also aggravate existing heart diseases.

†PPM = parts per million. * µG/M³ = micrograms per cubic meter. ¥ Primary standards are set to protect public health. Secondary standards are designed to protect public welfare. Source: USEPA, Air and Radiation Section, http://www.epa.gov/air/criteria.html Last accessed March 16, 2006.

3.10.1 How is air quality regulated?

In 2002, SCDHEC developed an Early Action Compact State Implementation Plan for implementing measures to attain the 8-hour average standard so that areas in the state could develop Early Action Compacts. Early Action Compacts were submitted for both the Pee Dee Region (containing Dillon and Marion Counties) and the Waccamaw Region (containing Horry County) in December of 2002 and resubmitted in 2004.[71] Two monitoring stations exist for the Pee Dee and Waccamaw Regions to monitor the 8-hour ozone standard. Neither station (the Pee Dee Region station is located in Darlington County and the Waccamaw Region station is located in Williamsburg County) has exceeded the 8-hour standard for ozone in the past three years.[72]

As part of the Early Action Compact State Implementation Plan, transportation conformity is not required. However, through interagency meetings, air quality and transportation officials agreed on the importance of considering air quality goals in transportation planning. As a result, FHWA, Federal Transit Authority, and SCDOT met with SCDHEC, USEPA, and local and county officials (known as Metropolitan Planning Organizations) signed a memorandum of agreement outlining consultation procedures for transportation conformity and developing a Smart Highways Checklist to be used when developing Long Range Transportation Plans and Transportation Improvement Programs to meet state and federal air quality standards, as well as goals set forth in the Early Action Compacts.[73]

With the approval of the 2004 SIP revision, when an area in South Carolina is deemed nonattainment, it is then required to implement transportation conformity and the necessary consultation procedures, outlined in the MOA. Areas in South Carolina that were designated nonattainment for the 8-hour ozone standard but had the effective date of the designation deferred as a result of the Early Action Compact are not required to implement transportation conformity.

Under this guidance, no further action to evaluate air quality is required for the I-73 project.

3.10.2 Would air quality be impacted by the proposed project?

Air quality is not likely to be impacted by this project. The three-county area is currently in attainment of the NAAQS standards. In general, the project should improve traffic congestion along existing routes to the Myrtle Beach region, which would have positive effects on the region's air quality. In addition, the counties have entered into Early Action Compacts to set goals for cleaner air in the three-county area. This project also has been included in the South Carolina Transportation Infrastructure Program, which is reviewed for air quality compliance. With the Early Action Compacts in place, and standard review of the project as part of the South Carolina Transportation Infrastructure Program, the project is not likely to impact air quality in the three-county area.

[71] USEPA. Ozone Early Action Compacts. http://www.epa.gov/ttn/naaqs/ozone/eac/ Last accessed March 17, 2006.
[72] SCDHEC. Bureau of Air Quality, Ambient Air Quality Summaries. http://www.scdhec.nee Last accessed March 17, 2006.
[73] SCDHEC. Bureau of Air Quality, South Carolina Early Action Compact SIP. http://www.scdhec.net/eqc/baq/html/eap_sip.html Last accessed March 17, 2006.

3.11 What impacts could construction of the Build Alternative have?

During the construction of the project, several potential environmental impacts may occur, but these would be mitigated through careful attention to construction methods. Construction methods would follow the current edition of SCDOT's *Standard Specifications for Highway Construction* to minimize potential impacts. Appropriate mitigation measures would be incorporated into the design plans and construction specifications to reduce, and, possibly eliminate, the associated impacts.

3.11.1 Air Quality

Air quality impacts may occur during construction due to the dust and fumes from equipment, earthwork activities, and vehicles accessing the construction site. Air quality impacts may also occur from an increase of vehicle emissions from traffic delays due to construction activities. Construction activities could include staging of construction for interchange locations, delivery of equipment and materials, and longer waiting times at traffic signals.

Best management practices that limit dust generation are described in the *South Carolina Stormwater Management and Sediment Control Handbook For Land Disturbance Activities*[74] and *A Guide To Site Development and Best Management Practices For Stormwater Management and Sediment Control.*[75] These methods include vegetative cover, mulch, spray-on adhesive, calcium chloride application, water sprinkling, stone, tillage, wind barriers, and construction of a temporary graveled entrance/exit to the construction site.

In accordance with Section 107.07 of the South Carolina Highway Department Standard Specifications for Highway Construction,[76] the contractor would comply with *South Carolina Air Pollution Control Laws, Regulations and Standards.*[77] The contractor would also comply with county and other local air pollution regulations. Any burning of cleared materials would be conducted in accordance with applicable state and local laws, regulations and ordinances and the regulations of the South Carolina's State Implementation Plan for air quality, in compliance with Regulation 62.2, Prohibition of Open Burning.

3.11.2 Noise

Areas along the Build Alternatives could be affected by noise generated from various construction activities. The major construction elements of this project are expected to be earth moving, hauling, grading, and paving. General construction noise impacts to individuals living or working near the project would be expected,

[74] South Carolina Department of Health and Environmental Control's Office of Ocean and Coastal Resource Management, *South Carolina Stormwater Management and Sediment Control Handbook for Land Disturbance Activities* (2003), Appendix E.
[75] South Carolina Department of Health and Environmental Control's Office of Ocean and Coastal Resource Management, A Guide to Site Development and Best Management Practices for Stormwater Management and Sediment Control.
[76] SCDOT Standard Specifications for Highway Construction (2000).
[77] South Carolina Department of Health and Environmental Control, Bureau of Air Quality Control, *South Carolina Air Pollution Control Laws, Regulations, and Standards.*

particularly from noise generated by paving operations and from earth moving equipment. Overall, construction noise impacts are expected to be minimal since construction noise would be relatively short in duration and could be restricted to daytime hours.

3.11.3 Water Quality

Potential impacts to water quality from construction activities could be related to surface water runoff, accidental release of fuel or hydraulic fluids, sedimentation from soil erosion, and changes in stream channel grades. *The South Carolina Stormwater Management and Sediment Control Handbook for Land Disturbance Activities*,[78] provides information regarding stormwater management and sediment control during construction. Several Best Management Practices (BMPs) that could be possibly used during construction include the following:

- land grading;
- construction of temporary diversions to dispose of runoff to control erosion and sedimentation;
- construction of diversion dikes to prevent sediment-laden runoff from exiting the construction site;
- construction of temporary sediment traps which would detain sediment-laden runoff and trap the sediment to prevent impacts to surrounding water bodies;
- construction of sediment basins;
- straw bale dikes; and,
- rock dams to retain sediment on the construction site and prevent sedimentation of off-site water bodies.

The contractor would be required to comply with Section 107.26, SCDHEC's Environmental Protection and Water Pollution Control from the *South Carolina Highway Department Standard Specifications for Highway Construction*.[79] In addition, the contractor would be required to comply with current federal and state laws, as well as regulations regarding water quality and stormwater management.

