SECTION 4
ENVIRONMENTAL CONSEQUENCES

This section describes potential positive and negative impacts of the Preferred Alternative and the three build alternates studied in the DEIS (Bypass Alternates 1B-EXT, 4-EXT, and 5-EXT) on the social, physical, and natural environments within the project study area. Where applicable the No-Build Alternative is also discussed.

Impacts for the Preferred Alternative are based on final preliminary design plans, which incorporated design modifications and adjustments approved following selection of LEDPA. Impacts for the build alternates (1B-EXT, 4-EXT, and 5-EXT) were based on preliminary design plans available prior to publication of the DEIS. Impacts to most natural resources in the area were determined based on slope stake limits (width of side slope). In the case of wetlands, impacts were based on slope stake limits plus ten feet of clear zone on each side to more accurately estimate the impacts. A summary of the environmental consequences is provided in Section 4.11.

4.1 HUMAN ENVIRONMENT

Impacts to the human environment may include impacts to communities, changes in community access, relocations, disruption of community services or facilities, and economic impacts.

4.1.1 Community

Community cohesion impacts include the effects of neighborhood division, social isolation, changes in community character, increased/decreased neighborhood access, and shortened travel times.

In the cases of all neighborhoods within the Preferred Alternative and the bypass alternate corridors, the suburban and agrarian visual character of these neighborhoods and their surroundings would be altered with the presence of a major highway facility. The following sections describe the impacts specific to neighborhoods identified within the study area. These neighborhoods are shown on Figure 3-3. The No-Build Alternative would not impact community cohesion.

Springdale Apartments (Old Snow Hill Road)
This complex is located east of NC 11, on the south side of Old Snow Hill Road. The Preferred Alternative would not directly impact the complex. An existing access from NC 11 to the apartments would be closed, but a new access would be provided off of Old Snow Hill Road. The apartments were within the study corridors of each of the bypass alternates considered; however, none of the preliminary designs for these corridors would directly impact the apartments. In fact,

existing NC 11 would be shifted to the west at this location and would be further from the apartments than it is currently.

Pines Neighborhood (NC 102)
Small areas around the perimeter of this neighborhood are within the study corridors of each of the bypass alternates; however, there would be no direct impact to the neighborhood from the Preferred Alternative or any of the alternates. Access to the neighborhood from NC 11 and NC 102 would be maintained.

Summit Village (Dennis McLawhorn Road)
The Preferred Alternative/Bypass Alternate 4-EXT will not directly impact this neighborhood. Bypass Alternates 1B-EXT and 5-EXT would pass just to the west of this subdivision but would not directly impact any of the homes in the neighborhood. Access to the neighborhood would be retained from Dennis McLawhorn Road.

Abbott Farms and Abbott Farms South (Abbott Farm Road)
The Preferred Alternative/Bypass Alternate 4-EXT will not directly impact these neighborhoods. Bypass Alternate 1B-EXT would pass through these neighborhoods and would impact several properties. Bypass Alternate 1B-EXT would also alter existing access to the remaining properties in Abbott Farms South so that they would be accessed by a new road from Abbott Farm Road, while access to Abbott Farms would be provided from Jolly Road. Bypass 5-EXT would not directly impact Abbott Farms or Abbott Farms South.

Brevard (NC 903)
The Preferred Alternative/Bypass Alternate 4-EXT will not directly impact these neighborhoods; Bypass Alternates 1B-EXT also avoids direct impacts on them. The majority of this neighborhood would be directly impacted by Bypass Alternate 5-EXT, with more than half of the 25 existing lots directly affected by the proposed interchange on Bypass Alternate 5-EXT at NC 903. Under the Bypass Alternate 5-EXT scenario, access to the remaining parcels would be provided by a new access road from NC 903.

Emerald Chase, J.L. Nobles Division, and Sandy Meadows (Pocosin Road)
The Preferred Alternative/Bypass Alternate 4-EXT will not directly impact these neighborhoods and Bypass Alternates 1B-EXT and 5-EXT would pass to the east of these subdivisions. There would be no direct impacts to these subdivisions from any of the bypass alternates.

Westwind, Sutters Place, Randall Estates, and Ivy Chase (Pocosin Road)
The Preferred Alternative/Bypass Alternate 4-EXT will not directly impact these neighborhoods; Bypass Alternate 5-EXT also avoids direct impacts on them. These neighborhoods would each be impacted to some extent by Bypass Alternate 1B-EXT. Properties in Westwind and Sutters Place would be required for construction of the bypass in this location. Only two to three properties located in the rear of the Sutters Place neighborhood would be impacted. Right of way would also be required from several parcels in Ivy Chase along Pocosin Road and Randall Estates along Frog

Level Road to allow for improvements on these roads. With Bypass Alternate 1B-EXT, access to remaining properties in these neighborhoods would be available from Pocosin Road and Frog Level Road.

Gatewood, Shady Acres, and Mayfield (Frog Level Road)
The Preferred Alternative/Bypass Alternate 4-EXT will not directly impact these neighborhoods; Bypass Alternate 1B-EXT also avoids direct impacts on them. A new interchange would be provided under all scenarios just west of these neighborhoods on Forlines Road. Two properties at the entrance to the Gatewood community would be impacted by construction associated with improvements to Frog Level Road under Alternate 5-EXT only. Alternate 5-EXT would not directly impact Shady Acres and Mayfield.

Pinecrest, Hampton Creek, Field Stream at Sawgrasse Pointe, Augusta Trails, Meadow Woods, and Forrest Pines (Davenport Farm Road/Frog Level Road)
These neighborhoods would not be directly impacted by the Preferred Alternative or any of the bypass alternates. A new interchange would be provided under all alternates just west of these neighborhoods on Forlines Road. Bypass Alternates 1B-EXT and 5-EXT are the closest alternates to these neighborhoods.

Bristolmoor, Brighton Place, and Taberna (Frog Level Road)
The Preferred Alternative/Bypass Alternate 4-EXT would not impact these subdivisions. All three subdivisions would be impacted to some extent by Bypass Alternates 1B-EXT and 5-EXT. Bristolmoor would be the most impacted because of its location in close proximity to a proposed interchange at Forlines Road. In Brighton Place, approximately 15 lots near the back of the subdivision would be impacted by Bypass Alternates 1B-EXT and 5-EXT. Access to remaining parcels would continue from Frog Level Road. In Taberna, a small number of parcels along the road would be impacted by the preliminary designs for Bypass Alternates 1B-EXT and 5-EXT.

Community Access

Through traffic traveling on Memorial Drive (NC 11) is anticipated to transfer to the new facility. Local community and social patterns, however, are not expected to change. Since through traffic would be diverted from existing NC 11, accessibility to facilities and services within the developed community centers is expected to improve for local traffic.

Likewise, accessibility to employment, services, and facilities along Stantonsburg Drive (US 264 Business) and in Greenville is expected to improve for residential neighborhoods in the study area. Residents would have a shorter distance to travel to reach a controlled-access facility, which would provide for faster travel times to regional destinations.

While no major cross streets connecting to any of the residential areas would be closed as part of the proposed project, there may be individual and community property access impacts due to relocation of driveways and local roads. The NCDOT provides new access wherever possible to

properties isolated by a project. All property access changes and proposed solutions developed for the preferred alternative will be presented to affected property owners through NCDOT's public involvement process. Design modifications to service roads and other property access points incorporated as a result of local government requests and a service road study completed by NCDOT in June 2007 are described in section 2.8.2 of this FEIS.

