3.3 Environmental Justice

3.3.1 What is Environmental Justice?

Disproportionate

Disproportionate is defined in two ways:
- The impact is predominately borne by the minority or low-income population group or,
- The impact is "more severe" than that experienced by non-minority or non-low income populations.

Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations, requires that each Federal agency shall, to the greatest extent allowed by law, administer and implement its programs, policies, and activities that affect human health or the environment to identify and avoid "disproportionately high and adverse" effects on minority and low-income populations.

FHWA defines minority and low-income populations as the following:
"Minority means a person who is:
(1) Black (having origins in any of the black racial groups of Africa);
(2) Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
(3) Asian American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or
(4) American Indian and Alaskan Native (having origins in any of the original people of North America and who maintain cultural identification through tribal affiliation or community recognition)." [53]

"Minority population means any readily identifiable groups or minority persons who live in a geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed FHWA program, policy or activity."[54]

"Low-Income means a household income at or below the U.S. Department of Health and Human Services (USHHS) poverty guidelines."[55]

"Low-Income population means any readily identifiable group of low-income persons who live in a geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed FHWA program, policy or activity."[56]

[53] FHWA, Order 6640.23, 2(c), *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (December 2, 1998).
[54] *Ibid* at 2(e).
[55] *Ibid* at 2(b).
[56] *Ibid* at 2(d).

FHWA has identified three fundamental environmental justice principles:[57]

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

To identify minority and low-income populations, information from the 2000 U.S. Census was collected for each block group within the project study area between I-95 and I-74. Delineated by the U.S. Census Bureau, a block group is the smallest geographic unit for which demographic data are readily available. Demographic data include the physical characteristics of a population such as age, sex, race, marital status, family size, education, geographic location, and occupation. The information collected for each block group included the total population, total minority population, and total population living below the poverty level. From this data, the percentage of persons classified as minority and the percentage of persons below the poverty level were calculated. For the purposes of identifying low-income populations in the project study area, the USHHS poverty thresholds were used (refer to Table 3.15).

Table 3.15
2000 USHHS Poverty Thresholds

Size of Family Unit	Weighted Average Thresholds
1	$ 8,794
2	$ 11,239
3	$ 13,738
4	$ 17,603
5	$ 20,819
6	$ 23,528
7	$ 26,754
8	$ 29,701
9	$ 35,060

Source: U.S. Census Bureau, Housing and Household Economic Statistics Division, Last Revised: December 7, 2005

Once the baseline minority and low-income populations were identified, the block group data was compared to the populations within the state, county and the area of each county within the project study area. Since the characteristics of the four counties varied, the percentage of minority and low-income populations within the project study area in each individual county was used as the threshold. The threshold was then utilized for determining if a

Executive Order 12898

"The selection of the appropriate unit of analysis may be governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as not to artificially dilute or inflate the affected minority population."

[57] FHWA, Environmental Justice Website, "An Overview of Transportation and Environmental Justice," http://www.fhwa.dot.gov/environment/ej2000.htm (May 20, 2008).

block group potentially contained high concentrations of environmental justice populations. The project study area was chosen as the unit of analysis so as not to artificially dilute or inflate the affected populations, as stated in Executive Order 12898.

Efforts were made to include low-income and minority populations within the project study area in the project development process. The public involvement efforts are described more fully in Chapter 4, Public Involvement and Agency Coordination, but include:

- Public Information Meetings in central locations, including Bennettsville and Hamlet;
- Stakeholder meetings, including National Association for the Advancement of Colored People (NAACP) representatives;
- Distribution of surveys through small community grocery and convenience stores; and,
- Door–to–door surveys within low-income and minority communities to ensure input.

3.3.2 Are there minority populations in the project study area?

There are a total of 56 block groups within the project study area, including 11 block groups in Dillon County, 29 block groups in Marlboro County, 12 block groups in Richmond County, and four block groups in Scotland County (refer to Figure 3-25, page 3-93). The portions of each county located within the project study area had the following percentages of their population defined as minority: Dillon (60 percent), Marlboro (56 percent), Richmond (36 percent), and Scotland (46 percent). These percentages were used as the minority thresholds for each county and project study area.

There are 24 block groups located within the project study area that have minority populations at or above the threshold percentage for their respective counties (six in Dillon, 11 in Marlboro, five in Richmond, and two in Scotland). The percent of the total population of the project study area defined as minority in the year 2000 was estimated at approximately 50 percent. This rate is 15 percent higher than South Carolina (35 percent) as a whole, 22 percent higher than North Carolina (28 percent) as a whole, and 25 percent higher than the United States (refer to Table 3.16, page 3-92).

3.3.3 Are there low-income populations in the project study area?

In the project study area, the percentages of the population considered to be low-income or living below the poverty level in each county are as follows: Dillon County (27 percent), Marlboro County (20 percent), Richmond County (17 percent), and Scotland County (18 percent). Figure 3-25 (refer to page 3-93) identifies these block groups for each county.

Table 3.16
Minority Population, 2000

	Total Population	Total Minority Population	Percent Minority Population
South Carolina	4,012,012	1,411,528	35 %
North Carolina	8,049,313	2,244,657	28 %
Project Study Area (PSA)	56,926	28,684	50 %
Dillon County	30,722	15,780	51 %
Dillon Co. PSA	6,545	3,915	60 %
Marlboro County	28,818	16,203	56 %
Marlboro Co. PSA	28,818	16,203	56 %
Richmond County	46,564	17,690	38 %
Richmond Co. PSA	13,498	4,845	36 %
Scotland County	35,998	17,886	50 %
Scotland Co. PSA	8,065	3,721	46 %

Source: U.S. Census Bureau, 2000

Of the total 56 block groups within the project study area, 29 block groups represent areas of low-income populations (four in Dillon, 19 in Marlboro, four in Richmond and two in Scotland). Twenty percent of the total population within the project study area was found to be living at or below the poverty level in the year 2000. This rate is six percent higher than South Carolina, eight percent higher than North Carolina, and 12 percent higher than the United States (refer to Table 3.17, page 3-94).

According to the FHWA definitions, minority and/or low-income populations do reside within the project study area (refer to Figure 3-25). Twenty-four block groups represent areas of minority population, while 29 block groups represent areas where the population is living below the poverty level in the project study area (refer to Table 3.18, page 3-94). Sixteen block groups meet both the minority and low-income thresholds set forth by the FHWA.

3.3.4 How were potential environmental justice impacts evaluated?

Executive Order 12898 requires that the proposed project be reviewed to determine if there would be disproportionately high or adverse effects on environmental justice populations. It also requires the review of the goals to achieve a fair distribution of benefits and burdens to all communities impacted by the Preferred Alternative while allowing those living within the project study area to participate in the transportation decision-making process.

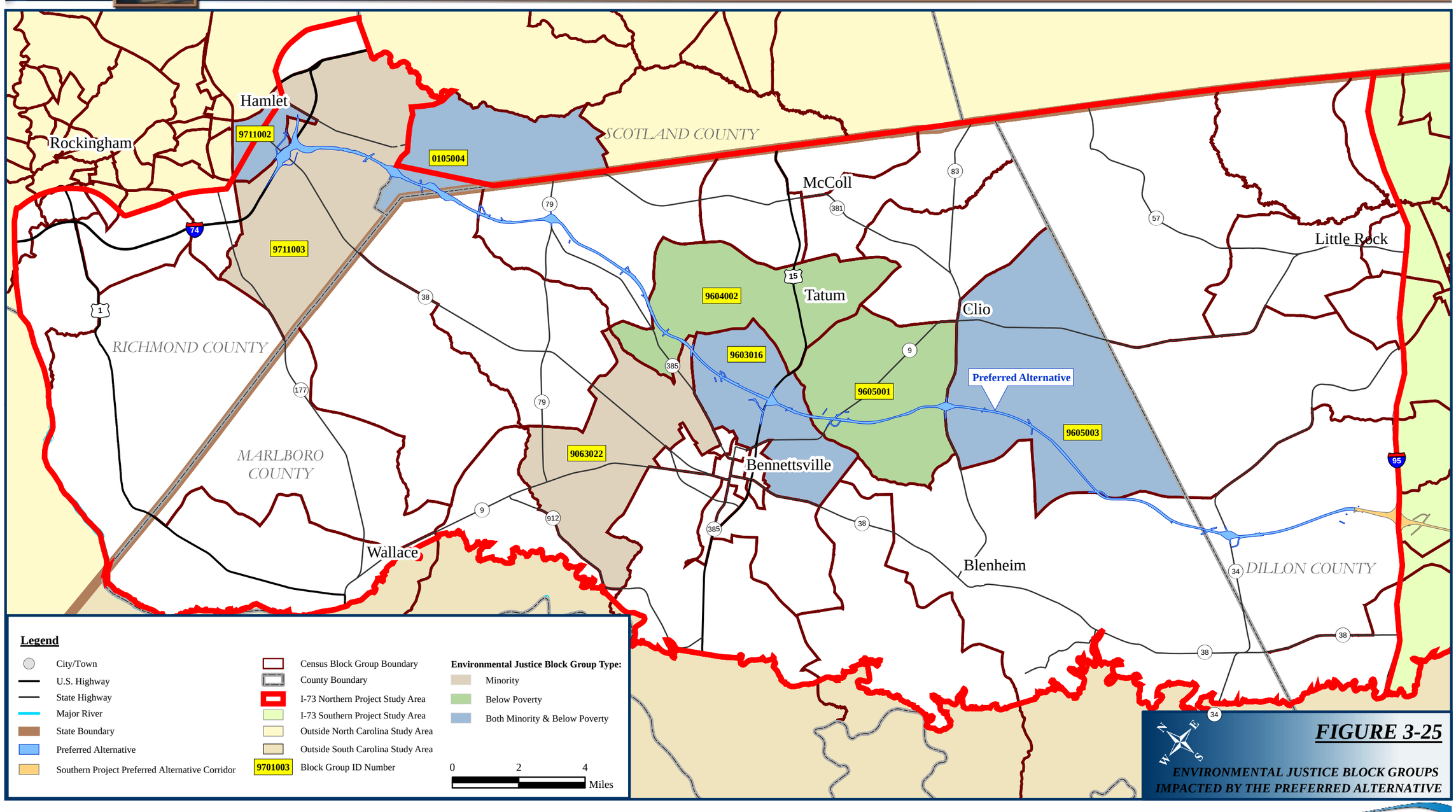

FIGURE 3-25

ENVIRONMENTAL JUSTICE BLOCK GROUPS IMPACTED BY THE PREFERRED ALTERNATIVE

Table 3.17
Low income Population, 2000

	Total Population	Total Below Poverty	Percent Below Poverty
South Carolina	4,012,012	547,869	14 %
North Carolina	8,049,313	958,667	12 %
Project Study Area (PSA)	56,926	11,375	20 %
Dillon County	30,722	7,311	24 %
Dillon Co. PSA	6,545	1,741	27 %
Marlboro County	28,818	5,882	20 %
Marlboro Co. PSA	28,818	5,882	20 %
Richmond County	46,564	8,754	19 %
Richmond Co. PSA	13,498	2,300	17 %
Scotland County	35,998	7,212	20 %
Scotland Co. PSA	8,065	1,452	18 %

Source: U.S. Census Bureau, 2000

Table 3.18
Total Number of Block Groups with EJ Populations

	Total Block Groups	Minority Block Groups	Low-Income Block Groups	Low-Income & Minority Block Groups
Dillon County	11	6	4	3
Marlboro County	29	11	19	9
Richmond County	12	5	4	3
Scotland County	4	2	2	1
Project Study Area	56	24	29	16

Source: U.S. Census Bureau, 2000 U.S. Census.