3.11.4 Wildlife

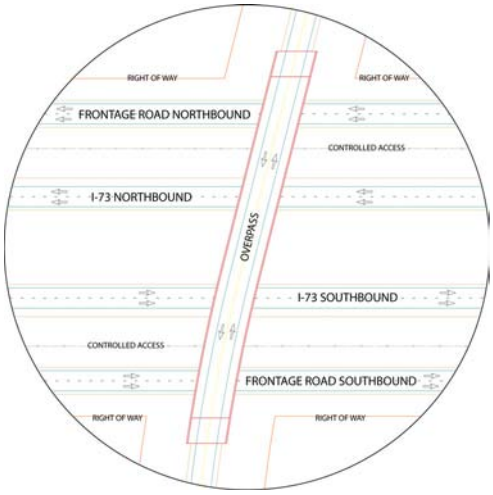
Staging and stockpiling operations during construction could result in possible disruption to the resident wildlife population. Both the clearing of habitats, as well as the noise and vibration from construction operations could displace mobile wildlife species. Construction activities would stimulate competition between displaced species and the resident wildlife population adjacent to the construction site. Biotic impacts would be temporary, since staging and stockpiling areas would be abandoned after construction.

3.11.5 Maintenance of Traffic

The construction of I-73 on sections of existing U.S. Route 501 will be more complex than sections on new location. At several sections construction will be performed in the median of U.S. Route 501.

[78] Ibid.
[79] Ibid.

The segment of I-73 on the Marion Bypass would require construction in the median of existing U.S. Route 501. One side of U.S. Route 501 would stay in place while the other side would be relocated to allow for I-73 to be placed in the center. U.S. Route 501 would become a pair of one-way frontage roads on the outside of each side of I-73 (refer to graphic of the frontage roads). I-73 would then be constructed between the lanes of U.S. Route 501. Because of the one-way frontage roads the traffic circulation would be changed. People wanting to get onto U.S. Route 501 from the western side would have to get on the frontage road heading south. If they wanted to travel north they would have to stay on the southbound side until they reached a location to pass under I-73 and make a U-turn to go north. Likewise the people on the eastern side would have to turn north onto U.S. Route 501. Those wanting to proceed south would have to travel north until they reached a turn around under I-73 and head south.



One-way Frontage Roads

This situation would occur again at the U.S. Route 501 crossing of the Little Pee Dee River. One side, the northern side, of U.S. Route 501 would be shifted farther north to allow for construction of I-73 between the travel lanes. Again, U.S. Route 501 would be come a pair of one-way frontage roads on the outside of both sides of I-73. The situation here would be more complex because there are several bridge structures that would have to be replaced. Again, people would have to travel in one direction on U.S. Route 501 on either side of I-73 until they reached a place to make the turn around to go in the opposite direction.

This situation would arise a third time on U.S. Route 501 from Aynor south to S.C. Route 22. The one-way frontage roads would maintain access to adjacent properties but would require the same circulation patterns for local trips on U.S. Route 501 as described for the other segments.

Extreme caution must be taken during the design and construction of the project to ensure that proper measures are met to provide a safe facility to the traveling public. These considerations would be necessary due to the existing high volume of traffic which uses U.S. Route 501 as the primary route from I-95 to the Myrtle Beach area, especially during the peak season summer months. A minimum design speed of 45 mph would have to be maintained in the construction area in order to minimize undue traffic backups and delays.

Shifting of traffic during the various phases of construction would be required. This would cause a potential for accidents due to motorists unfamiliarity with the facility as it changes. A conflict that would occur between the construction traffic, such as large hauling trucks and construction tractors, and the traveling public that would increase the risk of accidents and potential fatalities in the work zone area. The construction activity would warrant the placement of more rigid traffic control apparatus such as temporary concrete barriers which would create an undue obstacle, but reduce the potential for injury or fatalities should an accident occur.

In addition, the construction in the areas of U.S. Route 501 will cause a burden on the existing businesses and residents adjacent to the existing roadway. During certain phases of construction, access will be affected

to these properties to the extent that a vehicle wanting to gain access to specific property may have to be detoured several miles.

A similar situation would exist on the eastern crossing of the Little Pee Dee River, along S.C. Route 917. However, in that situation the existing road would be maintained as a two-lane frontage road, with traffic in both directions. I-73 would be built on the southwestern side of the existing road. Again, shifting of traffic during phases of construction would be increase the potential for accidents and rigid traffic control would be needed to make a safe work and travel environment. The traffic volumes at this crossing are substantially less than at the U.S. Route 501 crossing, making the maintenance of traffic at this location easier to perform.

A higher number of people live in the vicinity of U.S. Route 501 and in turn any alternatives that utilize this existing facility would impact more people by altering the existing traffic patterns. As such, Alternative 4 would have the greatest impact to mobility and constructability since it follows existing U.S. Route 501 for the greatest length. Alternatives 1 and 8 would have the second highest impacts to construction and mobility since their alignments follow the existing U.S. Route 501 corridor south of Aynor. Alternative 6 would connect to I-95 near the Gateway Industrial Park and would require a complex system of collector and distributor roads. Alternative 3 would have the least impacts for construction and mobility because it is primarily on new alignment.

Traffic congestion could occur, particularly in areas where new construction would be in the vicinity of existing facilities. Temporary detours could be needed as part of maintenance of traffic during construction, particularly at interchanges. Existing facilities could be closed for brief periods of time, as approved by SCDOT. Detours could also be utilized in areas where construction activities would lead to a reduced number of lanes on an existing facility. This would help reduce traffic congestion in the vicinity of construction. Any detours and maintenance-of-traffic layouts proposed by the contractor would be reviewed and approved by SCDOT. Temporary detours and closures of facilities could lead to more inconveniences for local residents and travelers throughout the areas of construction. Businesses along these roadways could experience a loss of revenue during construction due to the inconvenience placed on customers to access these businesses.

Access roads would be needed to maintain existing connections that would otherwise be lost due to construction of the project. Measures that could be incorporated to provide maintenance of traffic include temporary lane closures, temporary relocation of roads, or construction of temporary structures. The speed limits in the construction work zone areas should generally be lower than the posed speed limit on the existing facility. The construction of the interchanges may be completed in stages and the contractor would be required to use typical maintenance of traffic layouts or submit site-specific layouts for review. The contractor would also be required to comply with Section 104.07, Maintenance and Maintaining Traffic, 107.06, Sanitary Health and Safety Provisions, and Section 107.09, Public Convenience and Safety of the *South Carolina Highway Department Standard Specifications for Highway Construction.*[80]

[80] *Ibid.*

3.11.6 Estimated Costs

Table 3.34 lists the estimated costs to construct each alternative. The costs are shown in 2006 dollars, and then factored up by six percent per year to the Years 2011 and 2016.