4.1.2 Relocations

Based on its final preliminary design, the Preferred Alternative will require a total of forty (40) relocations, including thirty nine (39) residential relocations and one (1) business relocations.

Potential residential and business relocation impacts for each of the three bypass alternates studied in the DEIS, along with the impacts for the Preferred Alternative, are shown in Table 4-1. The impacts for the bypass alternates were based on preliminary designs for each at the time the DEIS was prepared. The number of relocations for the bypass alternates is based on information provided in the 2006 NCDOT Relocation Report for the project.

TABLE 4-1: RELOCATIONS

	Business Relocations	Residential Relocations
Preferred Alternative+	1	39
Bypass Alternate 1B-EXT*	9	60
Bypass Alternate 4-EXT*	2	42
Bypass Alternate 5-EXT*	8	90

+ Based on (Date) NCDOT Relocation Report
* Based on June 2006 NCDOT Relocation Report

Bypass Alternate 5-EXT would have relocated the most residences of the three detailed study corridors, requiring 98 relocations, including eight business relocations. Alternate 4-EXT would have required the least relocations with 40.

In addition to these potential relocation impacts, several secondary structures such as barns, garages, and sheds on properties are affected. In general, parcels where these structures are impacted are large enough to allow for relocating or rebuilding these structures elsewhere on the property.

4.1.1.1 Relocation Assistance

A detailed relocation report has been prepared by NCDOT and includes information on comparable replacement housing in the project area. It is the policy of NCDOT to ensure that comparable replacement housing is available for relocatees prior to construction of state and/or federally assisted projects. Furthermore, the NCDOT has three programs to minimize the inconvenience of relocation: relocation assistance, relocation moving payments, and relocation replacement housing payments or rent supplements.

With the Relocation Assistance Program, experienced NCDOT staff will be available to assist displacees with information such as; availability and prices of homes, apartments, or businesses for sale or rent, and financing or other housing programs. The Relocation Moving Payment Program, in general, provides for payment of actual moving expenses encountered in relocation. Where displacement will force an owner or tenant to purchase or rent property at higher cost or to lose a favorable financing arrangement (in case of ownership), the Relocation Replacement Housing Payments or Rent Supplement Program will compensate up to $22,500 to owners who are eligible and qualify, and up to $5,250 to tenants who are eligible and qualify.

The relocation program for the proposed action will be conducted in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) and the North Carolina Relocation Assistance Act (GS-133-5 through 133-18). This program is designed to provide assistance to displaced persons in relocation to a replacement site in which to live or do business. At least one relocation officer is assigned to each highway project for this purpose.

The relocation officer will determine the needs of displaced families, individuals, businesses, non-profit organizations, and farm operations without regard to race, color, religion, sex, or national origin. The NCDOT will schedule its work to allow ample time, prior to displacement, for negotiation and possession of replacement housing that meets decent, safe, and sanitary standards. The relocatees are given a 90-day written notice after NCDOT purchases the property. Relocation of displaced persons will be offered in areas not generally less desirable in regard to public utilities and commercial facilities. Rent and sale prices of replacement housing will be within the financial budget of the families and individuals displaced and will be reasonably accessible to their places of employment. The relocation officer also will assist owners of displaced businesses, non-profit organizations, and farm operations in searching for and moving to replacement property.

All tenant and owner residential occupants who may be displaced will receive an explanation regarding all available options, such as: 1) purchases of replacement housing; 2) rental of replacement housing, either private or public; and 3) moving existing owner-occupied housing to another site (if practicable). The relocation officer also will supply information concerning other state or federal programs offering assistance to displaced persons and will provide other advisory services as needed in order to minimize hardships to displaced persons in adjusting to a new location.

Last Resort Housing is a program used when comparable replacement housing is not available, or is unavailable within the displacee's financial means, and the replacement payment exceeds the federal and state legal limitation. The purpose of the program is to allow broad latitudes in methods of implementation by the state so that decent, safe, and sanitary replacement housing can be provided. Since opportunities for replacement housing appear adequate within the study area, it is not likely that the Last Resort Housing Program would be necessary for the proposed project. However, this program will still be considered as mandated by State law.

4.1.2 Community Facilities and Services

The No-Build Alternative would not directly impact community facilities or services.

4.1.2.1 Libraries, Schools, and Parks and Recreational Facilities

Schools, libraries, and parks and recreation areas in the study area would not be impacted by the Preferred Alternative or any of the three bypass alternates.

4.1.2.2 Churches

No churches will be impacted by the Preferred Alternative. No churches were located within any of the bypass alternate corridors studied in the DEIS. Piney Grove Church, located on the south side of US 13 east of Davenport Farm Road (SR 1128), is located just east of the proposed interchange along the Preferred Alternative/Bypass Alternate 4-EXT at US 13. Landmark Church, located on US 13 near the intersection with Hollowell Road (SR 1512) in Greenville, is located east of Bypass Alternate 1B -EXT's proposed interchange location at US 13.

4.1.2.3 Emergency Services

The proposed project would not relocate any emergency facilities. By adding a new freeway southwest of Greenville, accessibility to the area for emergency reasons would be improved over the current condition. In addition, travel time to medical facilities, including Pitt County Memorial Hospital, would be substantially decreased. The positive effect on emergency services would be similar for each of the bypass alternates.

4.1.3 Minority & Low Income Populations

4.1.3.1 Analysis

A comparison of minority and low income populations at the census block group level was performed to determine potential impacts of the project on these populations. For the purposes of this analysis, the study area consists of Census Tract 6, Block Group 2; Census Tract 13, Block Group 1; Census Tract 14, Block Groups 1, 5 and 6; and Census Tract 16, Block Groups 2 and 3 (see Figure 3-1). Based on 2000 Census Data, the non-white population of the entire study area (36.9 percent) is comparable to that of Pitt County (37.9 percent); however, non-white population varies among census block groups impacted by the project. The highest concentration of minority population (74.1 percent) occurs in Census Tract 14, Block Group 5, which includes the town of Ayden and the project's southern terminus at Memorial Drive (NC 11). The Preferred Alternative does cross this block group, although it would require few relocations in this area and would not divide any cohesive neighborhoods. In addition, the minority population in this block group is concentrated in its northeastern corner, within central Ayden, and the Preferred Alternative is well to the southwest of this area. Tract 14, Block Group 6, which is bounded to the east and west by Memorial Drive and Pleasant Plain Road and to the north and south by NC 102 and Old Snow Hill Road, has the lowest concentration of minority residents (9.2 percent). The Preferred Alternative also crosses this block group. Impacts of the project on these two tracts did not differ

among the bypass alternates studied in the DEIS, as all of the alternates shared a common alignment at this location. Other census block groups in the study area have minority populations ranging from 12 percent to 39 percent, which is less than or comparable to the minority population for Pitt County.

Census Tract 14, Block Group 5 also had the highest percentage of population living below the poverty level and the lowest median household income, both of which deviate significantly from the county and overall study area. In this area, approximately 38 percent of residents live below the poverty level, compared to 20 percent and 17 percent for the county and study area, and the median household income is $18,864, more than 50 percent lower than the study area and more than 40 percent lower than the county. However, these population characteristics are concentrated in the northeastern corner of this block group, away from the Preferred Alternative; thus there will be very little direct impact. The highest median household incomes are in Census Tract 13, Block Group 1 and Census Tract 14, Block Group 6. Tract 13, Block Group 1 is located along Memorial Drive (NC 11) between Jolly Road and Forlines Road. All other block groups have median incomes above the county and comparatively low populations living in poverty.