Block groups with concentrations of environmental justice populations above the county and project study area thresholds were identified during project development. The Preferred Alternative has been shifted and modified to avoid and/or minimize impacts to communities, including the low-income and minority areas in Adamsville, Bennettsville, Bingham, Clio, Dunbar, Hamlet, Lester, Minturn, Newtonville, and Tatum. For further information, please refer to Chapter 2, Section 2.7.2 page 2-47.

Although these areas were specifically identified, low-income and minority block groups make up 66 percent of all block groups within the project study area and environmental justice populations are widely spread throughout the four counties.

A block group analysis was conducted to identify the number of minority and low-income areas that would be impacted by the Preferred Alternative. The Preferred Alternative was then examined to determine whether disproportionate patterns or concentrations of adverse effects would occur in areas with environmental justice populations when compared to impacts in other areas of the project study area.

3.3.5 Would any minority and low-income populations be impacted?

The effects of the No-build Alternative on populations within the project study area would be essentially the same for all environmental justice areas. No relocations or visual impacts would occur. However, under the No-build Alternative, traffic volumes on local routes such as S.C. Route 38 would continue to increase and local travel patterns and accessibility in environmental justice communities could be affected. Other negative effects of the No-build Alternative may be the lack of increased development and employment opportunities within the project study area.

In total, there are 56 block groups in the project study area, of which 37 block groups (66 percent) meet the established thresholds for low-income and/or minority (refer to Figure 3-25, page 3-93). The Preferred Alternative passes through 12 of these 56 block groups within the project study area. Of these 12 block groups, 8 (66 percent) meet the established thresholds to qualify as low-income and/or minority, including five in Marlboro County, two in Richmond County, and one in Scotland County. Environmental justice populations also exist in 29 other block groups within the project study area, but these are not directly impacted by the Preferred Alternative.

Six block groups of the 12 impacted by the Preferred Alternative have minority populations over their respective county thresholds including the following: three minority block groups in Marlboro County, two in Richmond County, and one in Scotland County (refer to Table 3.19). Six of the 12 total block groups impacted by the Preferred Alternative meet their respective county thresholds for low-income populations, including four in Marlboro County, one in Richmond County, and one in Scotland County (refer to Table 3.19).

The Preferred Alternative impacts 66 percent of minority and/or low-income block groups wtihin the project study area (refer to Table 3.19). The percentage of environmental justice census block groups impacted by the Preferred Alternative is equal to the composition of the project study area as a whole (66 percent).

Table 3.19
Block Groups Impacted by the Preferred Alternative

Block Group	Percent Minority	Percent Low Income	Preferred Alternative
Dillon County			
450339706001	37%	19%	x
Marlboro County			
450699603016	**78%**	**27%**	**X**
450699603021	46%	12%	x
450699603022	**69%**	9%	**X**
450699604001	52%	9%	x
450699604002	50%	**21%**	**X**
450699605001	52%	**20%**	**X**
450699605003	**69%**	**33%**	**X**
450699606002	34%	17%	x
Richmond County			
371539711002	**78%**	**35%**	**X**
371539711003	**41%**	11%	**X**
Scotland County			
371650105004	**62%**	**20%**	**X**
Total number of block groups impacted by the Preferred Alternative			12
Number of minority/low-income block groups that are impacted by the Preferred Alternative			8
Percent of block groups impacted by Preferred Alternative that are EJ			66%

Notes:
Blue Bold text signifies that area qualifies as an EJ area.
X signifies EJ block group impacted by Alternative; x signifies non-EJ block group impacted by the Preferred Alternative.

3.3.6 What other methods were used to consider impacts to environmental justice populations in the project study area?

Due to the rural nature of the area, block groups are very large and development can be sparse. The Preferred Alternative passes through block groups that are considered to contain environmental justice populations, but do not impact these populations or communities. It also was evident based on field observations, community impact studies, survey data, and block level census data, that some communities that fell within low-income or minority block groups were not actually low-income or minority populations. Other communities were identified to have concentrations of low-income and minority populations, but did not fall within the identified low income and/or minority

block groups. For these reasons, a community-based analysis of impacts was conducted to identify the location of potential disproportionate effects associated with the Preferred Alternative. Issues that were considered when evaluating the potential for environmental justice impacts included the following:

- relocations;
- effects on community cohesion;
- economic impacts;
- access and mobility issues;
- noise impacts;
- change of visual character; and,
- impacts to parks and community facilities.

In general, comments and surveys received from environmental justice communities played an important part in establishing whether effects on the communities of concern were positive or negative, as well as determining the magnitude of the potential impacts.

3.3.6.1 Relocations

Areas with known concentrations of environmental justice populations were identified during the EIS analysis. Concerted efforts were made to shift the Preferred Alternative to avoid or minimize impacts to these communities, including low-income and minority areas in Adamsville, Bennettsville, Dunbar, and Hamlet. In many instances, the Preferred Alternative was shifted from known environmental justice areas to minimize relocations and direct impacts to environmental justice populations in these communities. For further information, refer to Chapter 2, Section 2.7.2, page 2-47.

For the purpose of the community-based study, relocations that fell within both environmental justice block groups and community boundaries, as defined by survey responses from citizens in the project study area, were included in Table 3.20. Total relocations within environmental justice block groups were tallied for the Preferred Alternative.

Because relocations located within environmental justice block groups could not be confirmed as minority and/or low-income at this stage in project development, the total number of relocations that fell within environmental justice block groups were counted. The Preferred Alternative would have 15 residential and four business relocations in these block groups.

Overall, the pattern of residential displacements is evenly dispersed throughout populations along the Preferred Alternative and relocations within minority or low-income populations did

Table 3.20
Community and Block Group Relocations

	Community	Relocations
Dillon County – no EJ block groups identified		
Marlboro County		
450699603016	Bennettsville	2B,1R
450699605001	Bennettsville	3R
450699603022	Adamsville	1R
450699605003	Dunbar	2R
Richmond County		
371539711003	Hamlet	2B, 3R
371539711002	Hamlet	1R
Scotland County		
371650105004	Hamlet*	4R
	Total	**4B, 15R**

Notes:
R = residential relocation
B = business relocation
* Defined as Hamlet from the community survey

not constitute a disproportionately high and adverse effect on any single community. Other non-environmental justice communities would experience similar relocation effects and no particular community would bear a disproportionate portion of the relocations.

Based on field visits, housing and/or land would be available for those who are displaced to relocate within the affected communities. For further information about the relocation process, please refer to the Communities Section (Section 3.2.16, page 3-86).

3.3.6.2 Community Cohesion

Community cohesion is affected when neighborhoods are divided or relocations reduce the number of residences in a community. As discussed in the Communities Section (refer to Section 3.2, page 3-26), none of the communities along the Preferred Alternative are expected to experience impacts to community cohesion due to the construction of the proposed project. For additional discussion on community cohesion, refer to Chapter 3, Section 3.2, page 3-26, and the *Community Impact Analysis Technical Memorandum*.

3.3.6.3 Economic Impacts

The population of the project study area would be expected to benefit from economic opportunities resulting from the project. Potential economic opportunities could be beneficial to low-income populations in terms of more jobs and additional business development. Specific communities within the project study area including Bennettsville and Hamlet have expressed support for the project due to the potential economic opportunities. For additional discussion on economic impacts, refer to Chapter 2, Section 2.6.1.2 on page 2-33.

3.3.6.4 Access and Mobility

The Preferred Alternative may cause minor changes to local access and mobility in communities throughout the project study area. Connectivity of travel routes would be maintained by the construction of crossovers and frontage roads. Overall, changes in travel patterns and accessibility within communities are expected to be minor and should not prevent residents from accessing their churches, neighbors, or business and commercial centers. Therefore, environmental justice populations would not suffer a disproportionate impact from changes in travel patterns. For additional discussion on impacts to access and mobility, refer to Chapter 3, Section 3.2, page 3-26, and the *Community Impact Analysis Technical Memorandum*.

3.3.6.5 Noise

The Preferred Alternative would have the potential to introduce traffic noise into rural communities. Residences along the Preferred Alternative may experience noise levels above what currently exists. Overall, noise impacts resulting from the proposed project would be minimal, with eight residences, a seasonal produce stand, and a cemetery being impacted by the Preferred Alternative. For more information about potential noise impacts, please refer to Chapter 3, Section 3.8, page 3-114. Impacted receivers would be distributed throughout the project study area, with no community experiencing more than one impacted receiver and only three impacted receivers falling within environmental justice block groups. Therefore, no individual community or environmental justice population would experience disproportionate noise impacts.

3.3.6.6 Visual and Aesthetic Character

As discussed in Section 3.2 (refer to page 3-26), the Preferred Alternative would have the potential to change the visual environment of environmental justice communities. The effect in view and aesthetic character depends on the existing characteristics of the community; the distance between homes and the proposed project; and whether the facility is at-grade, contains an elevated overpass, or interchange. The Preferred Alternative may alter the visual elements

of environmental justice populations living in the following communities: Adamsville, Clio, Dunbar, Hamlet, Lester and Tatum. However, non-minority and non-low income populations in these and other communities would experience similar changes to the visual landscape, and therefore, environmental justice populations would not bear a disproportionate impact. For additional discussion on anticipated changes to visual and aesthetic character, refer to the *Community Impact Analysis Technical Memorandum*.

3.3.6.7 Parks and Community Facilities

The Preferred Alternative would not impact any public parks, facilities or churches located in environmental justice communities.

3.3.7 What efforts have been made to ensure full and fair participation of environmental justice populations in the transportation decision-making process?