Table 3.34
Potential Cost Per 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
Total Estimated Cost in Billions (2006 Dollars)	1.115	1.156	0.964	1.040	1.069	1.051	1.008	1.192
Total Estimated Cost in Billions (2011 Dollars at 6% Annually)	1.492	1.547	1.290	1.392	1.431	1.406	1.350	1.595
Total Estimated Cost in Billions (2016 Dollars at 6% Annually)	1.997	2.070	1.726	1.863	1.915	1.882	1.806	2.134

3.12 What considerations have been analyzed relating to pedestrians and bicyclists?

The proposed project would provide facilities for bicyclists and pedestrians where bridges are constructed to elevate roadways over the interstate. The bridges constructed at these locations would have 10-foot shoulders, which would accommodate pedestrian and bicyclists more safely. The existing road system within the project study area is comprised primarily of secondary roadways including U.S. Route 501, U.S. Route 76, S.C. Route 41, and S.C. Route 22. The secondary roadways have limited or no shoulders making it difficult to accommodate pedestrians or bicyclists.

The SCDOT has developed policies to ensure that pedestrians and bicyclists are taken into consideration when planning to widen existing roadways or for new road construction projects. "Accommodating Bicycle and Pedestrian Travel: A Recommended Approach" is a policy statement adopted by the USDOT to guide the integration of bicycling and walking facilities into the transportation mainstream.[81] Along with input from public agencies, professional associations, and advocacy groups, the USDOT drafted the policy statement in response to Section 1202 (b) of the TEA-21. The policy statement states that facilities for bicyclists and pedestrians in urbanized areas should be established in new construction and reconstruction projects, unless bicyclists and pedestrians are prohibited by law from using the roadway, as they would be for the proposed project.

Due to the fact that access to the facility would be fully-controlled, in designated locations secondary roadways would be elevated and constructed over the interstate. The frontage roadways would be considered for bike and pedestrian facilities based on SCDOT policies. Although the proposed project

[81] http://www.fhwa.dot.gov/environment/bikeped/design.htm

would require the modification of several local roads, it would not reduce the routes available for travel by pedestrians or bicyclists. The proposed project is not anticipated to affect pedestrian or bicycle traffic.

3.13 What is the relationship of local short-term uses versus long-term productivity for the proposed project?

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

Natural Resources

3.14 Why is farmland an important consideration?

South Carolina has a long history of farming and agricultural significance, especially within the project study area. Drawn by its abundant resources, this area was first settled by Native Americans who were later followed by English settlers who traveled inland from the Carolina Coast.[82] In Horry County, pine trees supported an industry centered on the production of tar, turpentine, and rosin from 1830 until the beginning of the twentieth century. The timber and turpentine industry were replaced by the tobacco industry which was initiated in this region in the 1890's. The project study area was known as a successful tobacco-growing region; however, due to new federal legislation limiting the amount of tobacco farmers can produce, other crops are now being grown.

Farming in South Carolina produces crops valued at over 1.5 billion dollars annually. Dillon, Horry, and Marion Counties produce crops valued over 147.9 million dollars, representing 10 percent of South Carolina's overall crop value.[83] The top five crops in the three counties are soybeans, cotton, wheat for grain, corn for grain, and tobacco (Table 3.35, page 3-120). Hog and poultry farming, along with producing landscape flowers and plants, are also important elements of South Carolina's agricultural industry in Dillon, Horry, and Marion Counties.

3.14.1 How is farmland protected?

Congress recognized the importance of farmlands and passed the Farmland Protection Act in 1981. The purpose of this statute is to prevent the conversion of farmlands to non-agricultural uses by minimizing the impacts that federal programs have on farmlands. Prior to farmland being used for a federal project, an

[82] *http://www.marioncountysc.com/profile.html*
[83] Source: U.S. Department of Agriculture, 2002 Census of Agriculture.

Table 3.35
Top Five Crops in Dillon, Horry and Marion Counties in 2002
Interstate 73 EIS: I-95 to the Myrtle Beach Region

Crops	Dillon County	Horry County	Marion County
Soybeans (acres)	38,770	35,700	18,304
All Cotton (acres)	19,434	--	4,934
Wheat for grain (acres)	20,983	6,777	4,512
Corn for grain (acres)	6,676	13,813	5,028
Tobacco (acres)	2,763	7,636	3,868

Source: U.S. Department of Agriculture, 2002 Census of Agriculture.

assessment must be completed to determine if prime, unique, or statewide or locally important farmlands would be converted to non-agricultural uses. If the assessment determines the use of farmland is in excess of the parameters defined by the Natural Resources Conservation Service (NRCS), which is an agency of the U.S. Department of Agriculture (USDA), then the federal agency must take measures to minimize the impacts to these farmlands.

The Farmland Protection Act was passed in 1981 to protect farmlands from conversion to non-agricultural uses by minimizing the impacts that federal programs have on farmlands.

3.14.2 What are the different types of protected farmlands?

The NRCS is the lead agency that determines the suitability of farmlands. NRCS characterizes eligible farmland as being "prime", "unique" or of "statewide or local significance". The designations are based on NRCS soil type and are protected by federal legislation.

There are three different types of farmlands, Prime, Unique, and Statewide or Locally Important.

Prime farmlands are those lands that produce normal crops and require the least amount of inputs (i.e. fertilizer, pesticides, labor).

Unique farmlands are those lands other than prime farmlands used for production of specific high-value food or fiber crops such as nuts, fruits, or vegetables.

Statewide or Locally Important farmlands are those lands designated by state or local agencies as important for the production of crops in the area.

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, or oil-seed and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor without intolerable soil erosion (7 U.S.C. §4201(c)(1)(A)). Prime farmland includes land that possesses the above characteristics and may include land currently used as cropland, pastureland, rangeland, or forestland. Prime farmland does not include land already in or committed to urban development or water storage.

Unique farmland is land other than prime farmland that is used for production of specific high-value food and fiber crops (7 U.S.C. §4201(c)(1)(B)). It has the special combination of soil quality, location, growing season, and moisture supply needed to

economically produce high quality or high yields of specific crops when treated and managed according to acceptable farming methods. Examples of such crops include lentils, nuts, annually cropped white wheat, cranberries, citrus and other fruits, olives, and vegetables.

Statewide or locally important farmland is land that has been designated of state or local importance for the production of food, feed, fiber, forage, or oil-seed crops, but is not of national significance (7 U.S.C. §4201(c)(1)(C)).

3.14.3 What are the types and amounts of farmland in the project study area?

The project study area represents 942,000 acres of Dillon, Horry and Marion Counties. The project study area consists of 225,915 acres of prime farmland and 293,676 acres of farmland of statewide importance.[84] No unique farmland soils exist in the project study area.

In Dillon County, within the project study area, there are 11 soil types that have been designated as prime farmland and 15 soil types designated as farmland of statewide importance by the NRCS. These 26 soil types consist of approximately 191,117 acres, which equals 74 percent of Dillon County's total land area (Table 3.36).

In Horry County, within the project study area, there are 12 soil types designated as prime farmland and 11 soil types designated as farmland of statewide importance by the NRCS. These 23 soil types consist of approximately 472,464 acres, which is 65 percent of Horry County's total land area (Table 3.36).

In Marion County, within the project study area, there are 12 soil types designated as prime farmland and 12 soil types designated as farmland of statewide importance. These 24 soil types consist of approximately 190,640 acres, which comprises 61 percent of Marion County's total land area (Table 3.36).