While the area surrounding the project's southern terminus has the highest minority population, highest percentage of population in poverty, and lowest median household income, the Preferred Alternative will not have disproportionate impacts on members of these populations. As shown in Exhibit 1 the alignment will not impact the residential properties. In addition, impacts to this area would be the same for all bypass alternates studied in the DEIS. Other portions of the project area have relatively low minority populations and high incomes compared to the county. Therefore, it is not anticipated that the proposed project will have disproportionate adverse impacts to minority or low income communities.

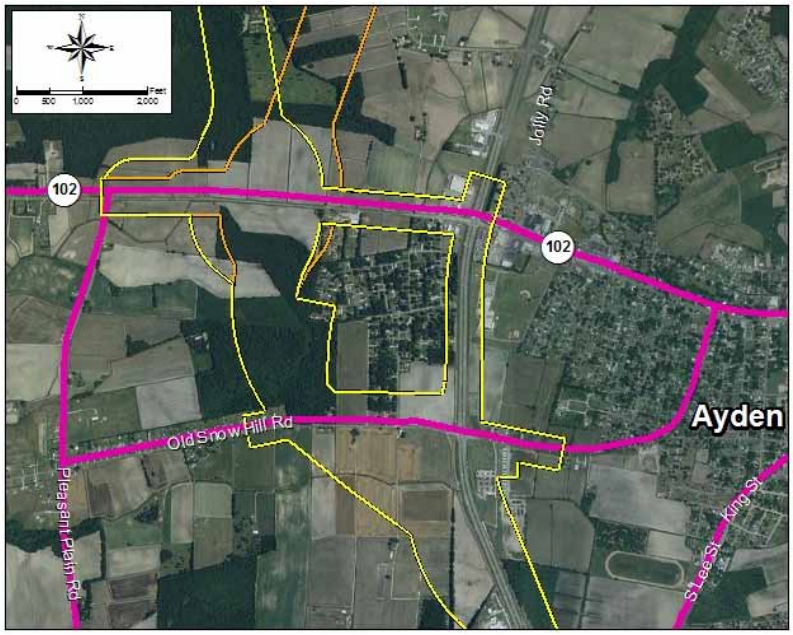


Exhibit 1 – Preferred Alternative's southern terminus vis-à-vis minority and low income residential locations

4.1.3.2 Avoidance and Minimization Efforts

The bypass alternate corridors were located to avoid passing through the centers of neighborhoods and subdivisions. Preliminary engineering designs further minimized relocations where possible.

Based on the above analysis, one low income minority population was identified. However, the bypass alternates shared a common alignment and terminus in this area and would therefore have the same impacts to this community. The alignment and proposed interchange in this area were located to avoid residential impacts as much as possible.

4.1.3.3 Public Involvement Opportunities

NCDOT has attempted to include all residents and property owners in the study area in the project's decision-making process. Efforts to include residents of communities within the area are discussed in Section 7.

4.1.4 Economic

The Greenville Southwest Bypass project will not inhibit positive economic growth and development within the immediate study area or the towns of Ayden and Winterville, the city of Greenville, and Pitt County. Service-oriented developments such as gas stations, restaurants, and other related facilities may choose to locate at or near the proposed interchange locations. In addition, given the robust housing market and extension of water and sewer infrastructure within the study area it is presumed that additional residential subdivisions will be built.

The Preferred Alternative and each of the alternates considered in the DEIS are likely to positively impact the town of Ayden. The Preferred Alternative and the three alternates would all interchange with NC 11 just south of NC 102 within the town. This new connection would greatly enhance access to and cut travel time to job centers in Greenville, including Pitt County Memorial Hospital and other facilities along Stantonsburg Road (US 264 Business). Commuters would be drawn to Ayden by these quicker travel times, easy access to the freeway, and relatively low land costs.

The city of Greenville is projecting development in the area of the proposed Southwest Bypass to increase over the coming years, labeling it the Southwest Greenville Growth Area. The availability of water and sewer service is currently driving growth in this area. Due to its location, the Preferred Alternative would likely lead to development concentrating first around interchange locations and then spread east toward existing development and water/sewer service areas. Because they lie to the west of the other two bypass alternates considered, the Preferred Alternative/Bypass Alternate 4-EXT may lead to development further to the west at a more rapid pace.

Bypass Alternate 1B-EXT
Bypass Alternates 1B-EXT and 5-EXT followed a common alignment from Stantonsburg Road (US 264 Business) to Forlines Road (SR 1126). This area is experiencing growth as a result of its proximity to jobs in Greenville and the availability of water and sewer services and it is unlikely that the project would have much influence on the pattern or pace of development in this area. South of Forlines Road, Bypass Alternate 1B-EXT was located close enough to existing and planned future development in Winterville that it would also not be expected to have a substantial influence on development. Bypass Alternate 5-EXT was located closest to existing development and therefore would have the least influence on growth and development in the area.

4.2 LAND USE AND TRANSPORTATION PLANNING

4.2.1 Land Use

Since the proposed project would be constructed on new location, land uses along the Preferred Alternative will likely change. Under each of the three detailed study bypass alternates, land uses were also projected to change. The No-Build Alternative would not introduce any impacts to existing land use.

4.2.1.1 Existing Land Use and Zoning Impacts

Land use impacts resulting from highway construction include physical displacement or alteration of adjacent land uses (direct impacts) and alteration of existing or planned uses of lands occurring because of the project, but removed from the project in time or space (indirect impacts). Land use decisions are typically made by the land owner in concert with local jurisdictions (county and municipal governments). These decisions are guided by the inclinations of the owners, economic conditions, physical constraints of the land, local land use policies, zoning restrictions, and the issuance of building permits. State or federal governments have no controls over these decisions except through regulatory permitting legislation. As such, a detailed discussion of development trends and potential indirect impacts of the project is included in Section 4.10, Indirect and Cumulative Impacts.

4.2.1.2 Compatibility with Area Land Use Plans

Land use plans typically address the general area of a proposed transportation improvement rather than a specific location; therefore, the anticipated land use plan impacts of the proposed project would be the same for the Preferred Alternative and each of the three bypass alternates.

The proposed project has been under consideration for many years and is acknowledged and supported in the *Greenville Urban Area Thoroughfare Plan* (2004) as well as local land use and comprehensive plans for the city of Greenville, the towns of Winterville and Ayden, and Pitt County. These plans were developed or updated with the assumption that the proposed Greenville Southwest Bypass would be constructed before the end of their planning period. If the project were not built, these plans would require modification.

City of Greenville

The proposed project is consistent with the goals and policies established by the city of Greenville in its 2004 Horizons Comprehensive Plan. It is noted in the plan that access to the proposed Greenville Southwest Bypass should be fully controlled and that commercial uses should be limited to focus areas along the bypass. It is the desire of the city of Greenville that office and employment uses adjoin the selected corridor with the provision that vegetation be used to screen these uses from both the highway and any existing/planned residential communities.

In the Greenville Horizons Plan, the area between the CSX Railroad and Frog Level Road (SR 1127) in the vicinity of the three bypass alternates is slated for industrial development. The area between Frog Level Road and US 13/US264A is targeted for office/institutional/multi-family development with the intersection of US 13/US 264A and Davenport Farm Road (SR 1128) targeted for commercial use. The remainder of the area surrounding the three bypass alternates is primarily planned for medium-density residential uses with a few pockets of conservation and open space in wetland areas.