In order to engage and provide for the full and fair participation of potentially affected environmental justice communities, the following strategies were implemented:

- Public Information Meetings were held in Marlboro and Richmond Counties, and advertised in the local newspapers and on television;
- Attendance of Project Team Representatives at local organization meetings to generate interest and participation in the proposed project;
- Stakeholder Working Group meetings were held and included local community leaders and NAACP representatives;
- Project website and toll-free hotline, which could be accessed at any time to learn the status of the project and information on times and locations of meetings; and,
- Distributed community surveys through various methods to ensure full participation of all populations, including school surveys, mail surveys, and door-to-door survey distribution and/or interviews.

For more information about public involvement and participation in the project, refer to Chapter 3, Communities (Section 3.2, page 3-26), Chapter 4, Public Involvement (Section 4.1, page 4-1), the *Community Impact Analysis Technical Memorandum,* and the *Public Involvement Technical Memorandum.*

Full and fair access to information will continue to be provided to citizens during the future project phases through Public Hearings, Stakeholder Working Group meetings, updated information on the project website and hotline, and in mailings.

3.3.8 Summary

All identified areas that contain environmental justice populations would experience both beneficial and adverse effects similar to those of non-environmental justice populations in the project study area. No environmental justice populations would bear a disproportionate impact from the Preferred Alternative.

During project development, impacts to both environmental justice and non-environmental justice communities have been avoided or minimized when possible. The Project Team initially designed the Preferred Alternative to avoid municipal boundaries and dense residential areas (refer to Chapter 2, Section 2.4, page 2-4, and the *Alternative Development Technical Memorandum*). Based on public input, the Preferred Alternative was further refined where possible to minimize the number of relocations, as well as impacts to community cohesion and accessibility.

3.4 Section 4(f) Resources

3.4.1 What is Section 4(f)?

Section 4(f)

Section 4(f) is part of the *Department of Transportation Act of 1966* which regulates the taking of publicly owned properties for transportation projects.

Section 4(f) properties are publicly-owned parks, recreational lands, and wildlife and waterfowl refuges under local, state, or federal ownership. Historic sites that are under public or private ownership are also considered under Section 4(f).

Section 4(f) of the *Department of Transportation Act of 1966* regulates how publicly owned properties such as parks, recreational lands, wildlife and waterfowl refuges, and historic sites are used for transportation projects. In addition, Section 4(f) regulates historic sites that are privately owned. According to 23 CFR §771.135(p), Section 4(f) uses can be any of the following:

- a direct use if it is permanently including property into the transportation project;
- a temporary use when the temporary occupancy of the property is adverse to the purpose of the property; or,
- a constructive use when the proximity impacts are severe enough that the features or activities that make the property a Section 4(f) resource are impaired.

If it can be demonstrated that no prudent or feasible alternative exists to avoid a Section 4(f) property, then it can be used for a project, provided there is a plan to minimize harm to the property, as documented in a Section 4(f) Evaluation.

SAFETEA-LU recently amended Section 4(f) of the Department of Transportation Act in an effort to streamline the approval of projects that have a *de minimis* impact to Section 4(f) property.[58] The word "*de minimis*" is defined by Black's Law Dictionary as something that is "minimal" or "(of a fact or thing) so insignificant that a court may overlook it in deciding an issue or case." Under SAFETEA-LU, the USDOT will take into account any avoidance or minimization of impacts along with any mitigation or enhancement measures to determine whether there is a *de minimis* impact from the use of the property. If the use results in a *de minimis* impact, then an avoidance alternatives analysis is not required and the Section 4(f) evaluation process would be considered completed. For parks, recreational lands, wildlife and waterfowl refuges, the managing agency would have to state, in writing, that the project is not likely to "adversely affect the activities, features and attributes" of the Section 4(f) resource. A *de minimis* impact for historic properties would require the SHPO to determine in writing that the project would have "no historic properties affected" or "no adverse effect" to historic properties. Historic resources that are considered Section 4(f) resources are discussed further in Section 3.6.6 (refer to page 3-111).

3.4.2 What parks, recreational facilities, and wildlife/ waterfowl refuges are found in the project study area?

There are approximately 24 public parks, recreational facilities, and wildlife/waterfowl refuges in the project study area. Other public recreational facilities such as picnic areas, tennis courts, school playing fields and playgrounds are located throughout the four counties in the project study area, but are not in close proximity to the Preferred Alternative.

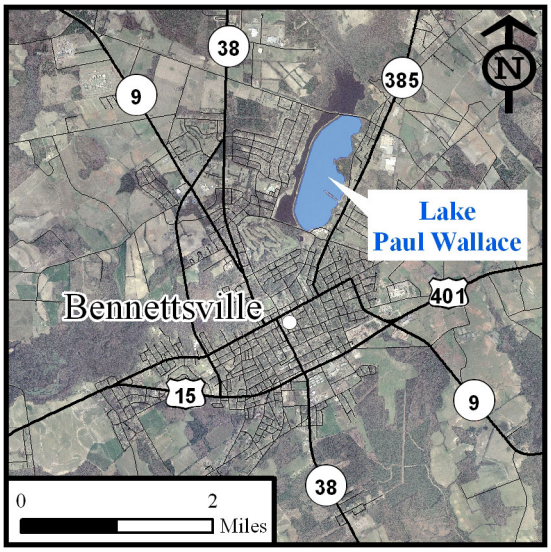

Figure 3-26 Location of Lake Paul Wallace

Lake Paul Wallace (also known as Lake Wallace) is the largest recreational area located within the project study area, (refer to Figure 3-26). This 600+ acre man-made lake is located just north of downtown Bennettsville and is managed by SCDNR. The lake features a lighted, 3.5-mile walking trail and provides users opportunities for swimming, water skiing, boating, and fishing. The portion of Lake Wallace located north of Beauty Spot Road (Road S-35-47) is a federal waterfowl refuge for Canada geese, ducks, coots, and herons, which makes it an excellent area for bird watching. In addition, this part of the lake also serves as the reservoir for the City's water system. Table 3.21 lists the public recreational facilities and parks that are located within the project study area.

[58] 23 U.S.C. §6009(a) (2005).

Table 3.21
Public Recreational Facilities, Parks, and Wildlife/Waterfowl Refuges Located in Project Study Area

Marlboro County		Marlboro County	
Bennettsville	Lake Paul Wallace	McColl	C.W. Love Complex
	John C. Lindsay Park		J.D. Geddie Park
	Girls Softball Facility	Blenheim	Blenheim Dixie Youth Park
	Soccer Facility		Bakers Trail
	Smith Park	Brownsville	Brownsville Roadside Park
	Spring Sports Complex	Tatum	Community Park
	Kidsland Park	Clio	Bennett Park
	County Community Center	**Dillon County**	
	McLeod Street Park	Oak Grove	Playground
	Woodland Park		Picnic Area
Wallace	Wallace Dixie Youth Park	Minturn	Ball Field
	Wallace Smithville Community Center	Little Rock	Community Park
	Wallace Roadside Park	**Richmond County**	None
		Scotland County	None

Source: Wilbur Smith Associates, 2007.

3.4.3 Would the Preferred Alternative impact Section 4(f) parks or recreational facilities?

The Preferred Alternative avoids the parks or recreational facilities listed in Table 3.21; therefore, no impacts are anticipated. No indirect impacts are anticipated since access to park and recreational facilities would not be affected by the Preferred Alternative.

3.5 Section 6(f) Resources

What are Section 6(f) Resources and would any be impacted by the project?

The *Land and Water Conservation Fund Act of 1965* established funding to provide matching grant assistance to states and local governments for the planning, acquisition, and development of outdoor public recreation sites and facilities. Section 6(f) of the Act prohibits the conversion of property

acquired or developed with these grants to a non-recreational purpose without the approval of the Department of Interior's National Park Service (NPS).

Five Section 6(f) resources are located in the project study area, including the following:

- J.D. Geddie Park in McColl;
- Bennettsville City Parks (refers to any/all parks in Bennettsville);
- Bennettsville Recreation Areas (refers to any/all parks or recreation areas in Bennettsville);
- Bennettsville Community Tennis Facilities (Spring Sports Complex and Smith Park); and,
- Woodland Park in Bennettsville.[59]

The Preferred Alternative avoids these Section 6(f) resources; therefore, no impacts are anticipated.

3.6 Historic Resources

3.6.1 What are historic resources?

Section 106 of the *National Historic Preservation Act of 1966* (NHPA) requires federal agencies to review the effects of any proposed action on historic resources. Prior to undertaking a project, federal agencies conduct archival research and field surveys to assess resources that are currently listed or might be eligible for listing on the NRHP. The NRHP is a list of all historic resources that have been determined to be significant. There are four criteria to determine if a resource should be listed on the NRHP:

Historic Resource

Historic resources are districts, buildings, sites, structures, or objects that are significant in American history, architecture, archaeology, engineering, and culture. – (16 U.S.C. § 470(a)(I)(A))

- Association with a significant event or broad pattern of history;
- Association with a significant person;
- Conveys unique or distinctive architecture of high artistic value; or
- Has the potential to yield information important to history or prehistory.[60]

In addition to the criteria, most sites are generally required to be at least fifty years of age for listing on the NRHP.

[59] NPS, State Land and Water Conservation Fund Website, "Grant Listing" http://waso-lwcf.ncrc.nps.gov/public/index.cfm (May 20, 2008).

[60] NPS, *National Register Bulletin #15*, "How to Apply the National Register Criteria for Evaluation," (1990).

Based on research findings and field survey results, agencies make eligibility recommendations on resources in the project study area to the SHPO. The SHPO makes determinations as to whether a resource is eligible for listing on the NRHP and what effect the project could have on eligible or listed resources in the area.

3.6.2 How was the historic resources survey conducted?

An intensive above-ground historic resources field survey was completed for the South Carolina portion of the project study area between September and November 2006. The field survey was completed following guidelines established by SCDAH to identify and document architectural resources over fifty years of age for NRHP eligibility consideration. Archival research was conducted which included a literature review and records check at SCDAH and the South Carolina Institute of Archaeology and Anthropology. The South Carolina Historical Society in Charleston, various public libraries in the respective counties, and the University of South Carolina's Caroliniana Library were also consulted to identify, assess, and interpret the above-ground historical resources located in the project study area. Once historic contexts were developed for the region, local and regional resources were consulted to identify persons and events significant to local history and to uncover their associations with potential archaeological sites or historic resources.

An intensive above-ground historic resources field survey was completed for the North Carolina portion of the project study area in November 2006. The field survey was completed following guidelines established by North Carolina Department of Cultural Resources to identify and document architectural resources over fifty years of age for NRHP eligibility consideration. Archival research was conducted and included a literature review and records check at the Survey and Planning Branch of the North Carolina SHPO.