Table 3.36
Summary of Prime and Farmland of Statewide Importance Soils
Interstate 73 EIS: I-95 to the Myrtle Beach Region

	Project Study Area	Dillon County	Horry County	Marion County
Prime Farmland (acres)	225,915	83,251	219,785	58,741
Farmland of Statewide Importance (acres)	293,676	107,866	252,679	131,899

Source: GIS data from NRCS, 2006

[84] GIS data, NRCS 2006

3.14.4 What are the typical farm sizes in Dillon, Horry, and Marion Counties?

Data from the Census of Agriculture is only available at the county level; therefore, Dillon, Horry, and Marion County data is being used to characterize the project study area. Aerial photography specific to the project study area was also used to assess the agricultural land uses.

South Carolina's overall average of total land area in farms is approximately 25 percent. As shown in Table 3.37, Dillon County has a total land area in farms that is well above South Carolina's overall average, while Horry County has a total land area in farms that is roughly equal to the state's overall average and Marion County has approximately 29.8 percent of its land area in farms, just above the state's average.

The USDA classifies all farms into size groups according to the total land area of the farm. The land area of a farm includes land owned and operated as well as land rented from others. Therefore, land rented was considered part of the tenant's farm and not part of the owner's. In the three-county region, farm size ranges from as small as one acre to over 1,000 acres or more. In 2002, the majority of farms in the three county-region ranged between 50 to 179 acres in size. The trends in the size and number of farms within Dillon, Horry, and Marion Counties from 1992 to 2002 trends show the number farms in all three counties have decreased between 6 and 34 percent.

Table 3.37
Total Land Area in Farms, 2002
Interstate 73 EIS: I-95 to the Myrtle Beach Region

	Dillon County	Horry County	Marion County	3-County Area Total
Approximate Land Area (acres)	259,099	725,556	313,000	1,297,655
Land in Farms (acres) (% of total area)	112,262 (43.3%)	188,311 (26.0%)	93,262 (29.8%)	393,835 (30.3%)
Number of Farms	197	988	213	1398
Average Size of Farm (acres)	570	191	438	400
Average Value of Land and Buildings (farms), dollars	$768,990	$439,723	$617,759	$608,824

Source: U.S. Department of Agriculture, 2002 Census of Agriculture.

3.14.5 What methodology was used to determine farmland impacts?

The average size of local farms, amount of prime and statewide important farmlands in the project study area corridor, and percentage of farmland to be converted by the alternatives were used to determine the *relative value* of the farmland to be converted.

Formal consultation with the NRCS for compliance with the Farmland Protection Act was completed. An evaluation utilizing the Farmland Impact Conversion Rating form for Corridor Type Projects form (NRCS-CPA-106) was performed for the proposed eight Build Alternatives. The purpose of the farmland conversion impact rating form is to help identify and

approximate the amount of farmland conversion that would be associated with each of the proposed alternatives.

Potential impacts to farmlands have been quantitatively assessed for each of the alternatives based on the three counties' prime and farmland of statewide importance. The NRCS required that a separate farmland conversion impact rating form be submitted for each county, since each has different ratings for their prime and statewide important soils. As explained previously, no unique farmland is located within the project study area.

For each alternative, two values, the relative value and the corridor assessment value, were determined. The *relative value* category was completed by the NRCS, on a scale of 0-100, the relative value of farmland to be converted by the alternatives ranged from 44 to 87 points. The *corridor assessment value* pertains to the use of land, the availability of farm support services, investments in existing farms, and the amount of land that could be rendered non-farmable due to construction of the corridor. The corridor assessment value had a scale of 0-160 points, the alternatives ranged from 53 to 70.

A "divided" farm parcel is an area divided either diagonally or laterally by the proposed right-of-way, thus dividing a single area of land into two or more plots.

3.14.6 What were the results of the Farmland Impact Conversion Evaluation?

By totaling the relative value and the corridor assessment value, it was determined that the total threshold, 160 points overall, set by NRCS, was not exceeded by the Build Alternatives in any of the three counties(refer to Table 3.38). The highest total value was 157 for Alternative 4 in Dillon County. The lowest value was 107 points for Alternative 7 in Marion County (refer to Table 3.38). Since the 160 threshold was not exceeded for any of the alternatives, mitigation actions that could reduce adverse impacts associated with the Build Alternatives would not be required.

Table 3.38
NRCS Farmland Conversion Evaluation
Point Total by Alternative
Interstate73: I-95 to Myrtle Beach Region

	Alt 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8
Dillon County	156	149	153	157	155	149	155	147
Horry County	131	130	134	128	138	139	134	128
Marion County	117	109	117	110	117	112	107	116

3.14.7 How would the proposed project impact farmlands?

The No-build Alternative would have no effect on farming operations since existing conditions would remain unchanged. Construction of the Build Alternatives would result in the direct conversion of farmland to a transportation facility. Alternative 8 would incur 2,155 acres of impact to prime and statewide important farmland soils, the highest of all proposed alternatives (refer to Table 3.39). Alternative 3 would have the least amount, 1,708 acres, of prime and statewide important farmland soils directly impacted, (refer to Table 3.39). Overall, while the difference between the highest (Alternative 8) and the lowest (Alternative 3) may be enough to differentiate it is not a substantial difference.

The Build Alternatives would also result in other impacts, such as divided farm parcels. If farm buildings or land were divided from farming operations, inaccessibility to fields or pastureland may result if access were not provided. If access is not provided, the farm operator may experience increased time requirements and expenses in order to conduct normal farming operations. The increased expenses could include the need to transfer equipment, feed, and livestock between the divided parts of the farm.

Impacts to parcels that could potentially be divided by the alternatives were identified. Given that farm size in the project study area ranges from 1 acre to 1,000 acres or more, it was determined that no parcel would

Table 3.39
Prime and Farmland of Statewide Importance Soils
Interstate73: I-95 to Myrtle Beach Region

Alternative	Total Farm-land (acres)	Dillon		Horry		Marion	
		Prime (acres)	Statewide Importance (acres)	Prime (acres)	Statewide Importance (acres)	Prime (acres)	Statewide Importance (acres)
1	1,993	417	227	261	294	368	426
2	2,009	526	321	499	129	294	240
3	1,708	420	223	422	130	252	261
4	1,717	420	222	270	278	178	349
5	2,136	486	236	490	130	368	426
6	1,835	522	331	422	140	203	217
7	1,781	360	277	498	130	178	338
8	2,155	571	331	280	285	308	380

be too small to farm. For every parcel that an alternative traversed, three areas were calculated: the area within the 400-foot corridor and the two remaining areas on either side of the corridor. The area within the 400-foot corridor was calculated as direct impacts. It is assumed that the parcels divided by an alternative could be acquired by a neighboring farm, so the farmland, even though it may be split, may not be removed from active production. Maintaining access to farms that have been split or severed by I-73 is an issue that will be further investigated for the Preferred Alternative in the Final EIS.