Town of Winterville

While neither the Preferred Alternative nor any of the proposed corridors are located within the boundaries or ETJ of the town of Winterville, the town, through its comprehensive land use plan, supports the proposed bypass.

Town of Ayden

The Preferred Alternative and all of the proposed bypass alternates are consistent with the town's future land use plans. Each of the alternates under detailed study includes the Southern Extension, tying to Memorial Drive (NC 11) south of the town of Ayden near Snow Hill Road with an interchange at NC 102 west of NC 11. The 2004 comprehensive plan calls for property along NC 11 near its intersection with NC 102 to be developed for industrial use.

Pitt County

The proposed Southwest Bypass project is included in the County's current and future land use plans as shown in the 2002 *Comprehensive Land Use Plan*. The Preferred Alternative and all alternates under consideration are consistent with the bypass as shown in the county's plans. Areas of the county adjacent to proposed corridor locations are planned for suburban residential use.

4.2.2 Transportation Planning

The proposed project is consistent with local and state transportation plans for the area. The project is included in the Draft NCDOT 2009-2015 TIP as Project Number R-2250. The southern terminus of the project is NC 11 in the vicinity of NC 102, and the northern terminus is the existing interchange of US 264/Stantonsburg Road (US 264 Business) interchange.

The Preferred Alternative and all three of the bypass alternates are also consistent with the *Greenville Urban Area Thoroughfare Plan* (2004). The proposed bypass is included as a top priority project in the thoroughfare plan. The plan shows the bypass as a new location road extending from the town of Ayden to the interchange of US 264/US 264 Bypass. The plan calls for the new freeway to provide easier travel from the south to the north and to Pitt County Memorial Hospital, as well as relieve traffic on Memorial Drive (NC 11) and Stantonsburg Road (US 264 Business).

4.3 PHYSICAL ENVIRONMENT

This section describes potential impacts of the proposed project to the following aspects of the existing physical environment: noise, air quality, farmlands, utilities, visual environment, hazardous materials, floodplains and floodways, and protected lands.

4.3.1 Noise

A noise analysis was conducted to determine if noise levels generated along each alternate would exceed criteria established by FHWA and also used for state funded projects. Detailed results of the noise analysis are presented in the *Noise Study and Evaluation Technical Memorandum*. The Preferred Alternative lies within the Bypass Alternate 4-EXT corridor and would have the same impacts as this alternate. The following text provides a summary of the analysis methodology, results, and abatement measures considered for the project.

4.3.1.1 Analysis Methodology

The primary task in determining noise impacts is to identify activity areas along the project corridors sensitive to noise. These areas are then represented by a specific site (typically a building or residence) chosen because of its proximity to the roadway in question. The areas are defined not only by differing activities, but also by traffic changes or spatial groupings that clearly separate land use. Impact assessments have been performed for 267 areas within the project corridors which represent 424 residential properties and three churches. Noise levels in these areas have been determined for three conditions: 1) existing (2004); 2) design year (2030) no build; and design year (2030) build.

Eight measurements were taken along the project where noise was expected to be predominantly traffic related. All of the measurements except one are within 3 dB(A) of what a noise model predicted, which validates the accuracy of the noise model. One measurement was 5 dB(A) higher than what the computer model predicted which is due to an unusual noise event which occurred during the measurements.

The three other measurements were taken at locations where traffic was not expected to be a major contributor to the noise level in order to establish a background noise level. The background noise level can result from noise sources other than roadway traffic, such as weather,

environmental or ordinary neighborhood activity. Background, non-traffic noise levels were observed to vary from 43 to 67 dB(A), based on the measurements that were taken.

At sites where traffic is a major contributor to the ambient noise level, an FHWA approved highway noise prediction computer model (FHWA Traffic Noise Model, Version 2.5) was used to determine the traffic generated noise. The model accounts for such factors as ground absorption, roadway geometry, receptor distance, vehicle volumes and speeds, and volumes of medium trucks (vehicles with two axles/six tires) and heavy trucks (three axles or more).

Noise levels have been predicted for that hour of the day when the vehicle volume, operating speed and number of heavy trucks combine to produce the worst traffic noise conditions. This condition usually occurs at Level of Service (LOS) C. If the Design Hourly Volume (DHV) is not predicted to exceed the LOS C volume for a given segment, the DHV was used in the model. If the DHV for a given segment exceeds the LOS C volume, then the LOS C volume was used.

The assessment of traffic noise impacts requires three comparisons:

(1) The noise levels under existing conditions must be compared to those under build conditions. This comparison shows the change in noise level that will occur between the present time and the design year if the project is built.
(2) The noise levels under design year no-build conditions must be compared to those under build conditions. This comparison shows how much of the change in levels will be attributed to the proposed project.
(3) The noise levels under build conditions must be compared to the applicable NAC. This comparison determines the compatibility of noise levels under build conditions and present land use.

4.3.1.2 Analysis Results

Table 4-2 summarizes the properties affected by noise. The No-Build Alternative (2030) levels range from 44 dBA to 66 dBA. The maximum noise levels encountered from the build alternatives is 69 dBA along Bypass Alternate 4-EXT/Preferred Alternative.

TABLE 4-2: SUMMARY OF NOISE IMPACTS			
	Impacted Properties		
	Bypass Alternate 1B-EXT	Bypass Alternate 4-EXT/ Preferred Alternative	Bypass Alternate 5-EXT
Approaching or Exceeding the NAC	14	12	11
With Substantial Noise Increase	14	5	6
Approaching or Exceeding the NAC and with Substantial Noise Increase	4	0	1
Total Impacted Properties without Mitigation	28	17	17
Total Impacted Properties with Mitigation	15	7	7

A comparison of the design year build noise levels with the applicable NAC, as shown in Table 4-2, reveals that eleven residential properties and a church along the Preferred Alternative/Bypass Alternate 4-EXT will receive traffic noise levels which approach or exceed the NAC, and five properties will experience design year build noise levels substantially higher than existing levels. Along Bypass Alternate 1B-EXT, traffic noise levels at fourteen residential properties would approach or exceed the NAC and fourteen properties would experience substantially higher noise levels in the design year. Along Bypass Alternate 5-EXT, traffic noise levels at eleven residential properties would approach or exceed the NAC and six properties would experience substantially higher noise levels in the design year. Of those properties impacted, four properties along Bypass Alternate 1B-EXT and one property along Bypass Alternate 5-EXT would receive traffic noise levels which both exceed the NAC and will be substantially higher than existing levels.

4.3.1.3 Noise Abatement Measures

The construction of sound barriers has been considered for the impacted receptors. Preliminary barrier investigations were performed to determine their feasibility. In order for a barrier to be effective, it should be continuous along the roadway adjacent to the impacted site or sites. Openings for pedestrian or vehicular access greatly reduce the ability of a noise barrier to attenuate noise levels.

In addition to physical constraints, the feasibility of a sound barrier is based on its effectiveness in reducing traffic noise levels. A barrier which reduces noise levels by a minimum of five dB(A) is considered effective. Noise barriers should preferably reduce noise levels by eight dB(A) at receptors located adjacent to the proposed wall.