3.6.3 What above-ground historic resources were found during the survey?

Table 3.22 lists the historic resources that are listed on, eligible, or potentially eligible for the NRHP within one mile of the Preferred Alternative. No known, above-ground listed, NRHP sites are located within one mile of the Preferred Alternative (refer to Figure 3-27, page 3-108). This table also includes seven sites that are located within one mile of the Preferred Alternative that have been determined by the South Carolina SHPO as eligible for the NRHP, but are not yet listed (refer to Table 3.22, and Figure 3-27 on page 3-108). In addition, there are two sites within the North Carolina portion of the project study area that have been determined potentially eligible for listing on the NRHP by the North Carolina SHPO. During the development of alternatives, properties listed on the NRHP or determined eligible for listing were considered constraints and efforts were made to avoid these known resources (refer to Chapter 2, Section 2.4, page 2-4). For more details on the sites listed on the NRHP, refer to the *Cultural Resources Technical Memorandum*.

Table 3.22
Historic Resources within One Mile of the Preferred Alternative

ID Number (Figure 3-27)	County	Resource Name	Location	Potential Effect
Sites Eligible for Listing on the NRHP				
1	Marlboro	Hebron United Methodist Church District	Road S-34-23, Hebron	None
2	Marlboro	Manning House	Road S-34-23, Hebron	None
3	Marlboro	Hebron Colored School	S.C. Route 381, Dunbar	None
4	Marlboro	Beauty Spot Motor Court Office Building	U.S. Route 15/401, Bennettsville	Adverse
5	Marlboro	Resource 1095	S.C. Route 9, Bennettsville	None
Sites Potentially Eligible for Listing on the NRHP				
Not Shown	Marlboro	38ML291	Bingham	TBD*
Not Shown	Marlboro	38ML309	Dunbar	TBD*
Not Shown	Marlboro	38ML340	Bennettsville	TBD*
Not Shown	Marlboro	38ML296	South Marlboro County	TBD*
Not Shown	Marlboro	38ML213	Dunbar	None
Not Shown	Marlboro	38ML214	Dunbar	None
6	Richmond	Resource RH 680	N.C. State Route 1804	None
7	Richmond	Ghio Post Office	N.C. State Route 1802	None

Source: Brockington and Associates, 2007.
Archaeological sites are not shown on Figure 3-27 due to their sensitive nature.
* TBD = To be determined

3.6.4 What would be the potential impacts to historic resources?

When evaluating potential impacts to historic resources for the proposed project, a historic resource was considered directly impacted if it was partially or completely located within the Preferred Alternative's right-of-way. An adverse visual impact may occur when the project can be seen from the historic resource. The Preferred Alternative's 400-foot right-of-way was buffered by 300 feet on both sides and examined to determine potential impacts on historic resources located outside of the right-of-way, including lack of access to the resource, a change in the resource's setting, or indirect and cumulative impacts.

Adverse Affect

An adverse affect refers to the diminishment of a property's integrity, with respect to its location, design, setting, materials, workmanship, feeling, or association.

Resource 031 0011
Beauty Spot Motor Court Office Building

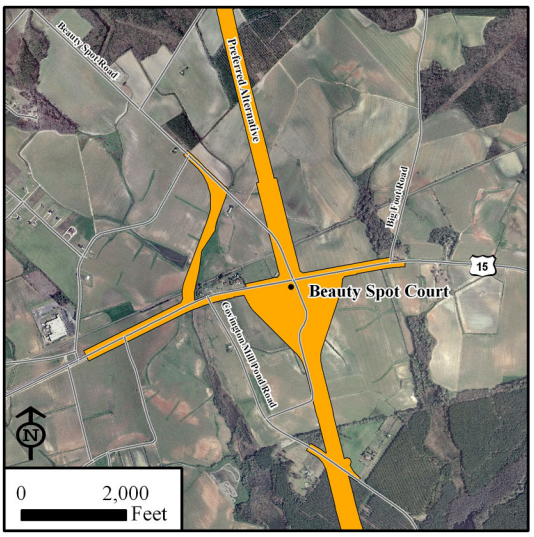

Figure 3-28 Location of Beauty Spot Motor Court Office Building

The Preferred Alternative would impact Resource 031 0011, the Beauty Spot Motor Court Office Building. This historic resource is the office building for a former motor court complex constructed circa 1920 and is located at 690 U.S. Route 15/401, east of Bennettsville (refer to Figure 3-28). It was determined eligible for the NRHP by the SHPO under Criteria A in relation to automobile tourism in the United States and Criteria C as an early and good example of roadside architecture. The Preferred Alternative would directly impact the property causing an adverse effect to the eligible historic resource. Two shifts in the Preferred Alternative at the U.S. 15/401 interchange were evaluated to attempt avoiding and/or minimizing impacts to the property. The eastern shift resulted in seven additional residential relocations, twice the amount of impacted wetland acres, and impacted Beauty Spot Cemetery and an NRHP eligible archaeological resource (Resource 1095) when compared to the original alignment. The western shift had ten residential relocations when compared to the original alignment, and almost doubled the amount of impacted wetland acres. A full discussion of the potential shifts to the Preferred Alternative to avoid and minimize impacts to the Beauty Spot Motor Court Office Building can be found in Appendix E. A mitigation plan was developed in coordination with the SHPO that includes preparing a publication for public distribution, such as a brochure or poster, that focuses on the history of the Beauty Spot Motor Court Office and provides a brief history of motor court and early automobile-related tourism in Marlboro County (refer to SHPO letter dated March 6, 2008 in Appendix A and the Memorandum of Agreement between SCDOT and SHPO, signed July 2008 in Appendix A). The American Council on Historic Preservation was contacted by FHWA regarding the adverse effect to the property and was provided the draft Memorandum of Agreement between SHPO and FHWA. The Council stated that its participation in the the consultation process was not needed at this time based upon the information provided to it by FHWA (refer to letter dated July 9, 2008 in Appendix A).

Indirect impacts from induced development near above-ground historical resources due to the construction of I-73 could diminish the rural setting that contributes to the historical significance. Based on predicted land use modeling, the potential for induced development may exist in the

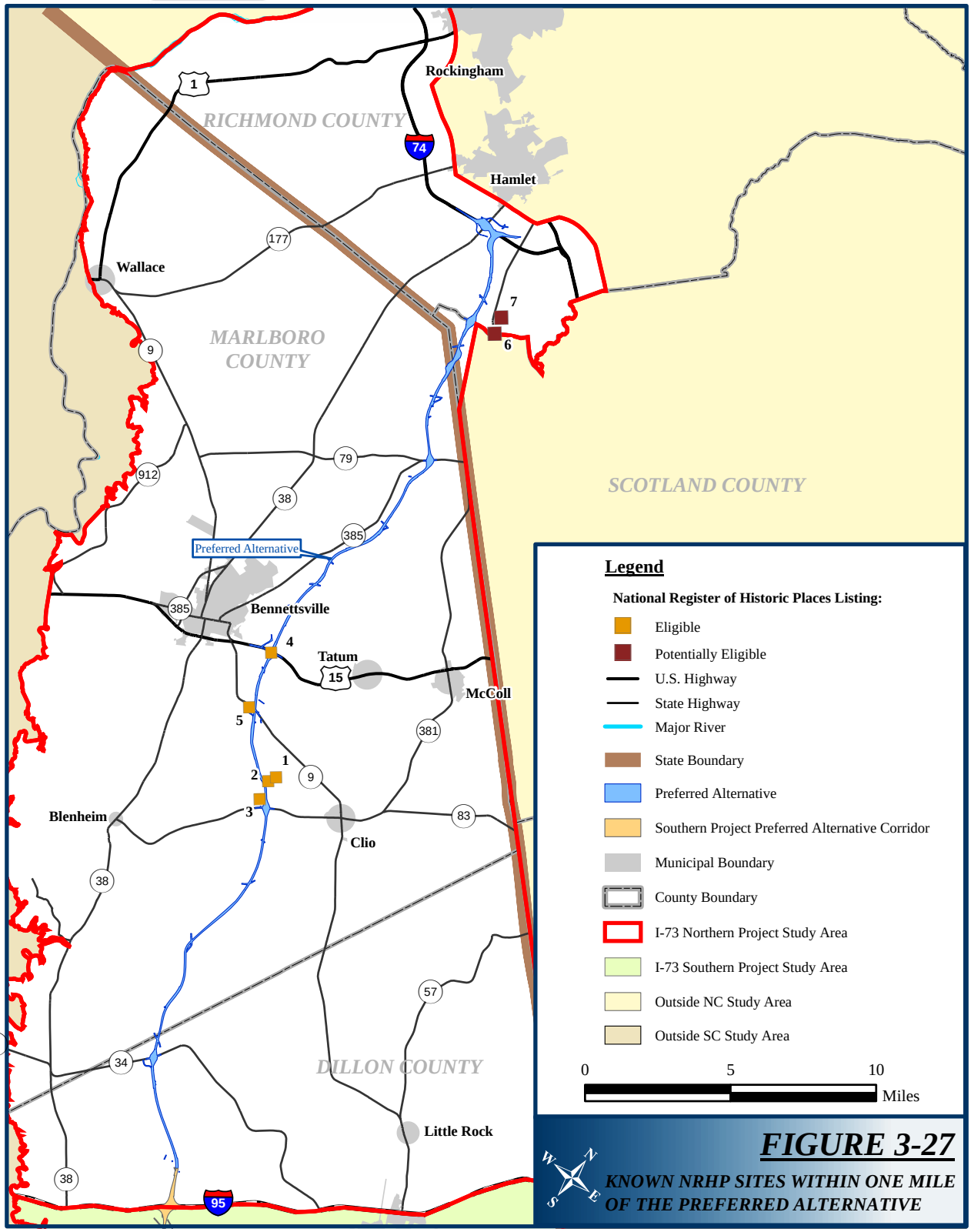

FIGURE 3-27

KNOWN NRHP SITES WITHIN ONE MILE OF THE PREFERRED ALTERNATIVE

vicinity the NRHP-listed Appin Historic District (Resource 82003894), which is located west of Bennettsville along U.S Route 15/401.

While special measures are required by federal agencies to avoid and minimize impacts to potentially eligible and NRHP listed sites, there are no such requirements for private developers. Development in the areas of the historic resources could change the rural nature of the viewshed, which in turn may diminish the historical significance of the properties. Similarly, there may be potentially eligible archaeological resources currently unknown in the vicinity of the Preferred Alternative, which could be affected by future private development.