Table 3.40
Divided Farmland Parcels in the Project Study Area
Interstate73: I-95 to Myrtle Beach Region

Alternative	Total Corridor (acres)	Total (acres)	Dillon County (acres)	Horry County (acres)	Marion County (acres)
1	2,519	209	65	27	117
2	2,578	275	80	103	92
3	2,273	257	65	110	82
4	2,336	169	65	23	81
5	2,530	281	65	99	117
6	2,321	261	86	111	64
7	2,347	243	65	99	79
8	2,567	207	86	23	98

Alternative 5 would incur the greatest potential impact to farmland via divided parcels (281 acres) while Alternative 4 would incur the least amount of impacts via divided parcels (169 acres), (Table 3.40).

Overall, farming operations would be directly impacted as a result of the construction of the proposed project. No farmlands, besides those acquired for right-of-way, should be rendered un-farmable and access issues to divided parcels would be addressed during the right-of-way acquisition process. The conversion of farmland to right-of-way due to the construction should not cause a significant disruption of agricultural activities in the project study area.

3.14.8 What would be the potential indirect and cumulative impacts on farmland?

Impacts from induced development and cumulative impacts were calculated with the use of GIS. Spatial data layers containing acreages of projected growth by alternative (which were determined in the land use study, Section 3.5) were overlaid on the soils data (obtained from the NRCS) within the project study area. The acreages of projected growth that fell within prime farmland or farmland of statewide importance were identified and calculated.

How would development that is expected to occur with the No-build Alternative impact farmlands?

Development that would be expected under the No-build Alternative would impact approximately 20,426 acres of farmlands, including prime farmland and farmland of statewide importance. These impacts would include: in Dillon County, 28 acres of prime farmland and 20 acres of farmland of statewide importance; in Horry County, 3,373 acres of prime farmland and 1,309 acres of farmland of statewide importance; and in Marion County, 3,173 acres of prime farmland and 12,523 acres of farmland of statewide importance. Approximately 16,000 acres of this development in Marion County would be located at the site of a proposed inland port that is currently in the planning stage, located north of the City of Marion. The inland port would encompass: one acre of both prime farmland and farmland of statewide importance in Dillon

County; and 2,993 acres of prime farmland and 12,405 acres of farmland of statewide importance in Marion County. The No-build Alternative was used as a baseline to compare development that was projected as a result of the construction of I-73.

What would be the potential impacts from induced development on farmland?

In addition to the direct conversion of farmland to roadway right-of-way and indirect impacts, impacts from development induced by the construction of the project would be anticipated in the project study area. Listed in Table 3.41 are acres of impacts from induced development to farmland, based on the land use model. Alternative 2 would have the highest acres of impacts from induced development with 1,362 acres, while Alternative 3 would have the least acres of impacts with 1,014 acres.

Table 3.41
Impacts from Induced Development on Prime and Farmland of Statewide Importance Soils in the Project Study Area by Alternative
Interstate73: I-95 to Myrtle Beach Region

Alternative	Total Impacts from Induced Development to Farmland (acres)	Dillon Prime (acres)	Dillon Statewide Importance (acres)	Horry Prime (acres)	Horry Statewide Importance (acres)	Marion Prime (acres)	Marion Statewide Importance (acres)
1	1,157	69	56	304	136	349	243
2	1,362	93	33	420	241	353	222
3	1,014	43	47	336	164	230	194
4	1,047	59	55	264	135	296	239
5	1,284	56	51	436	213	300	228
6	1,152	77	28	384	182	279	202
7	1,118	46	50	393	173	262	194
8	1,303	78	32	387	229	377	240

What would be the potential cumulative impacts on farmland?

Cumulative effects on farmland are caused by the aggregate of past, present and reasonably foreseeable future actions. Cumulative impacts would include development in the project study area that would be expected under the No-build Alternative, development that may result from the project, as well as other development in the project study area that may affect farmlands. Listed in Table 3.42, page 3-127, are cumulative impacts to farmland in the project study area from development that is projected from the land use model. Alternative 2 would have the most acres of cumulative impacts with 21,906 acres, while Alternative 7 would have the least acres of cumulative impacts with 21,144 acres. However, the relatively small magnitude of the difference between alternatives means that they are essentially the same.

Table 3.42
Cumulative Impacts on Prime and Farmland of Statewide Importance Soils in the Project Study Area by Alternative
Interstate73: I-95 to Myrtle Beach Region

Alternative	Total Cumulative Impact to Farmland (acres)	Dillon Prime (acres)	Dillon Statewide Importance (acres)	Horry Prime (acres)	Horry Statewide Importance (acres)	Marion Prime (acres)	Marion Statewide Importance (acres)
1	21,648	70	95	3,677	1,445	3,522	12,839
2	21,906	121	53	3,793	1,550	3,526	12,863
3	21,440	71	67	3,709	1,473	3,403	12,717
4	21,501	87	75	3,637	1,444	3,496	12,762
5	21,710	84	71	3,809	1,522	3,473	12,751
6	21,578	105	48	3,757	1,491	3,452	12,725
7	21,144	74	70	3,766	1,482	3,035	12,717
8	21,729	106	52	3,760	1,538	3,510	12,763

In addition to projected growth and land use changes, other transportation projects in the project study area contribute to the cumulative impacts on farmlands. In 2000, construction of the Conway Bypass from U.S. Route 501 in Conway to U.S. Route 17 in North Myrtle Beach was completed. The Conway Bypass was 28.5 miles of new location roadway and its construction impacted farmlands directly and/or by bisecting parcels, which created access problems for some farm owners. The widening of S.C. Route 38 from I-95 to Marion is currently under construction. This project widened an existing route from two to four lanes, which have impacted minor amounts of farmlands adjacent to the road.

3.14.9 What Federal/USDA farmland programs are active or found in the project study area and how would they be impacted by the proposed alternatives?

In addition to prime, unique, and statewide or locally important farmlands, the NRCS and USDA have developed other programs for farmlands that provide incentive for landowners to protect, enhance, or conserve their properties. Below are the different types of programs being used in the project study area (refer to Figure 3-35, page 3-128). Table 3.43, page 3-129 lists the amount of acreage for each program within the project study area.

Farm and Ranch Lands Protection Program

The Farm and Ranch Lands Protection Program (FRPP) is a voluntary program managed by NRCS that helps farmers and ranchers keep their land in agriculture. Matching funds are provided by the program to State, Tribal, or local governments and non-governmental organizations with existing farm and ranch land