A noise abatement measure is considered cost-effective by NCDOT policy if the cost of the measure per protected residential property does not exceed $35,000 plus an incremental increase of $500 per dB(A) average increase. In the analysis, each residential unit is considered a single

residential property. When a noise barrier is determined to exceed the cost criteria, the opportunity exists for a third party to contribute the entire cost of the abatement measure. To remain in compliance with Federal regulations, the cost analysis must also consider properties which are not impacted but which would also benefit from the construction of a sound barrier. Barrier costs are estimated at $15 per square foot of noise wall.

One barrier (Site 5) along the Preferred Alternative/Bypass Alternate 4-EXT was shown to be effective and reasonable based on its cost-effectiveness, for a total cost of $378,000. The site is also common to the other two bypass alternates considered. Another barrier location (Site 2) along Bypass Alternate 1B-EXT was also found to be reasonable, for a total cost of $504,000 for the two barriers along this alternate. These barriers are shown on Figure 4-1. Eight other barriers were found to be effective but above the cost per benefited property criteria and will not receive further consideration without third party funding.

23 CFR, Part 772 identifies certain noise abatement measures that may be incorporated in the project design to reduce traffic noise impacts. These abatement measures include: traffic management, alteration of vertical and/or horizontal alignments, landscaping and the construction of sound barriers. Due to design constraints and access and space requirements, noise barriers were found to be the only feasible method of abatement.

Based on the studies thus far accomplished, NCDOT intends to install noise abatement measures in the form of barriers in the location previously discussed on the Preferred Alternative. However, if it subsequently develops during final design that these conditions have substantially changed, the abatement measures would be reevaluated. A final decision of the installation of the abatement measure will be made based upon barrier cost, decibel reduction achieved, public support, the degree of noise impact, required sound barrier height, and consideration of potential safety and/or drainage problems.

4.3.1.4 Construction Noise

The major construction elements of this project are expected to be earth removal, hauling, grading, and paving. General construction noise impacts, such as temporary speech interference for passersby and those individuals living or working near the project, can be expected particularly from paving operations and grading equipment. However, considering the relatively short-term nature of construction noise and the limitation of construction to daytime hours, these impacts are not expected to be substantial. The transmission loss characteristics of nearby natural elements and man-made structures are believed to be sufficient to moderate the effects of intrusive construction noise.

4.3.1.5 Information on Noise for Local Officials

It is the policy of NCDOT that the type of material used in construction of noise abatement measures be an engineering decision based on economics, effectiveness, and to a limited degree,

Rock Spring Rd
Macgregor Downs Rd
264
Julia Ln
Barrier 5
John P East Memorial Hwy
John P East Memorial Hwy
264
B's Barbeque Rd
Stantonsburg Rd
264
43
11
264
5
Greenville
ALT
264
13
ALT
264
43
ALT
264
13
Winterville
903
102
Ayden
903
11

Legend

- Preferred Alternative (Corridor Limits)
- Build Alternate 4-EXT
- Build Alternate 1B-EXT
- Build Alternate 5-EXT
- # Candidate Barrier Location Number
- Candidate Barrier

N
W E
S

0 200 400 600 800 Feet

North Carolina
Department of Transportation

Greenville Southwest Bypass Study
(Improvements to NC 11 & US 264 Bus)

NCDOT Project Definition No.: 34411
T.I.P. No. R-2250

Figure 4-1 **Candidate Noise Barrier Location**

visual impact. Visual impact considerations assure that a barrier meets a basic aesthetic level and a basic durability level such that excessive deterioration or corrosion will not occur.

It is also a part of this policy to have traditional highway resources pay for the required noise abatement. Should a local jurisdiction request that a material be used for the noise barrier that is more costly than that proposed by NCDOT, the requesting body must assume all of the additional cost.

If a local jurisdiction insists on the provision of a noise abatement measure deemed feasible but not reasonable by NCDOT, a noise barrier may be installed, provided the locality is willing to assume all of the cost of the abatement measure, including but not limited to preliminary engineering, construction, maintenance, and that NCDOT's material, design and construction specifications are met.

In an effort to prevent future noise impacts on currently undeveloped lands, NCDOT uses the following criteria:

- The "Date of Public Knowledge" is the approval date of the Record of Decision (ROD). After the Date of Public Knowledge, Federal/State governments are no longer responsible for providing noise abatement measures for new development for which building permits are issued within the noise impact area of the proposed highway project. For development occurring after this public knowledge date, it is the responsibility of the local governing bodies to ensure that noise compatible designs are utilized.

- The date for determining when undeveloped land is "…planned, designed and programmed…" for development will be the issuance of a building permit for an individual site.

The information on projected noise level contours for the Preferred Alternative and each bypass alternate shown in Table 4-3 should assist local authorities in exercising land use control over the remaining undeveloped lands adjacent to the roadway within the local jurisdiction. For example, with the proper information on noise, the local authorities can prevent development of incompatible activities and land uses with the predicted noise levels of an adjacent highway.

TABLE 4-3: TYPICAL DISTANCES TO NOISE CONTOURS

Bypass Segment	Contour Distances* (feet)	
	66 dB(A)	71 dB(A)
Old NC 11 to NC 11	170	100
NC 11 to NC 102	120	60
NC 102 to NC 903	140	80
NC 903 to Forlines Road	150	90
Forlines Road to US 13	170	100
US 13 to US 264	190	110

Distances measured from centerline of nearest roadway and are common to the Preferred Alternative and all three alternates.

4.3.2 Air Quality

The air quality analysis conducted for this project, *Air Quality Study Technical Memorandum* (2005), evaluated the impacts of the proposed improvements on future air quality conditions in the project vicinity. A summary of the methodology, procedures, and conclusions is provided below.

4.3.2.1 Methodology

The air quality analysis was performed in accordance with the Federal-Aid Policy Guide.
The principal air pollutants of automotive emissions are Carbon Monoxide (CO), Hydrocarbons (HC), and Nitrogen Oxides (NOx). Other pollutants, such as sulfur dioxide and particulates, are produced to a lesser degree. A wide range of photochemical oxidants (ozone) also result through a complex series of light-induced reactions between emitted hydrocarbons and nitrous oxides.

Automobiles are not regarded as significant sources of particulate matter and sulfur dioxide. Nationwide, highway sources account for less than seven percent of particulate matter emissions and less than two percent of sulfur dioxide emissions. Particulate matter and sulfur dioxide emissions are predominantly the result of non-highway sources (e.g., industrial, commercial, and agricultural). Because emissions of particulate matter and sulfur dioxide from automobiles are very low, there is no reason to suspect that traffic on the project will cause air quality standards for particulate matter and sulfur dioxide to exceed the National Ambient Air Quality Standard (NAAQS).

The Clean Air Act Amendments of 1990 make the sale, supply, or transport of leaded gasoline or lead additives unlawful after December 31, 1995. Because of these reasons, it is not expected that traffic on the proposed project will cause the NAAQS for lead to be exceeded.

Highway vehicles are considered to be the major source of CO in the project area. For this reason, and because CO is a relatively non-reactive pollutant, CO was used in the analysis as an indicator of the air pollutants produced by traffic activities on the proposed roadway.

In order to evaluate the future air quality effects of the proposed project, two concentration components must be identified; background and local. Added together, the two concentrations indicate the concentration of CO in the study area and can be compared to the NAAQS. Local CO concentrations were predicted at selected sensitive sites adjacent to the proposed alignments for specified years using a line source model. The combined CO concentrations (background and local) were then assessed against the NAAQS to determine the extent of the impact the proposed project would have on the air quality in the project study area.