Viewshed

A viewshed includes all of the physical features of a landscape that define a particular landscape type that can be seen from the historic resource. A change in the relationship of a historic resource to its surrounding features can diminish the qualities that make the resource eligible for the NRHP.

Source: National Park Service, ***How to Apply the National Register Criteria for Evaluation***

3.6.5 What known archaeological resources are within the project study area?

A GIS-based archaeological predictive model was developed for the South Carolina portion of the project study area as part of the alternatives analysis to determine the potential for archaeological resources being found in the project study area. NCDOT determined that the archaeological model would not be used in the North Carolina portion of the project study area due to the proposed project's limited length and cost-effectiveness.

Known environmental and cultural attributes typical of the project study area were evaluated according to the different subsistence and mobility patterns of peoples within each prehistoric and historic time period. Environmental variables considered in the model included soil type, the slope of the land, and the presence of water. Additionally, the locations of previously recorded archaeological sites within the project study area were considered in the predictive model. The model ranked each land unit (100 square foot portion of the landscape) with a value of one for lowest probability to a value of 10 for highest probability for finding archaeological resources. Upland sites near surface waters comprise the majority of suitable land surfaces.

The archaeological predictive model determined that 51 percent of the Preferred Alternative corridor contained areas with a high probability rating. This meant that sites with a high probability for containing artifacts could potentially be found within the corridor of the Preferred Alternative during a Phase I shovel testing process.

Phase I shovel testing was completed for the corridor within South Carolina, while detailed archaeological investigations will be completed on the Preferred Alternative within North Carolina

prior to purchase of right-of-way. Phase I testing involves digging small test pits at regular intervals in areas of high probability for archaeological resources. If a significant number of resources are found, then it is considered a site. A site must then be evaluated for eligibility for listing on the NRHP.

Phase I Archaeological Shovel Test

A Phase I Archaeological Shovel Test is performed by digging small test pits at regular intervals in high probability areas. If three or more artifacts are found within a 100-foot radius of each other, then it is considered a site. This site then must be evaluated for eligibility for listing on the NRHP.

Based on aforementioned literature searches, there are 205 previously recorded archaeological sites in the South Carolina project study area and 52 in the North Carolina project study area. While most have not been evaluated for NRHP eligibility, they were avoided to the maximum extent possible during alternative development. Those that were within the right-of-way of the Preferred Alternative were formally evaluated for eligibility.

Four archaeological sites were recommended to the SHPO as eligible, pending further testing. Phase II testing will be completed on the following four potentially eligible sites:

- Site 38ML291 is an archaeological site containing artifacts of the Middle Archaic and Woodland periods located in the Bingham area.
- Site 38ML340 is an archaeological site containing artifacts of the Archaic period located in the Bennettsville area.
- Site 38ML309 is an archaeological site containing artifacts of the Early Archaic and Woodland periods located in the Bennettsville area.
- Site 38ML296 is an archaeological site containing artifacts of the Woodland period located in the southern portion of Marlboro County.

If they are found to be significant, then a data recovery plan may be developed in coordination with the SHPO.

In the event that previously unknown cultural resources are discovered during construction, the resources will be handled according to 36 CFR §800.11 in coordination with the SHPO and appropriate Tribal Historic Preservation Offices.

Detailed archaeological investigations will be completed on the Preferred Alternative within North Carolina prior to purchase of right-of-way. On April 22, 2008, Brian Overton of NCDOT's Human Environment Unit met with John Mintz of North Carolina Office of State Archaeology (NC-OSA) for consultation regarding the proposed North Carolina portion of I-73 on new location (TIP# I-4923). The discussion included appropriate survey strategies, specific topics of studies, background

research subjects and the archaeological Area of Potential Effects (APE). The Scope of Work for the archaeological investigation will incorporate this agreed upon approach to Section 106 compliance. NC-OSA and NCDOT agreed it would be appropriate to develop the Scope of Work and initiate the survey after the Least Environmentally Damaging Preferred Alternative was further developed and made available for review and further consultation. This detailed design and mapping will guide the designation of the archaeological APE.

As the SCDOT-prepared FEIS is likely to be finalized in the near future and prior to the start date for archaeological investigations for the undertaking in North Carolina, this work will be completed at a point following the issuance of the FEIS. Concurrence with NC-OSA and North Carolina SHPO will be reached for all investigations, including background study, survey, evaluations, submittal of report and the possible completion of archaeological data recovery or other mitigations. If recommended, archaeological data recovery and mitigation will be completed prior to any construction activities. A Memorandum of Agreement has been completed between NCDOT and NC-OSA as a record of the consultation completed and further archaeological investigation requirements needed for the proposed project in North Carolina, refer to Appendix A.

3.6.6 What are the potential impacts to historic resources under Section 4(f)?

The Preferred Alternative would impact Resource 031 0011, the Beauty Spot Motor Court Office Building, as previously described in Section 3.6.4 (refer to page 3-106). The Preferred Alternative would directly impact the property causing an adverse effect to the eligible historic resource, and constituting a direct use under Section 4(f). A Draft Section 4(f) Evaluation has been completed for this site and can be found in Appendix E. Alternatives were evaluated to avoid the property; however, these resulted in greater impacts to wetlands and relocations. Additionally, this site is within the U.S. Route 15/401 interchange, and due to constraints in the area, the interchange could not be shifted. Therefore, a signed Memorandum of Agreement and mitigation plan were developed with SHPO; for further information please refer to Section 3.6.4 (page 3-106) and Appendices A and E.

3.7 Hazardous Materials

3.7.1 What is a hazardous material?

A hazardous material is generally defined as any material that has or will have, alone or 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 solid, sludge, liquid, or gas.[61] Hazardous materials and waste sites are regulated primarily

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

by the *Resource Conservation and Recovery Act of 1976* (RCRA), as amended; the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA); and the *Superfund Amendments and Reauthorization Act of 1986* (SARA).

3.7.2 Are there any potentially contaminated sites located within the project study area?

An assessment of the project study area was performed in order to identify the presence of potential hazardous materials and waste sites. Hazardous materials and waste sites were inventoried based on a review of federal and state records of regulated sites, as well as a windshield survey of the alternative corridors conducted in October 2006 to identify potential sites. Additional information provided by SCDHEC and the North Carolina Department of Environment and Natural Resources (NCDENR) was reviewed. Table 3.23 provides a summary of the potential hazardous materials sites identified during the initial database search.

Potentially Hazardous Sites

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

Table 3.23
Summary of Hazardous Material Sites Identified within the Project Study Area

Landfills[1]	14
Hazardous Material Facilities[2]	821
Toxic Release Inventory Sites[3]	4
Total Number of Sites within the Study Area	**839**

Note: Some sites were identified in multiple databases. Total number of sites (839) accounts for duplicates.

[1] Landfills and solid waste disposal facilities are regulated under RCRA. SCDHEC and NCDENR maintain inventories of permitted and inactive landfills in South Carolina and North Carolina.

[2] Hazardous Material Facilities include hazardous waste sites, hazardous waste generators, Aboveground Storage Tanks (ASTs), Underground Storage Tanks (USTs), leaking USTs, groundwater contaminated sites, releases of oil and hazardous substances and sites proposed to or on the National Priorities List (NPL).

[3] The Toxic Release Inventory (TRI) is maintained by EPA and is an inventory of chemical releases from federal and industrial facilities. The TRI provides information on the release and transfer of toxic chemicals from facilities in any given area.

Source: Wilbur Smith Associates, 2007.

3.7.3 Would the Preferred Alternative impact potentially contaminated sites in the project study area?

GIS data layers were overlaid onto existing maps of the Preferred Alternative to locate the 839 sites and determine which hazardous material and waste sites within the project study area may be impacted. In addition, the GIS information was compared to data collected during the field survey and a building inventory of the project study area.

Hazardous material sites within or immediately adjacent to the 400-foot right-of-way were assumed to be potentially impacted by the Preferred Alternative and are discussed below. Potentially impacted sites were researched in environmental databases containing information about hazardous waste and material sites from multiple regulating state and federal agencies, including the USEPA. The Facility Index System (FINDS) database is a comprehensive listing of facilities regulated by USEPA and refers users to the specific database that pertains to the type of site. Sites located within 0.5 mile of the Preferred Alternative or farther away were not considered to be impacted. These sites are provided in the *Hazardous Materials Technical Memorandum* for informational purposes.

3.7.3.1 What listed hazardous materials and waste sites may be potentially impacted by the Preferred Alternative?

Charlie's Auction and Water System

The Preferred Alternative would potentially impact Charlie's Auction and Water System in Hamlet, North Carolina. The site would be located adjacent to the proposed 400-foot right-of-way of the Preferred Alternative. This site was identified on the Integrated Compliance Information System (ICIS) database, which supports enforcement of and compliance by National Pollutant Discharge Elimination Sites (NPDES). A storage building and two aboveground storage tanks (ASTs) are located on the property. No other information was found concerning potential hazardous materials that may be at this location. After a review of the available data, there is nothing to indicate that contamination will be an issue at the site.

3.7.3.2 What other potential hazardous materials and waste sites were identified that could be impacted by the Preferred Alternative?

During field surveys, two additional sites were identified that would be within or adjacent to the proposed right-of-way and may contain potentially hazardous materials. Central Carolina Gas

is located north of I-74 and east of N.C. State Route 1807 and would be within the right-of-way of the Preferred Alternative. This site contains numerous ASTs for propane. Smith's Tire Shop, appears to be vacant and it is unknown whether any potentially hazardous materials may be present. It would be located adjacent to the right-of-way of the Preferred Alternative in front of Charlie's Auction and Water System. The status of these sites is unknown, but searches of relevant databases revealed no record of release or other hazardous materials to date.

Based upon review of databases and the above findings, the three sites listed above do not require any further investigation; no further action is recommended. Should previously unknown contamination be discovered as the project moves forward, the contamination (contaminated soil and/or groundwater within the right-of-way) would be removed and properly disposed of prior to the initiation of construction activities at that site.

3.8 Noise

3.8.1 What is noise?

Noise is "any sound that is undesired or interferes with a person's hearing of something".[62] Noise or sound is a pressure on the eardrum 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 3.24 provides an overview of several different types of noises and the associated sound level 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 the form of loud or persistent noises from cars and trucks. Traffic noises are generated from engines, mufflers, and tire contact with the roadway.

3.8.2 How are noise impacts estimated?

Noises affect people differently due to their environment and other various factors. Loud noises such as a car honking 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

[62] *Webster's New Collegiate Dictionary* (Springfield, Massachusetts:G&C Merriam Company, 1975).