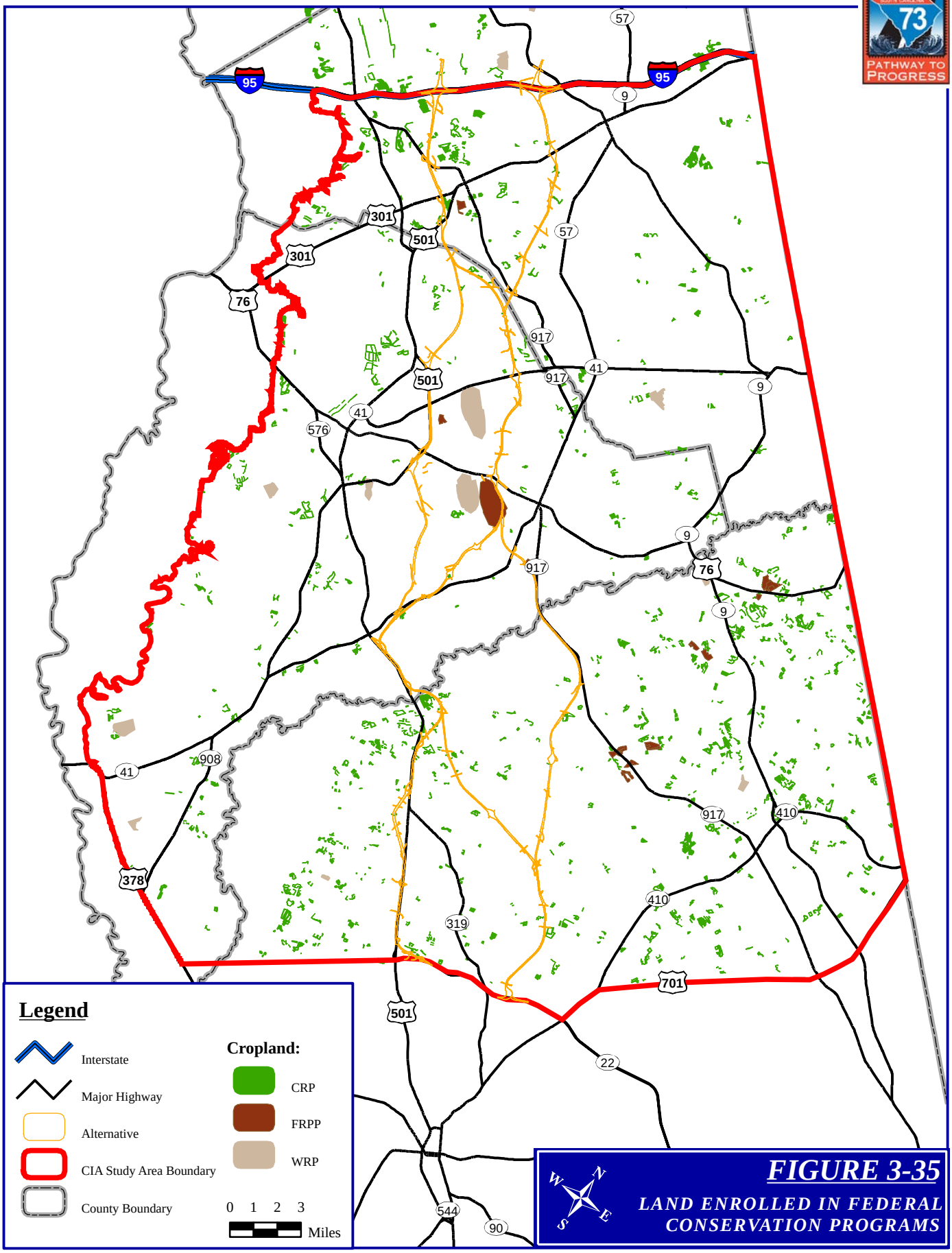


FIGURE 3-35

LAND ENROLLED IN FEDERAL CONSERVATION PROGRAMS

Table 3.43
Land Enrolled in Federal Conservation Programs
Interstate 73 EIS: I-95 to the Myrtle Beach Region

	Dillon County	Horry County	Marion County
Conservation Reserve Program (acres)	3,083	7,374	1,720
Farm and Ranch Lands Protection Program (acres)	74	698	1,046
Wetland Reserve Program (acres)	409	1,660	2,361

Source: USDA, NRCS South Carolina Office

protection programs to purchase conservation easements. The Farm and Ranch Lands Protection Program was reauthorized in the Farm Bill to protect working agricultural land from conversion to non-agricultural uses.[85]

Alternatives 1, 2, 5, and 8 would intersect only one of the easements, while Alternative 3 and Alternative 6 would intersect both sites. Alternative 4 and Alternative 7 would not affect either of the easements. If the proposed alternative would traverse through these easements, the remainder of the land in the affected parcels would remain in the program and no mitigation would be required.

Conservation Reserve Program

The Conservation Reserve Program (CRP) was established in 1985 and takes land prone to erosion out of production for 10 to 15 years and devotes it to conservation. In return, farmers receive an annual payment for applying approved conservation practices on the conservation acreage. Under Conservation Reserve Program contracts, farmers are compensated for planting permanent covers of grass and trees on land subject to erosion. This vegetation can improve water quality or habitat for wildlife in the area. The USDA's Farmland Service Agency administers this voluntary program.

Wetlands Reserve Program

The Wetlands Reserve Program (WRP) is another voluntary program administered by the NRCS, which offers landowners financial incentives to enhance wetlands by retiring marginal agricultural land. To be eligible, land must be restorable and provide significant wetland and wildlife habitat. The program offers landowners three options: restoration cost-share agreements of a minimum 10-year duration, 30-year easements, or permanent easements.

Even though there is land in the Wetland Reserve Program within the project study area, none would be impacted by any of the proposed alternatives.

[85] Farm Bill, 2002.

There are over 200 Conservation Reserve Program easements in the project study area. All of the proposed alternatives would intersect multiple easements, ranging from 15 to 34 easements (Table 3.44). Alternative 6 would intersect the fewest easements (15), which contain approximately 58 acres of land. The alternatives with the most impacts to easements are Alternative 1, which intersects 34 sites and Alternative 8, which intersects 27 sites. Both alternatives would impact approximately 213 acres of land. If the proposed alternative would traverse through an easement, the remainder of the land in the affected parcels would remain in the program and no mitigation would be required.

Table 3.44
Impacts to Land in the Conservation Reserve Program
Interstate73: I-95 to Myrtle Beach Region

	Total acres	Total Number of Sites	Dillon County	Horry County	Marion County
Alt. 1 acres (sites)	213	34	26 (11)	52 (6)	135 (17)
Alt. 2	184	17	26 (6)	52 (4)	106 (7)
Alt. 3	77	22	39 (11)	16 (4)	22 (7)
Alt. 4	177	29	39 (11)	3 (1)	135 (17)
Alt. 5	205	24	39 (11)	59 (6)	107 (7)
Alt. 6	58	15	26 (6)	10 (2)	22 (7)
Alt. 7	149	19	39 (11)	3 (1)	107 (7)
Alt. 8	213	27	26 (6)	52 (4)	135 (17)

3.15 What types of uplands are found in the project study area?

3.15.1 What are upland communities?

Upland communities generally are dry areas with the water table at one foot or more below ground during the growing season. These areas support plant and animal species that are adapted for survival in dry conditions, such as plants that have developed long tap roots to reach deep water tables and burrowing mammals that make their homes underground. South Carolina's coastal plain contains many types of natural upland communities. Each community is characterized by its vegetative composition, landscape position, soil type, and hydrologic regime. To gather baseline data for potential impacts to natural communities, uplands were identified in an 8-mile wide corridor extending from I-95 to S.C. Route 22 known as the upland study area (Figure 3-1).

Upland biotic communities identified within the upland study area were classified based on their vegetative composition as described in *The Natural Communities of South Carolina*.[86] Nelson lists the following six natural upland communities that occur in the uplands study area:

- Levee;
- Mesic mixed hardwood forest;
- Oak-hickory forest;
- Pine-scrub oak sandhill;
- Upland pine-wiregrass woodland; and,
- Xeric sandhill scrub.