For each of the three build corridors studied, the intersection having the potential for generating the highest CO concentration was identified. Since all three corridors considered are along new alignments in new right of way, proposed intersections were not constrained in size and were all

designed to operate at an acceptable level of service. Therefore, the determination of which intersection had the potential for generating the highest concentration of CO became primarily dependent on traffic volume. For all three corridors, the intersection with the highest volume of entering vehicles was the US 13/264ALT interchange. The analysis at this intersection was performed in each of the two eastern quadrants, where the highest volumes of entering vehicles were identified.

Air quality projections were calculated for the estimated year of project completion (2010, subject to availability of funds), interim year after project completion (2020), and the design year (2030).

CO 1-hour and 8-hour concentrations of 2.9 parts per million (ppm) and 2.3 ppm, respectively, were used for background concentrations in the analysis. These values were recommended for background concentrations in the Greenville area by the Division of Air Quality, North Carolina Department of Environment and Natural Resources.

4.3.2.2 Analysis Results

Table 4-4 lists the predicted one-hour and eight-hour carbon monoxide concentrations for the No-Build and Build Alternatives for receptors located at the right-of-way line. In comparing the projected CO concentration levels in Table 4-4 with the National Ambient Air Quality Standards, no violations of the 1-hour standard (35 ppm) or 8-hour standard (9 ppm) are expected. The 1-hour and 8-hour CO concentrations are not expected to exceed 4.4 and 3.5 ppm (including background contributions), respectively, at any of the sites along the Preferred Alternative or any of the corridors for any of the three years investigated.

TABLE 4-4: AIR QUALITY ANALYSIS RESULTS

1-Hour Concentrations for Bypass Alternates 1B-EXT and 5-EXT*									
Year	**Analysis Site**								
	1	2	3	4	5	6	7	8	9
2010	3.2	3.2	4.0	3.5	3.6	3.4	3.6	3.5	3.4
2020	3.2	3.2	3.8	3.5	3.5	3.4	3.5	3.3	3.4
2030	3.5	3.7	3.8	3.6	3.6	3.5	3.7	3.7	3.7
1-Hour Concentrations for Preferred Alternative/Bypass Alternate 4-EXT*									
Year	**Analysis Site**								
	10	11	12	13	14	15	16	17	18
2010	3.3	3.1	3.6	3.5	3.4	3.5	3.6	3.4	3.5
2020	3.3	3.2	3.5	3.4	3.4	3.4	3.5	3.3	3.5
2030	4.4	3.7	3.7	3.7	3.5	3.6	3.7	3.7	3.7
8-Hour Concentrations for Bypass Alternates 1B-EXT and 5-EXT^									
Year	**Analysis Site**								
	1	2	3	4	5	6	7	8	9
2010	2.5	2.5	3.2	2.8	2.8	2.7	2.8	2.8	2.7
2020	2.5	2.5	3.0	2.8	2.8	2.7	2.8	2.6	2.7
2030	2.8	2.9	3.0	2.8	2.8	2.8	2.9	2.9	2.9
8-Hour Concentrations for Preferred Alternative/Bypass Alternate 4-EXT^									
Year	Analysis Site								
	10	11	12	13	14	15	16	17	18
2010	2.6	2.4	2.8	2.8	2.7	2.8	2.8	2.7	2.8
2020	2.6	2.5	2.8	2.7	2.7	2.7	2.8	2.6	2.8
2030	3.5	2.9	2.9	2.9	2.8	2.8	2.9	2.9	2.9

* Includes 2.9ppm background concentration
^ Includes 2.3ppm background concentration

4.3.2.3 State Implementation Plan (SIP) Consistency

Pitt County has been determined to be in compliance with the SIP and the NAAQS. Because the proposed project is located in an attainment area, the provisions of the November 24, 1993, USDOT regulation provisions (40 CFR Parts 51 and 93) are not currently applicable. This project is not anticipated to create any adverse effect on the air quality of this attainment area.

The temporary air quality impacts from construction are not expected to be significant. During construction, all materials resulting from clearing and grubbing, demolition, or other operations will be removed from the project, burned, or otherwise disposed of by the Contractor. Any burning will be done in accordance with applicable local laws and ordinances and regulations of the North Carolina State Implementation Plan for air quality in compliance with 15 NCAC 2D.0520. Care will be taken to ensure that burning will be done at the greatest distance practicable from dwellings and not when atmospheric conditions are such as to create a hazard to the public. Burning will be performed under constant surveillance. Also, measures will be taken in allaying the dust generated by construction when the control of dust is necessary for the protection and comfort of motorists or area residents.

4.3.3 Prime Farmland

In accordance with the Farmland Protection Policy Act of 1981 (7 CFR Part 658) and State Executive Order Number 96, an assessment was undertaken of the potential impacts of land acquisition and construction activities in prime, unique, and local or statewide important farmland soils, as defined by the US Natural Resource Conservation Service (NRCS). Approximately 268 acres of prime farmland soils will be impacted by the Preferred Alternative (see Table 3-13 for a listing of these soils). Table 4-5 presents this information, along with the impacts to farmland soils within the proposed corridors for the three bypass alternates studied in the DEIS.

TABLE 4-5: IMPACTS TO PRIME FARMLAND SOILS

Alternative/ Bypass Alternate	Prime Farmland Soils Impacted (acres)
Preferred Alternative	268.4+
Bypass Alternate 1B-EXT	767.8*
Bypass Alternate 4-EXT	753.7*
Bypass Alternate 5-EXT	811.5*

+Impact based on preliminary right of way limits
*Impact based on conceptual right of way limits

As required by the FPPA, coordination with the NRCS for this project was initiated by submittal of Form AD-1006, Farmland Conversion Impact Rating. This coordination effort served as the basis for determining the farmland impacts of the bypass alternate corridors. The NRCS responded by completing their portions of this form and providing a relative value of farmland that may be affected (converted) by the proposed project. The NRCS assigns ratings to potential farmland impacts in order to determine the level of significance of these impacts. The ratings are comprised of two parts. The Land Evaluation Criterion Value represents the relative value of the farmland to be converted and is determined by the NRCS on a scale from 0 to 100 points. The Corridor Assessment, which is rated on a sale of 0 to 160 points, evaluates farmland soil based on its use in relation to the other land uses and resources in the immediate area. The two ratings are added together for a possible total rating of 260 points. Sites receiving a total score of less than 160 should be given a minimal level of protection, and sites receiving a total score of 160 or more are given increasingly higher levels of consideration for protection (7 CFR Section 658.4). The description of soils as prime farmland soils (see above) is not the same as the designation of prime farmland soils requiring mitigation for loss per NRCS criteria.

Completed AD-1006 Farmland Conversion Rating Forms are provided in Appendix G. None of the proposed bypass alternate corridors resulted in a total site assessment score greater than 160 points. As the Preferred Alternative is within the Bypass Alternate 4-EXT corridor, its score would be the same as the score for this corridor. Therefore, in accordance with the Farmland Protection Policy Act, no mitigation for farmland loss is required for the project.

4.3.4 Infrastructure and Utilities

4.3.4.1 Utilities

Electric

Ayden, Greenville Utilities Corporation (GUC), and Pitt-Greene EMC provide electrical service within the study area. Neither the Preferred Alternative nor any of the bypass alternates would

directly impact any of the distribution substations in the project area; however, each would cross transmission easements. The Preferred Alternative/Bypass Alternate 4-EXT would cross a GUC easement at two locations: See Figure 4-2

- Improvements along US 13/264ALT east of a proposed interchange would cross the easement. This crossing would be approximately 1,000 feet west of Frog Level Road and 1,500 feet east of the mainline of the bypass.
- The bypass would parallel the easement to the west from Frog Level Road before crossing the easement approximately 2,500 feet south of the CSX Railroad tracks.