Table 3.24
Common Noises and dBA Levels

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	

Source: National Institute on Deafness and Other Communication Disorders, 2007.

noise from roadway traffic affects the surrounding environment. The NAC were developed through noise level studies, determinations of land uses, and various types of daily activities. A table was developed from these analyses for determining what dBA levels 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 (refer to Table 3.25, page 3-116). Only activity categories "B" and "C" were identified within the project study area. However contours were calculated for the first three categories (A, B, C) and were used for analysis since they compare exterior noises and would provide a planning tool for future development within the area.

Table 3.25
FHWA Noise Abatement Criteria

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: FHWA, Noise Policy FAQs Website, 2007.

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

Potential sources of background noise include cars, trucks, farm equipment, and trains. An established network of roadways already exists throughout the project study area and, as a result, background traffic noises exist. Existing traffic and background noises were measured at 12 locations within the project study area using a noise measurement device, known as a dosimeter. Validation sites were chosen using several criteria including proximity to existing roadways, proximity to the proposed Preferred Alternative, and land uses (i.e. commercial and residential) within the project study area. 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. The FHWA-developed Traffic 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.

3.8.4 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 3.26. In most cases, the predicted noise levels were slightly 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 were noted at these locations. On average, the TNM estimated noise levels were approximately one dBA higher than what was measured in the field. Generally, it would take at least a five 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 one 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 and 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, (within one dBA of the NAC for each land use category), or meet or exceed the NAC, 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 as compared to existing levels.

Table 3.26
Ambient Noise Levels

Site	Location	Field Measured Noise Level (dBA)	TNM Predicted Noise Level (dBA)	Difference (TNM minus Field Measurement)	Comments
1	U.S. Route15	47	47	0	
2	U.S. Route15	60.1	61.7	1.6	
3	S.C. Route 38	58.3	60.2	1.9	
4	S.C. Route 381	51.6	50.9	-0.7	Dogs barking
5	S.C. Route 9	55.8	57.6	1.8	
6	S.C. Route 9	55.1	57.5	2.4	
7	S.C. Route 79	56.4	56.7	0.3	
8	S.C. Route 9	62.3	62.4	0.1	
9	S.C. Route 38	69.2	68.7	-0.5	Loud truck turning next to microphone
10	S.C. Route 9	65.1	65.3	0.2	
11	S.C. Route 38	57.5	59.1	1.6	
12	U.S. Route15	67.1	67.2	0.1	

To assume a worst case scenario, peak hour traffic volumes for 2005 and 2030 were used for the model. Table 3.27, (refer to page 3-118) presents the Noise Model inputs used for speed and vehicle mix for the various roadways in the project study area. Noise levels were predicted for the Preferred Alternative and compared to the NAC and existing noise levels to determine if potential impacts were anticipated.

Table 3.27
Noise Model Vehicular Data

Route	Speed (mph)	Automobiles (percent)	Medium Trucks (percent)	Heavy Trucks (percent)
I-95	70	72	4	24
I-73	70	91	3	6
U.S. Routes	55	90	4	6
State & Local	55	94	3	3

Because of the size of the project study area, locations were picked throughout to provide a uniform representation of sound levels and the potential areas that could be impacted. These sites were chosen because of their distance to the existing and proposed roadways and the types of land uses at each of the locations. TNM was used to develop NAC contours for the existing road networks under Existing, Future No-build, and future Build Conditions. For the Future Build Condition, it was assumed I-73 was constructed and traffic conditions on local routes may have been affected. A worse case scenario is presented for the 2030 Build Condition in Table 3.28. In some cases, local routes at a few locations may see small increases in traffic because of vehicles accessing I-73 and therefore, would experience more noise. The majority of the other local routes would see a decrease in traffic due to I-73 and these locations would experience less noise. The approximate distances to the different land use categories in the NAC are shown above in Table 3.28.

Table 3.29 (refer to page 3-120) compares the approximate distances to the NAC land use categories along the Preferred Alternative.

3.8.5 What are the anticipated noise impacts for the Preferred Alternative?

In order to analyze and compare specific categories of noise impacts associated with the Preferred Alternative, contour distances were extrapolated from the TNM model and applied to detailed GIS land use data and structural information for the project study area. This provided the ability to calculate the number and types of structures that fell within the contours associated with each NAC category for the Preferred Alternative. The two contours of concern are the 66 dBA contour (Category

Table 3.28
Approximate Distance to NAC Contours for Existing, Future No-Build, Future Build, in feet

Roadway	A (56 dBA) (feet)	B (66 dBA) (feet)	C (71 dBA) (feet)
I-95			
Existing (2006)	1,300	380	220
No-build (2030)	1,350	410	230
Build (2030)	1,400	440	250
S.C. ROUTE 79			
Existing (2006)	82	18	10
No-build (2030)	141	40	13
Build (2030)	216	51	16
U.S. ROUTE 15			
Existing (2006)	275	69	12
No-build (2030)	287	95	50
Build (2030)	256	82	31
S.C. ROUTE 381			
Existing (2006)	62	13	N/A
No-build (2030)	94	22	N/A
Build (2030)	150	33	14
S.C. ROUTE 9 (North of S.C. Route 385)			
Existing (2006)	74	34	16
No-build (2030)	236	70	43
Build (2030)	292	70	45
S.C. ROUTE 9 (South of S.C. Route 385)			
Existing (2006)	139	39	15
No-build (2030)	239	93	14
Build (2030)	239	93	14
S.C. ROUTE 38			
Existing (2006)	177	62	16
No-build (2030)	286	68	44
Build (2030)	216	61	27

B) and the 71 dBA contour (Category C); no Category A receivers were identified adjacent to the Preferred Alternative. The GIS analysis, summarized in Table 3.30 (refer to page 3-120) and shown on Figure 3-29 (refer to page 3-121), provides a more detailed picture as to where impacts are located along the Preferred Alternative.

Table 3.29
Approximate Distance to NAC Contour for the Preferred Alternative (in feet)

Location	Preferred Alternative
I-74 to S.C. Route 79	
A (56 dBA)	580
B (66 dBA)	155
C (71 dBA)	75
S.C. Route 79 to U.S. Route 15	
A (56 dBA)	545
B (66 dBA)	160
C (71 dBA)	90
U.S. Route 15 to S.C. Route 381	
A (56 dBA)	580
B (66 dBA)	175
C (71 dBA)	95
S.C. Route 381 to S.C. Route 34	
A (56 dBA)	580
B (66 dBA)	165
C (71 dBA)	85
S.C. Route 34 to I-95	
A (56 dBA)	560
B (66 dBA)	175
C (71 dBA)	95

Table 3.30
Noise Impacts Based on GIS Analysis

Preferred Alternative	Commercial	Residential	Other	Total
66 dBA	0	8	1*	9
71 dBA	1**	0	0	1
Total	1	8	1	10

* Cemetery
** Produce stand

Hamlet
SCOTLAND COUNTY
RICHMOND COUNTY
MARLBORO COUNTY
DILLON COUNTY
1 Residence
1 Residence
1 Residence
McColl
Tatum
1 Cemetery
Clio
Little Rock
57
79
Preferred Alternative
1 Business
1 Residence
Bennettsville
2 Residences
2 Residences
Blenheim

Legend

- Impacted Structure
- Wallace — Noise Validation Site
- U.S. Highway
- State Highway
- Major River
- State Boundary
- Preferred Alternative
- Southern Project Preferred Alternative Corridor
- Municipal Boundary
- County Boundary
- I-73 Northern Project Study Area
- I-73 Southern Project Study Area
- Outside NC Study Area
- Outside SC Study Area

0 1 2 Miles

N E S W

FIGURE 3-29
NOISE IMPACTS

The Preferred Alternative would have noise levels exceeding 66 dBA at eight residential structures, which are Category B receivers. One residence is located within each of the communities of Bennettsville, Hamlet, and Newtonville, while the remaining residences are not within the defined community boundaries. Four of these residences are located in Dillon County and one is in Scotland County. In addition, noise from the Preferred Alternative would be greater than 66 dBA at Beauty Spot Cemetery in the Bennettsville community, also a Category B receiver. Noise from the Preferred Alternative would be greater than 71 dBA at a produce stand in the community of Bennettsville, a Category C receiver.

Construction Impacts

Areas along the Preferred Alternative 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, 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.

3.8.6 What happens when impacts occur and can impacts be mitigated?

When traffic noise impacts occur, analysis of noise abatement measures must be completed to determine if noise impacts can be mitigated. 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.

Due to the rural setting of the project study area, areas of high density development and residential areas were avoided to the extent possible during the development of the Preferred Alternative. The avoidance of developed areas has reduced the number of potentially impacted receivers. For further information about avoidance of developed areas, please refer to Chapter 2, Section 2.4, page 2-4. The following noise abatement measures were evaluated for areas with the highest potential for noise impacts to determine the feasibility and reasonableness of their implementation.

3.8.6.1 No-build Alternative

This noise abatement measure would involve not constructing the project. The No-build Alternative would have no impacts associated with the construction of I-73. However, this measure would not satisfy the Purpose and Need of the project.

3.8.6.2 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 the Preferred Alternative 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 the Preferred Alternative and has been implemented throughout the entire process.

3.8.6.3 Traffic System Management Measures

Traffic management measures that limit vehicle type, speed, volume and time of operations are often effective noise abatement measures. However, an interstate facility design is generally not conducive to limiting vehicles' use, type, and speed. An interstate consists of a controlled access roadway designed to move traffic from point A to point B in a safe and effective manner. Limiting one or all of the above variables not only reduces the effectiveness of the facility, but may also create an unsafe roadway environment. For this project, traffic management measures are not considered appropriate for noise abatement due to their limiting effect on the capacity, level of service, and safety of the proposed project.

3.8.6.4 Noise Barriers

Noise barriers involve constructing solid barriers to effectively diffract, absorb, and/or reflect highway traffic noise, which 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 the following:

- constructability;
- cost;
- height;
- anticipated noise increase/decrease;
- noise reduction obtained;
- number of receptors benefited;
- residents' views;
- land use type; and,
- whether land use changes are expected.

The SCDOT noise abatement criteria states that a noise barrier should cost no more than $25,000 per benefited receptor while NCDOT allows a cost of $35,000 per benefited receptor. In addition,

if a noise wall is constructed, the wall cannot be higher than 25 feet based on specifications by SCDOT, NCDOT, and FHWA. A benefited receiver is defined as one that achieves a five dBA reduction in noise, whether that receptor was impacted or not.

Development within the project study area is sparse and the Preferred Alternative is located well away from the more highly developed areas, thereby further reducing the number of impacted noise receivers. Noise impacts associated with the Preferred Alternative consist of isolated areas of one to two impacted residential structures. Due to the costs compared to the number of benefited receptors, noise barriers would not be warranted under either NCDOT or SCDOT standards for noise receivers impacted by the Preferred Alternative. Therefore, a noise barrier analysis was not performed.