3.15.2 Why are uplands important?

Upland communities can provide a variety of benefits for both the human and natural environments. Based on a review of the aerial photography, vast amounts of land within the uplands study area are currently used for crop and timber production. Most industrial, commercial, and residential development occur on uplands, especially since the advent of the Section 404 permitting program. Furthermore, naturally vegetated uplands serve as recreational areas for outdoor activities such as hunting, hiking, camping, bird watching, and nature photography.

While natural, unaltered upland communities are sparsely scattered throughout the uplands study area, they provide essential habitat for wildlife to nest, raise young, forage, and hide from predators. Forested areas along the major waterways such as the Little Pee Dee River and Buck Swamp provide safe corridors for animal species that move frequently in search of food sources. Continuous or un-fragmented natural corridors are the most beneficial to these mobile species. Upland communities also provide resting and foraging habitat for migratory bird species that move through South Carolina on their way to northern summer nesting areas or southern over-wintering areas.

Forested and other permanently vegetated upland habitats located adjacent to wetlands and streams also provide water quality enhancement. Stormwater runoff from roadways, farm fields, and parking lots flows through these areas before reaching the waterbodies, which helps filter sediments and other pollutants. These vegetated buffer areas also stabilize the soils adjacent to wetlands and streams, reducing the likelihood of erosion that degrades or destroys aquatic species habitat. In addition, shading from upland communities along streams allow for cooler water temperatures, which some aquatic species require.

What does overstory, shrub layer, and herbaceous layer mean?

The overstory is composed of plants that are mature trees, and are typically the top layer of leafy growth.

The shrub layer and herbaceous layer make up the understory. The shrub layer consists of plants that are small woody species or saplings of larger trees.

The herbaceous layer includes plants that are not made up of woody material, and include herbs and grasses.

[86] Nelson, J.B. (1986). *The Natural Communities of South Carolina*. South Carolina Wildlife and Marine Resources Department.

3.15.3 How were upland communities identified for this project?

Initially, the SCDNR's Gap Analysis Program (GAP) data and the National Wetland Inventory (NWI) maps were used to identify the upland community types within the uplands study area. The 2005 infrared aerial photography was reviewed within a 600-foot wide corridor for each alternative and the GAP database was updated based on the current land use conditions depicted. Field visits were conducted to verify changes and the GAP data was corrected to correlate the GAP habitat designations with the Nelson habitat descriptions. Changes made to the mapping included updating agricultural fields that were converted to pine plantations or housing developments; changing former pine dominated forests that have transitioned to mixed pine/hardwood forests; and revising forested areas that have been clear-cut and are in early successional condition.

What is GAP?

The Gap Analysis Program (GAP) is a nationwide program in which dominant natural vegetation is mapped using satellite imagery, as well as other sources, and native vertebrate species are mapped based on museum and agency collection records. GAP data can be used in conjunction with GIS as a planning tool to identify the distribution of plants communities and animals.

3.15.4 What upland natural community types were identified within the upland study area?

During the review of GAP data, NWI maps, aerial photography, and results of the field visits, the following natural upland communities were identified in the 600-foot wide corridors along the alternatives:

- Levee;
- Mesic mixed hardwood forest;
- Oak-hickory forest; and,
- Pine-scrub oak sandhill.

Since the upland study area has a rich history of agriculture and timber production, only a few upland communities were identified that could be considered natural. In addition, many of the natural communities have been fragmented by agricultural practices and development.

Levee

A levee is defined as a natural overflow barrier that occurs parallel to major brown- or blackwater river channels. Levees are periodically flooded, and sometimes destroyed as a result. The early "cane bottoms" (areas dominated by cane, *Arundinaria gigantea*) in South Carolina were probably associated with levees, but are now essentially gone. Typical overstory species include sycamore *(Platanus occidentalis)*, river birch (*Betula nigra*), laurel oak (*Quercus laurifolia*), various willows (*Salix* spp.), swamp chestnut

oak (*Quercus michauxii*), tulip-poplar (*Liriodendron tulipifera*), sweet-gum (*Liquidambar styraciflua*), water ash (*Fraxinus caroliniana*), water hickory (*Carya aquatica*), red maple (*Acer rubrum*), box-elder (*Acer negundo*), water-elm (*Planera aquatica*) and hornbeam (*Carpinus caroliniana*). The shrub layer includes parsley hawthorn (*Crataegus marshallii*), and swamp haw (*Crataegus viridis*). The herbaceous layer may include cane (*Arundinaria gigantea*) and false nettle (*Boehmeria cylindrica*).[87]

Mesic mixed hardwood forest

A mesic (moist soils) mixed hardwood forest is described as an upland forested slope or ravine. In the coastal plain, it is most frequently found on north-facing river banks. It may be difficult or impossible to recognize a single dominant species since the vegetation is so diverse. Typical overstory species include tulip-poplar, sweet-gum, red maple, black gum (*Nyssa sylvatica*), white oak (*Quercus alba*), black oak (*Quercus velutina*), beech (*Fagus grandifolia*), flowering dogwood (*Cornus florida*), hornbeam, American holly (*Ilex opaca*), and witch-hazel (*Hamamelis virginiana*). The shrub layer includes numerous species such as horse-sugar (*Symplocos tinctoria*) and pinxter-flower azalea (*Rhododendron nudiflorum*). The herbaceous layer may include partridgeberry (*Mitchella repens*) and green-and-gold (*Chrysogonum virginianum*).[88]

Soybean Field

Oak-hickory forest

Oak-hickory forests are described as diverse mixtures of hardwoods (primarily oaks) with some pines, found on upland slopes between rivers and tributaries on the coastal plain. Typical overstory species include white oak, black oak, blackjack oak (*Quercus marilandica*), post oak (*Quercus stellata*), scarlet oak (*Quercus coccinea*), mockernut hickory (*Carya tomentosa*), pignut hickory (*Carya glabra*), red maple, flowering dogwood, tulip-poplar, loblolly pine (*Pinus taeda*), and black gum. The shrub layer includes strawberry-bush (*Euonymus americana*), various viburnums (*Viburnum* spp.), horse-sugar, and several blueberries (*Vaccinium* spp.). The herbaceous layer may include crane-fly orchid (*Tipularia discolor*), spotted-wintergreen (*Chimaphila maculata*), dollar-leaf (*Rhynchosia reniformis*), and pencil-flower (*Stylosanthes biflora*).[89]

Pine-scrub oak sandhill

Pine-scrub oak sandhills are found on flat or hilly terrain on lower slopes of sandhills, on sandhills with relatively high amounts of organic matter, or on higher spots with more moisture. The overstory is characterized by longleaf pine, blackjack oak, bluejack oak (*Quercus incana*), post oak, and scrubby post oak (*Quercus margaretta*).