Bypass Alternates 1B-EXT and 5-EXT follow a common corridor in this area and include improvements or crossings at the two locations noted above, along with a crossing at the realigned Frog Level Road, which would be relocated just south of its crossing with the bypass. The realigned Frog Level Road would cross the easement approximately 400 feet west of the existing crossing.

Through coordination with the electric power companies during development of final plans and construction, the Preferred Alternative is not expected to affect customers.

Water and Sewer

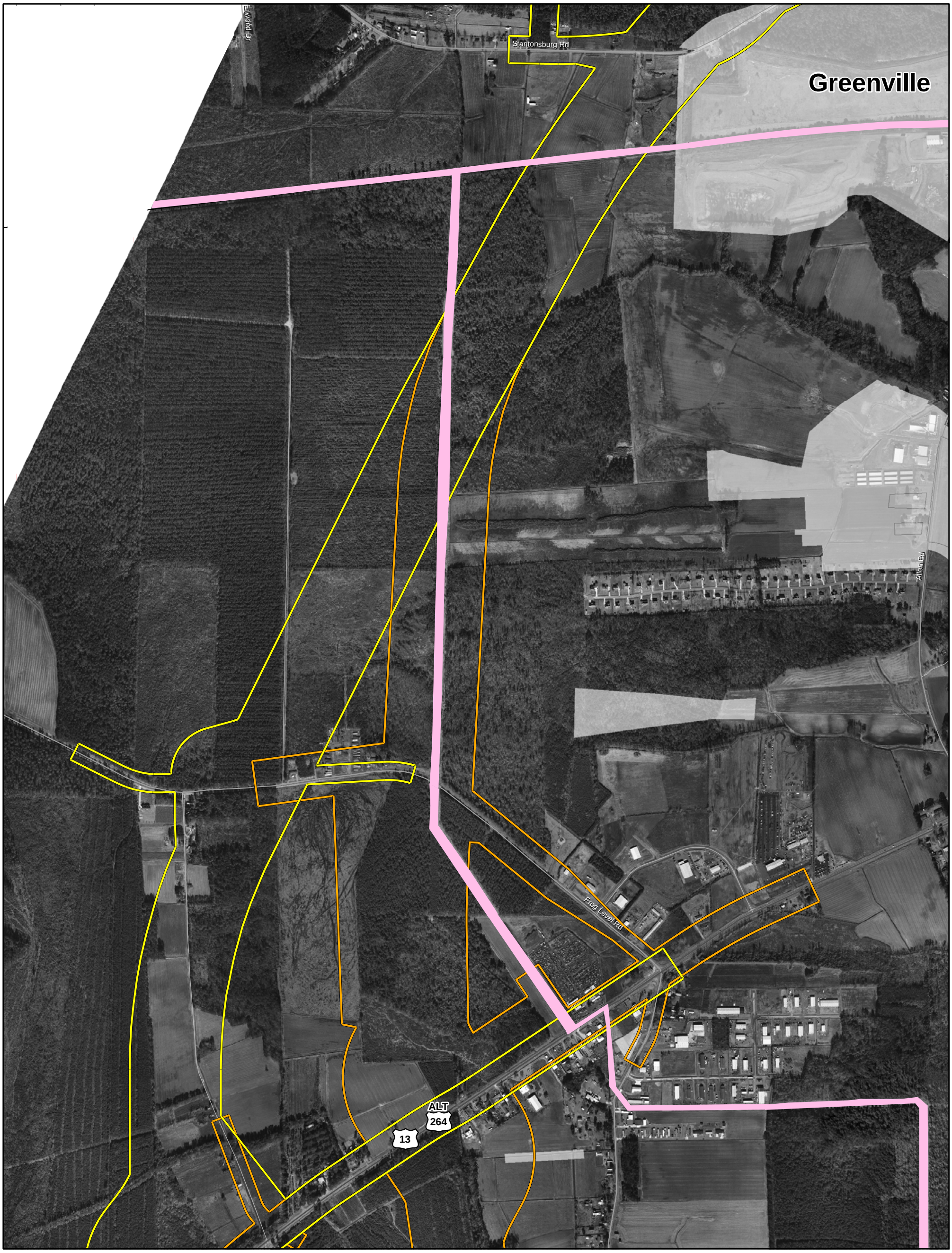
Existing water and sewer lines serve portions of the project area, particularly in the northern and eastern areas. These lines are underground and generally follow existing roads. Neither the Preferred Alternative nor any of the corridors would impact major water facilities, such as treatment plants or pump stations. Temporary disruptions in service could result during construction of any of the alternates; however, this impact would be minimized through coordination with GUC or other providers.

Natural Gas

Natural gas service lines are located within portions of the study area; however, the main lines that carry gas into the Greenville area are located north of the project area and would not be impacted. As with water and sewer service lines, natural gas service is concentrated in portions of the project area within municipal or ETJ limits and the lines are underground and generally follow existing roads. Temporary disruptions in service are possible during construction of any of the alternates; however, this impact would be minimized through coordination with GUC.

4.3.4.2 Mass Transit

The project area is not currently served by a fixed-route public transportation service. The City of Greenville's GREAT (Greenville Area Transit) system operates within the city limits of Greenville. The Pitt County Area Transit Services (PATS) provides services on a referral basis. Individuals are referred for special transportation assistance by either the Department of Social Services, the Council on Aging, or Vocational Rehabilitation Services. The service operates across the entire County providing transportation to medical appointments, to school, or to Pitt



Legend

- Preferred Alternative
- Build Alternate 1B-EXT
- Build Alternate 5-EXT
- GUC Power Transmission Easement

N
W E
S

0 600 1,200 2,400 Feet

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Figure 4-2 **Greenville Utilities Corporation Power Transmission Easement**

Community College. As the routes are not fixed, the proposed project would not have any negative impact on existing service; however, PATS will be advised of any detours or road-closings that result from the construction of the Preferred Alternative.

4.3.4.3 Railroads

The Preferred Alternative and all bypass alternates studied in the DEIS cross the CSX Railroad tracks near the project's northern terminus. The Preferred Alternative and the three alternates follow a common alignment at this location and would include a bridge over the CSX tracks. Bridging should not impact railroad facilities or operations. Neither the Preferred Alternative nor any of the bypass alternates cross Norfolk-Southern Railroad facilities in the project area.

4.3.5 Visual Environment

The introduction of any large facility in a rural area alters the local perception of the visual environment. A location may be deemed visually sensitive for its visual quality, uniqueness, cultural importance, and viewer characteristics. Although this project is state funded, NCDOT has elected to use FHWA guidelines to assess visual impacts. According to these guidelines, high visual quality is obtained when area landscape components have impressive characteristics that convey visual excellence. Striking landscapes are not limited to the natural environment and can be associated with urban areas as well. Visual quality is subjective in that it is also determined by a viewer's perception of an area.

The Preferred Alternative, as well as each of the bypass alternates studied in the DEIS, would include a new location freeway constructed at grade, introducing a visual intrusion into the primarily agricultural landscape. Because the area is relatively flat, the freeway would be visible from some distance in unforested areas. Further, elevated overpasses or bridges would be visible from a greater distance. Measures have been incorporated into the project to minimize visual impacts. These include avoiding dense residential areas and minimizing cut and fill slopes by following existing ground lines where possible.