Table 3.31 lists the various mitigation techniques and a brief explanation of why they would not be reasonable and/or feasible. Although some of the methods could help reduce impacts, the main tool in controlling future noise impacts is for state and local authorities to use the impact noise contour table to help in preventing and minimizing development in areas that have a high potential for noise impacts. The results of the noise analyses will be given to local governments to aid in future planning in their respective areas.

Table 3.31
Noise Abatement Analysis

Abatement Techniques	Reasonable	Feasible	Effectiveness
No-Build Alternative	No	No	Purpose and Need would not be met.
Change Highway Alignment	Yes	Yes	On-going during project development.
Traffic System Management	No	No	Effect capacity and level of service.
Noise Barriers	No	Yes	Not cost effective due to sparse development.

3.9 Air Quality

3.9.1 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* (CAA, as amended). The SCDHEC Bureau of Air Quality and NCDENR Division of Air

Quality are responsible for regulating and ensuring compliance with the Clean Air Act in South Carolina and North Carolina respectively.

The criteria pollutants that are measured under NAAQS are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.[63] In Table 3.32, 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.[64]

The United States is divided into geographical areas that are classified as either in nonattainment or attainment for air quality. If an area has exceeded the NAAQS levels for any of the six criteria pollutants, then it is in nonattainment. 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 are considered to be in attainment. All four counties in the project study area are considered to be in attainment for the 8-hour NAAQS for ground level ozone. These four counties are also shown to be in attainment for 2.5 particulate matter standards established by USEPA in July 1997. The four-county area is currently in attainment of the NAAQS standards.

3.9.2 What are the potential air quality issues associated with a transportation project?

In 1997, the USEPA determined that the 1-hour "peak" NAAQS 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.[65] This 8-hour standard would be phased in, and once an area has reached this standard for three years, it would no longer use the 1-hour standard. 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 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. Once the USEPA approved these compacts, and the milestones were reached, these areas would receive deferrals from the 8-hour average standard.

In 2004, SCDHEC and NCDENR began submitting Early Action Compact State Implementation Plans, including Early Action Compacts for implementing measures to attain the 8-hour average standard for ozone. Early Action Compacts in South Carolina were submitted for the majority of

[63] USEPA, National Ambient Air Quality Standards Webpage, http://www.epa.gov/ttn/naaqs/ (May 22, 2008).
[64] FHWA, "Air Quality Planning for Transportation Officials," http://www.fhwa.dot.gov/environment/aqplan/index.htm (May 22, 2008).
[65] USEPA, USEPA's Revised Ozone Standards, http://www.epa.gov/ttn/oarpg/naaqsfin/o3fact.html (May 22, 2008).

Table 3.32
Criteria Pollutants Measured Under the NAAQS

Pollutant	Standard				Description	Possible Effects to Human Health
	Averaging Time	ppm†	µg/m³*	Type of standard¥		
Carbon monoxide	1 hour	35	40,000	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.
	8 hours	9	10,000	Primary		
Lead	quarterly average	-	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 (arithmetic mean)	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	-	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	-	150	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 2.5 µm	24 hours	-	35	Primary & Secondary		
	1 year (arithmetic mean)	-	15	Primary & Secondary		
Sulfur oxides	3 hours	0.50	1,300	Secondary	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.
	24 hours	0.14	-	Primary		
	1 year	0.03	-	Primary		

†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

the counties in both attainment and nonattainment areas, including Dillon and Marlboro Counties. North Carolina submitted Early Action Compacts only for areas that were designated as nonattainment for NAAQS. Since Richmond and Scotland Counties are in attainment, Early Action Compacts were not submitted for these counties.

There are no monitoring stations within the project study area; however, there are three monitoring stations in counties surrounding the project study area. South Carolina has two sites: the Pee Dee station located in Darlington, South Carolina that monitors for ozone, and the Chesterfield station located in McBee, South Carolina, which monitors for ozone and particulate matter. Neither station has exceeded the 8-hour standard for ozone in the past three years. The Candor Station is located in Candor, North Carolina and monitors for particulate matter. Data from this station show that the three-year average for particulate matter is below the established standards.

As part of the Early Action Compact State Implementation Plan in South Carolina, 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, as well as local Councils of Governments to sign a memorandum of agreement outlining consultation procedures for transportation conformity. In addition, a Smart Highways Checklist was to be used when developing Long Range Transportation Plans and Transportation Improvement Programs. The Smart Highways Checklist would help meet state and federal air quality standards, as well as goals set forth in the Early Action Compacts.[66]

With the approval of the 2004 State Implementation Plan revision, when an area in South Carolina is deemed in nonattainment, it is then required to implement transportation conformity and the necessary consultation procedures, outlined in the memorandum of agreement. 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.

North Carolina Administrative Code 15A NCAC §02D. 2000 entitled *Transportation Conformity*, requires all transportation programs, projects, and plans to conform in areas that are designated as nonattainment or maintenance areas under 40 CFR §81.334.

In addition to the criteria air pollutants for which there are NAAQS, the USEPA also regulates 21 Mobile Source Air Toxics (MSATs),[67] which are a subset of the 188 air toxics defined by the CAA. MSATs are mostly from human made sources, such as compounds emitted from highway vehicles

[66] SCDHEC, Bureau of Air Quality, "South Carolina Early Action Compact SIP," http://www.scdhec.gov/eqc/baq/html/eap_sip.html (December 15, 2006).
[67] Federal Register, *Control of Emissions of Hazardous Air Pollutants from Mobile Sources*, 66 FR 17235.

and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

These MSATs are considered to potentially cause harmful health or environmental effects.[68] Six of these have been identified as priority MSATs, and include benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene.[69]

MSATs

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

FHWA has provided interim guidance on addressing MSATs in the NEPA analysis through *Memorandum HEPN-10: Interim Guidance on Air Toxic Analysis in NEPA Documents*.[70] This memorandum is included in Appendix G. While a basic discussion of potential MSAT emission impacts from the proposed project has been addressed, technical resources are not available at this time to determine project-specific health impacts from MSATs associated with the Build Alternatives. Due to the lack of technical resources, a discussion regarding incomplete or unavailable information is provided below, along with FHWA guidance and CEQ guidance in Appendix G (specifically 40 CFR §1502.22(b)).

The USEPA is the lead federal agency for administering the *Clean Air Act* and has certain responsibilities regarding the health effects of MSATs. The USEPA issued a *Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources*, (66 FR 17229, March 29, 2001). This rule was issued under the authority in Section 202 of the *Clean Air Act*. In its rule, USEPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel particulate matter emissions by 87 percent (refer to Chart 3.1, page 3-129).

[68] USEPA, Mobile Source Air Toxics Website, http://www.epa.gov/otaq/toxics.htm (May 22, 2008).
[69] FHWA, *HEPN-10: Interim Guidance on Air Toxic analysis in NEPA Documents*, (February 3, 2006), http://www.fhwa.dot.gov/ENVIRONMENT/airtoxic/020306guidapc.htm (May 22, 2008).
[70] *Ibid*.

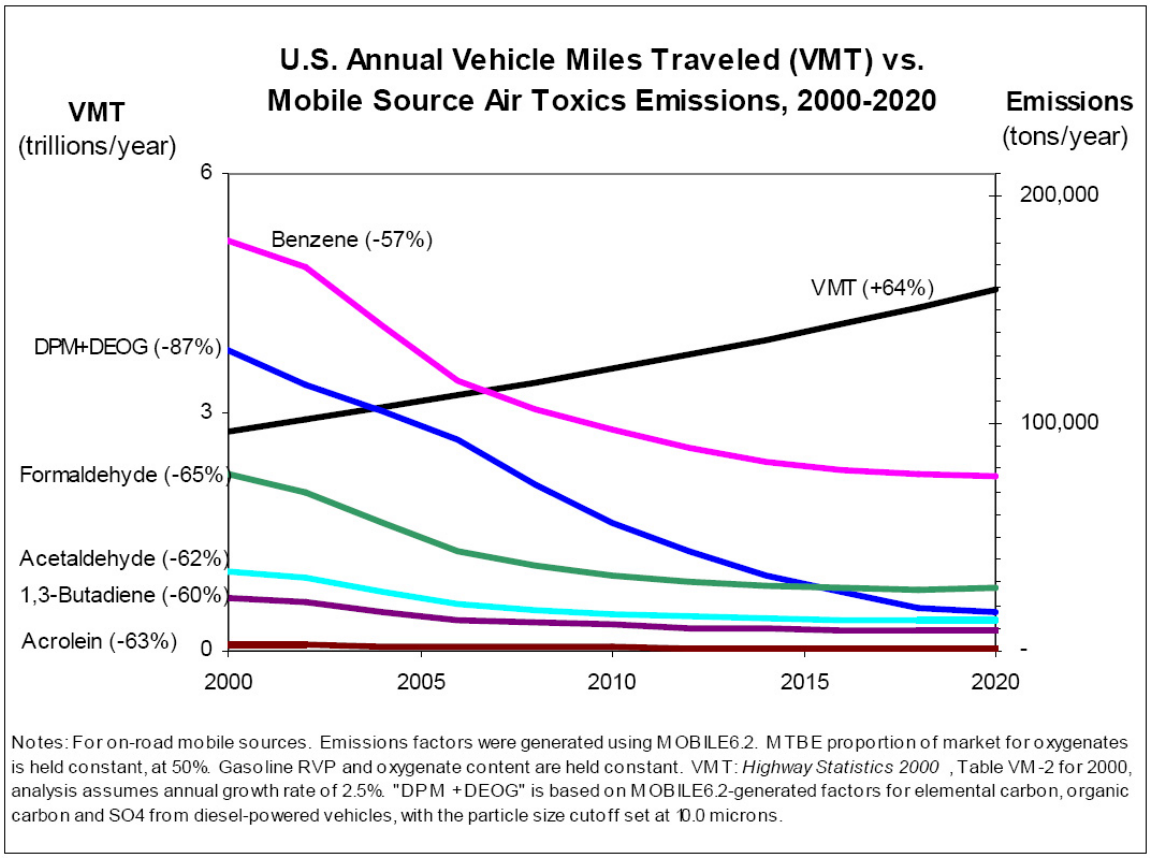

Chart 3.1 U.S. Annual VMT vs. Mobile Source Air Toxics Emissions, 2000 to 2020

Source: FHWA, HEPN-10: Interim Guidance on Air Toxic analysis in NEPA Documents.

As a result, USEPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

Unavailable Information for Project Specific MSAT Impact Analysis

This FEIS includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the alternatives in this FEIS. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR §1502.22(b)) regarding incomplete or unavailable information.