[87] *Ibid.*
[88] *Ibid.*
[89] *Ibid.*

The shrub layer typically includes deerberry (*Vaccinium stamineum*) and dwarf huckleberry (*Gaylussacia dumosa*). The herbaceous layer is dominated by grasses in the genera *Andropogon* and *Aristida*. Other herbaceous species include goat's-rue (*Tephrosia virginica*), various blazing-stars (*Liatris* spp.), trailing-arbutus (*Epigaea repens*), and bracken fern (*Pteridium aquilinum*).[90]

Three upland communities that are not formed naturally, and two formerly functioning as a wetland system, were identified. These are:

- Agricultural fields;
- Timberlands;
- Developed land;
- Drained bottomland hardwoods; and,
- Drained pine flatwoods.

Although timberlands and bottomland hardwoods are altered areas, they continue to provide the wildlife habitat and recreational opportunities as described earlier. Selective harvesting of trees from forested areas provides openings in the overstory, which allows sunlight to reach the ground. This promotes growth of herbaceous and shrub plant species, thereby making the forest habitat more diverse, which in turn provides additional nesting and foraging opportunities for wildlife such as small mammals and birds.

Agricultural fields and timberlands

Agricultural fields and timberlands are not natural communities. However, these upland communities are significant elements within the study area and therefore have been added. Agricultural fields are lands either currently planted with crops or fallow fields that have not yet succeeded to another community type. Timberlands include pine plantations, and are managed primarily for pulpwood. Typically, these areas are planted with loblolly pine or slash pine (*Pinus elliottii*).

Developed land

Although not natural communities, a category classified as "developed land" was added to describe industrial, commercial, residential, or otherwise developed upland areas.

Drained bottomland hardwoods

A bottomland hardwood is typically defined as a forested wetland area occurring on floodplains and in drainage areas. However, many bottomland hardwoods identified during the upland community study have had their hydrology altered and no longer function as wetlands. Typical tree species include sweetgum, red maple, swamp gum (*Nyssa sylvatica* var. *biflora*), water oak (*Quercus nigra*), laurel oak, cottonwoods (*Populus* spp.),

[90] *Ibid.*

willows (*Salix* spp.), river birch, and loblolly pine. The shrub layer consists of gallberry (*Ilex coriacea*), fetterbush (*Lyonia lucida*), sweet-bay (*Magnolia virginiana*), red-bay (*Persea borbonia*), and arrowwood (*Viburnum dentatum*).

Drained pine flatwoods

Pine flatwoods are found on flat or rolling terrain with a canopy of pines and a well-developed understory of several tall shrub species, and are usually defined as a wetland area. However, many of the pine flatwoods identified during the upland community study area have had their hydrology altered and no longer function as wetlands. Longleaf pine (*Pinus palustris*) is the most common overstory species, but loblolly and slash pine are also found. The understory and shrub layers may include sweet-gum, sweetbay (*Magnolia virginiana*), loblolly-bay (*Gordonia lasianthus*), inkberry (*Ilex glabra*), sweet gallberry (*Ilex coriacea*), wax-myrtle (*Myrica cerifera*), various fetterbushes (*Lyonia* spp.), dwarf huckleberry (*Gaylussacia dumosa*), low-bush blueberry (*Vaccinium tenellum*), ti-ti (*Cyrilla racemiflora*), possum-haw viburnum (*Viburnum nudum*), and running oak (*Quercus pumila*). The herbaceous layer is dominated by grasses in the genera *Andropogon* and *Aristida*.[91]

3.15.5 What impacts to upland natural community would occur?

Impacts to upland natural communities would consist of clearing and grubbing of vegetation within the construction limits in preparation of construction of the road. Excavation and/or the placement of fill material would occur to construct the road bed. Each of the Build Alternatives would impact upland natural communities. Table 3.45, page 3-136, provides the forested upland community impacts by community type that would result from the construction of each Build Alternative.

The Build Alternatives can be grouped together in four groups with each alternative having similar impacts, and one alternative occupying a group by itself. Alternatives 3 and 7 would have basically the same impacts, as would Alternatives 4, 5, and 6. The next highest impact group would be Alternatives 1 and 2, followed by Alternative 8 with the highest amount of upland impacts. Each alternative in a group would have less than 20 acres of impacts separating the lowest from the highest impact for that group. Each group would have less than 30 acres of impact between highest impact of that group and the lowest impact of the next group. The total impacts to forested uplands would range from a low of approximately 439.9 acres for Alternative 7, to a high of 562.9 acres for Alternative 8. The majority of the upland impacts from each Build Alternative would occur to agricultural and developed lands. The portion of forested uplands that would potentially be impacted would range from 23 to 26 percent of the total upland impacts for the Build Alternatives (refer to Section 3.1, Land Use, and Section 3.14, Farmlands) .

[91] *Ibid.*

Table 3.45
Potential Upland Community Impacts in Acres
Interstate73: I-95 to the Myrtle Beach Region

Upland Type	Alternatives							
	1	2	3	4	5	6	7	8
Oak-Hickory Forest	134.1	159.3	98.5	101.2	122.7	135.1	89.7	170.8
Pine Flatwoods	147.1	107.8	112.8	133.2	134.9	85.7	121.0	120.0
Pine-Scrub Oak	18.4	34.1	33.6	12.8	24.9	42.7	19.4	27.5
Timberlands	233.9	212.8	201.7	241.6	202.1	212.4	209.8	244.6
Total Upland Impact	**533.5**	**514.0**	**446.6**	**488.8**	**484.6**	**475.9**	**439.9**	**562.9**

Source: THE LPA GROUP INCORPORATED, 2006

Upland community impacts would result in the removal of wildlife habitat as discussed in Section 3.21. Of the forested uplands that would be impacted, the oak-hickory forest would support the most wildlife diversity due to the presence of mast producing species, on which animal species such as turkey, squirrels, and white tailed deer feed.

Alternative 7 would have the least impact to oak-hickory forests followed by Alternatives 3, 4, 5, 1, 6, 2, and 8 in ascending impacts. Pine flatwoods typically have a dense understory and provide cover and browse for white tailed deer. These areas also provide nesting and forage habitat for a variety of perching bird species. Alternative 6 would have the least impact to pine flatwoods followed by Alternatives 2, 3, 8, 7, 4, 5, and 1 in ascending order.

Pine-scrub oak forests are the least diverse of the upland habitats from a wildlife standpoint, however Pickering's morning-glory and crestless plume orchid, both state listed species, occur in this habitat type. None of the federally-listed species occur in pine-scrub oak communities. Alternative 4 would have the least impacts to this community type followed by Alternatives 1, 7, 5, 8, 3, 2, and 6 in ascending impacts.

The largest portion of the upland forest impacts would occur to timberlands, or managed pines, which typically have relatively low wildlife diversity when compared to the other upland types that would be impacted. Also, these forested areas are frequently disturbed by logging operations during which wildlife is displaced to adjoining upland communities. Timberlands could provide foraging habitat for red-cockaded woodpeckers. However, these forests generally are harvested before they reach maturity which is required for suitable red-cockaded woodpecker nest colonies. Impacts to timberlands would be basically the same for all the Build Alternatives with 43 acres difference between the lowest impact, Alternative 3, and the highest impact, Alternative 8.