Information that is Unavailable or Incomplete

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

Emissions

The USEPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model; emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, USEPA has identified problems with MOBILE 6.2 as an obstacle to quantitative analysis.

These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE 6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

Dispersion

The tools to predict how MSATs disperse are also limited. The USEPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. Research is being conducted on best practices in applying models and other technical methods in the

analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

Exposure Levels and Health Effects

Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of USEPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

The USEPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The USEPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information

for the six prioritized MSATs was taken from the IRIS database Weight of Evidence Characterization summaries. This information is taken verbatim from USEPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- Benzene is characterized as a known human carcinogen.
- The potential carcinogenicity of acrolein cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- Formaldehyde is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- 1,3-butadiene is characterized as carcinogenic to humans by inhalation.
- Acetaldehyde is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- Diesel exhaust (DE) is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases.
- Diesel exhaust also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by USEPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes, particularly respiratory problems.[71] Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

[71] South Coast Air Quality Management District, "Multiple Air Toxic Exposure Study-II," (2000); The Sierra Club, "Highway Health Hazards," (summarizing 24 studies on the relationship between health and air quality) (2004); Environmental Law Institute, "NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles," 35 ELR 10273 with health studies cited therein, (2005).

Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

3.9.3 Would air quality be impacted by the Preferred Alternative?

Air quality impacts are not anticipated by the Preferred Alternative. In general, the proposed project would improve the flow of heavy truck traffic through this area relieving congestion along existing routes, which would have positive effects on the region's air quality. In addition, both Dillon and Marlboro Counties in South Carolina have entered into Early Action Compacts to set goals for cleaner air. This project also has been included in the both North Carolina and South Carolina's Transportation Improvement Programs (STIPs), which are reviewed for air quality compliance. With the Early Action Compacts in place, and standard review of the project as part of the STIPs would increase mobility within this area. In view of the qualitative analysis (see below), the proposed project is not likely to impact air quality in the project study area.

Meaningful or reliable estimates of MSAT emissions and effects cannot be determined for the proposed project due to the technical shortcomings of current emission/dispersion models as well as the uncertain science with respect of health effects from MSAT emissions. Even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions for the proposed project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*.[72]

[72] Clagett and Miller, *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, http://www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm (May 22, 2008).

For the Preferred Alternative, the amount of MSATs emitted would be proportional to the vehicle miles traveled (VMT) and emissions would likely be lower than present levels in the design year as a result of USEPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 to 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the USEPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the project study area are expected to be lower in the future in virtually all cases.

During the development of the Preferred Alternative, areas of high density development, communities, neighborhoods, and residential areas were avoided to the extent possible; for further information refer to Chapter 2, Section 2.4, page 2-4. However, the Preferred Alternative would have the effect of moving some traffic closer to nearby homes and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be higher under the Preferred Alternative than the No-build Alternative.

As discussed above, the magnitude and the duration of the potential increases by the Preferred Alternative when compared to the No-build Alternative cannot be accurately quantified due to the inherent deficiencies of current models. In summary, when a highway is widened, and as a result moves closer to receptors, the localized level of MSAT emissions for the Preferred Alternative may be higher relative to the No-build Alternative, but this may be offset by increases in speed and reduction of congestion (which are associated with lower MSAT emissions). Additionally, MSATs would be lower in other locations when traffic shifts away. On a regional basis, USEPA's vehicle and fuel regulations, coupled with fleet turnover, may cause substantial reductions over time that, in almost all cases, cause region-wide MSAT levels to be lower than today.

Construction Impacts

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*[73] and *A Guide To Site Development and Best Management Practices For Stormwater Management*

[73] SCDHEC-OCRM, *South Carolina Stormwater Management and Sediment Control Handbook for Land Disturbance Activities* (2003), Appendix E.

and Sediment Control.[74] 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,*[75] the contractor would comply with *South Carolina Air Pollution Control Laws, Regulations and Standards*.[76] In addition, for the portion of the roadway being built in North Carolina, the contractor would be required to comply with the *North Carolina Air Quality Rules, Policies and Regulations*.[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 North Carolina's and South Carolina's State Implementation Plan for air quality, in compliance with South Carolina's Regulation 62.2, *Prohibition of Open Burning* and North Carolina's *Open Burning* Regulation, found in 15A NCAC 02D.1900.

3.9.4 Would climate change be affected by the proposed project?

There is a growing consensus in the scientific community that increased amounts of *greenhouse gases* in the earth's atmosphere are leading to changes in the global climate. The term "greenhouse" refers to the presence of these gases in the atmosphere that absorb heat reflected by the earth's surface, thus increasing the temperature of the land and oceans, much like a greenhouse works to keep plants inside warmer than the outside environment. There are several sources of these gases, but increased amounts resulting from human

Greenhouse Gases

Greenhouse gases are defined as carbon dioxide, water vapor, methane, nitrous oxide, and halocarbons (hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride). All but the halocarbons are naturally occurring. Man's activities have increased the levels of most of these constituents in the atmosphere. Water vapor is the one constituent thought not to be significantly affected by man's activities. Carbon dioxide increases are primarily due to combustion of fossil fuels. It is estimated that half of the methane levels are due to agricultural activities, combustion of fossil fuels and waste disposal. Nitrous oxides result from agricultural activities, fossil fuel combustion, wastewater treatment and waste combustion; and biomass burning. Halocarbons result primarily from industrial processes.

Source: ***Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2006.***

[74] SCDHEC-OCRM, *A Guide to Site Development and Best Management Practices for Stormwater Management and Sediment Control*.
[75] SCDOT, *Standard Specifications for Highway Construction* (2000).
[76] SCDHEC, Bureau of Air Quality Control, *South Carolina Air Pollution Control Laws, Regulations, and Standards.*
[77] NCDENR, Division of Air Quality, *Air Quality Rules, Policies, and Regulations,* http://daq.state.nc.us/rules/rules/ (January 30, 2007).

activities, primarily the consumption of fossil fuels, are generally acknowledged to have resulted in as much as a one degree Fahrenheit rise over the past century.[78] Concerns resulting from the changing climate are varied and include rising sea level, more extreme weather, diminishing biological diversity due to extinction of susceptible species, changing agricultural production, changing water supply, and effects to human health.

Transportation sources emit carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons (from refrigerants), all of which are considered greenhouse gases. The largest constituent (approximately eighty percent) of greenhouse gases is carbon dioxide.[79] Approximately 31 percent of the United States' carbon dioxide emissions came from transportation sources in 2006.[80] There are no national standards in place for greenhouse gas emissions at this time. Currently, the FHWA does not evaluate greenhouse gas emissions at a project level. This is because at this time the evaluation of greenhouse gas emissions at the project level will not result in better informed project decisions. FHWA is collaborating with the Department of Transportation's Center for Climate Change to evaluate implementable strategies to reduce the transportation component of greenhouse gas emissions. These agencies continue to evaluate and update their approach as more information becomes available.

In South Carolina, Governor Sanford issued Executive Order 2007-04 creating the Governor's Climate, Energy and Commerce Advisory Committee. The Committee was charged with consideration of "the potential benefits, costs, savings, and feasibility of furthering building and infrastructure efficiency, and of carbon dioxide mitigation options and related energy policy and economic opportunities, and develop specific recommended actions."[81] As of this date, the Committee has not officially released a report, but a draft report on their website includes a transportation and land use section that focuses on improving vehicle fuel efficiency, substituting gasoline and diesel with lower-emission fuels, and reducing total Vehicle Miles Traveled.[82] It appears that the Committee's final report will have several recommendations to reduce greenhouse gas emissions.

In North Carolina, the North Carolina Climate Action Plan Advisory Group was created to advise the NCDENR on recommendations to make to state policy makers for a state-level Climate Action

[78] NASA, Goddard Institute for Space Studies, "NISS Surface Temperature Analysis," http://data.giss.nasa.gov/gistemp/2007/ (July 8, 2008).
[79] USEPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2006,* April 15, 2008, p. ES-7, http://www.epa.gov/climatechange/emissions/downloads/08_CR.pdf (July 8, 2008).
[80] *Ibid* at p. 2-3.
[81] State of South Carolina, Office of the Governor, Executive Order 2007-04: *Establishing the Governor's Climate, Energy and Commerce Advisory Committee,* February 16, 2007.
[82] South Carolina Climate, Energy & Commerce Advisory Committee, *SC CECAC Revised Draft Report,* June 24, 2008, http://www.scclimatechange.us/ewebeditpro/items/O60F18204.pdf (July 8, 2008).

and Implementation Plan. A list of thirteen options, including the use of alternative fuels, land development planning, and technology incentives were developed for reducing or mitigating greenhouse gas emissions.[83]

While the air quality impacts of this project on climate change were not evaluated, the proposed project would result in an increase in the efficiency of the transportation network. It would lower the vehicle miles traveled and vehicle hours traveled on the existing traffic network and reduce the travel time between the northern terminus and I-95.[84] Therefore, this project is not expected to contribute to climate change.

Natural Environment

This Section discusses the natural resources found in the project study area, including farmlands, uplands, wetlands, invasive species, wildlife, protected species, water resources, floodplains, and uniformly affected resources. It also discusses how the No-build Alternative and Preferred Alternative may impact each resource, and what permits would be necessary to construct the Preferred Alternative.

3.10 Farmlands

3.10.1 Why is farmland an important consideration?

North Carolina and South Carolina both have a long history of farming and agricultural significance, especially within the project study area. Drawn by its abundant resources, this region was first settled by Native Americans then later by English settlers who traveled inland from the Carolina Coast.[85] Early residents of Marlboro and Richmond Counties were successful cotton farmers. In the mid 1800's, Richmond County grew as the economy diversified from agriculture to manufacturing with the establishment of cotton mills. Local legend holds that the farmland in Marlboro County was so fertile, that it was once sold by the pound instead of the acre.[86] Those settling in Scotland County were mainly of Welsh and Scottish descent, and established largely a farming community, with a few small stores scattered throughout.[87]

A farmer working in a field in the project study area

[83] North Carolina Climate Action Plan Advisory Group, *CAPAG Final Report, Executive Summary*,http://www.ncclimatechange.us/ewebeditpro/items/O120F18161.pdf (July 8, 2008).
[84] Traffic Technical Memorandum, "From I-95 to Future Interstate 74 in North Carolina," (2007).
[85] Marlboro County History Website, http://sciway3.net/proctor/marlboro/marlboro_history.html (May 22, 2008).
[86] *Ibid.*
[87] Scotland County Website, History Webpage, http://www.scotlandcounty.org/History.htm (May 22, 2008).