The overall visual character of the project area would be adversely impacted by the introduction of a new controlled access facility. However, as discussed in Section 3, this portion of Pitt County is expected to continue to experience some of the highest growth rates in the area and will become more suburban in nature. Further, visual quality for travelers using the proposed bypass, regardless of which corridor is selected, would be improved compared to the visual environment along existing Memorial Drive (NC 11) and Stantonsburg Road (US 264 Business). Travelers on the new roadway would have opportunities for views of agricultural, forested, and residential areas.

Visually Sensitive Resources

A rural historic district and several private historic properties exist within the project area. NCDOT will coordinate with HPO during final design of the Preferred Alternative to identify

potential minimization or mitigation measures for visual impacts to these resources. Visual impacts to these sites have been categorized using the following rating:

- No Impact – The view of the alternative has minor implications to the existing landscape or there is no impact at all.
- Low Impact – The view of the project is limited, the visual resource is limited in importance, there are dominating visual intrusions in the viewshed from other sources, or there is a weak visual contact between the facility and the landscape. If any of the proposed actions are closer to the resource than the existing facility, but do not necessarily create a visual impact due to visual intrusions, it has been rated as having a low impact.
- Moderate Impact – The view of the project is a moderate intrusion into the visual environment with greater contrast than the low impact but not as great as a high impact.
- High Impact – The project is in proximity and visible to viewers, has a strong contrast with the landscape, is in an area of importance with limited visual intrusions, or involves substantial view sensitivity.

The Preferred Alternative crosses the Renston Rural Historic District and is located just west of the Charles McLawhorn Historic Property. As the Bypass will be elevated over NC 903 and Abbott Farm Road, it will introduce a visual barrier that would bisect Renston. The elevated Bypass will also create a significant contrast with the rural, agricultural landscape and historic homes in this area. The Preferred Alternative will have a high visual impact on Renston. As the elevated Bypass may be visible from the Charles McLawhorn Historic Property, the Preferred Alternative will likely have a moderate visual impact on this property.

As Bypass Alternate 1B-EXT was located adjacent to the Charles McLawhorn Historic Property, it would have a moderate visual impact on the resource, introducing a visual contrast between the surrounding agricultural landscape and the freeway. Because Bypass Alternate 4-EXT was not elevated over NC 903 and Abbott Farm Road and because the preliminary design developed for it was located slightly farther west of the Charles McLawhorn Historic Property than the Preferred Alternative, it would have a low impact on the property. Because it would also bisect the Renston Rural Historic District and contrast with the rural landscape of the district, Bypass Alternate 4-EXT would have a high visual impact on Renston. Bypass Alternate 1B-EXT would cross the southernmost portion of the district and would have a moderate visual impact, primarily attributable to a proposed interchange with NC 903. Because it is located farther away from Renston and the Charles McLawhorn Historic Property, Bypass Alternate 5-EXT would not have a visual impact on these two resources.

The Cox-Ange House and the A.W. Ange Company Store Building are both sufficient distance from the Preferred Alternative and all of the alternative corridors such that there will be no impact to these resources. Likewise, the Alfred McLawhorn House, though closer to the Preferred Alternative and proposed corridors, is separated by adequate distance and other visual obstructions due to topography and vegetation and will not be impacted.

The William Amos Shrivers House will not experience visual impacts due to the Preferred Alternative. However, this resource is located just east of Bypass Alternate 5-EXT and its proposed interchange with NC 903. This bypass alternate would have a low impact on the visual environment of the property.

4.3.6 Hazardous Materials

Based on field surveys described in Section 3.3.6, there are sixteen locations that may be classified as hazardous materials sites. These include thirteen facilities that may possibly have underground storage tanks (USTs), one automotive salvage yard, and one with an above ground storage tank and a landfill. None of the alternates under consideration would directly impact the landfill site.

Table 4-6 lists the number of sites potentially affected by the Preferred Alternative and each bypass alternate. If any of the potential hazardous materials sites can not be avoided by the Preferred Alternative, further assessments of the properties will be conducted. These assessments will evaluate the properties for specific types and amounts of hazardous materials and will include right of way acquisition recommendations. It is not expected that conditions at any of these sites would preclude construction of any of the bypass alternates.

TABLE 4-6: SUMMARY OF IMPACTS TO HAZARDOUS MATERIALS SITES

Bypass Alternate	Number of Hazardous Materials Sites within Corridor
Bypass Alternate 1B-EXT	15
Preferred Alternative/ Bypass Alternate 4-EXT	15
Bypass Alternate 5-EXT	15

4.3.7 Floodways and Floodplains

A floodplain evaluation was conducted in accordance with Executive Order 11988 *Floodplain Management* and with 23 CFR 650 Subpart A *Location and Hydraulic Design of Encroachments on Floodplains*. This evaluation is based on the results of the Federal Emergency Management Agency's (FEMA) 2004 detailed flood insurance study and FEMA's Federal Insurance Rate Mapping (FIRM) for the incorporated and unincorporated areas of Pitt County.

4.3.7.1 Floodplain Encroachments and Risk

Encroachment on floodplains by structures and fill can reduce flood carrying capacity, increase flood height and velocities, and increase flood hazards beyond encroachment itself. As part of the National Flood Insurance Program, FEMA has determined floodway boundaries as a tool for floodplain management. Based on FEMA's definition, the 100-year floodplain can be divided into a floodway and floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that need to be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. However, when a detailed flood study has been performed, as in the case of Pitt County, site specific elevation

limits of flood height increases are established. The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe.

The Preferred Alternative/Bypass Alternate 4-EXT does not cross any FEMA flood hazard zones in the project area. Bypass Alternates 1B-EXT and 5-EXT would cross the 100-year floodplain associated with Swift Creek and Horsepen Swamp. The location of the floodplain impacts are shown on Figure 3-7. Corridor location and conceptual design took into consideration all factors to minimize impact to floodplains. Although approximately 0.2 acre of floodplain associated with Horsepen Swamp is located within the study corridor for Bypass Alternate 1B-EXT, the preliminary design for this alternate would not directly impact any floodplain areas. Bypass Alternate 5-EXT, however, would impact approximately 18.3 acres of floodplain associated with both Horsepen Swamp and Swift Creek. Major drainage structures proposed for the project would cross the floodplain at or near perpendicular angles, minimizing the length of floodplain traversed. All hydraulic structures would be designed such that the proposed structures would not significantly increase upstream flooding and would not increase the flood hazard potential of the existing floodplain.

4.3.7.2 Floodplain Values

Construction of the Preferred Alternative or any of the bypass alternates under consideration would increase the amount of impervious surface area within the study area, thereby increasing stormwater runoff to local waterways. The area impacted by this increased runoff would be minor in relation to the remaining pervious surface areas. The increased amount of road surface draining into the area would be small in relation to overall drainage areas.

4.3.7.3 Floodplain Development

The Greenville Southwest Bypass has been planned as a controlled access facility, where access to the roadway is limited to proposed interchanges at primary crossroads. As such, the bypass should not induce development along the facility that will have adverse impacts to the beneficial values of natural floodplains. Further, the *Pitt County Flood Damage Prevention Ordinance* sets forth strict provisions for any development within the 100-year floodplain.

4.4 CULTURAL RESOURCES

4.4.1 Historic Architectural Resources

The potential effect of the proposed project on historic architectural resources was evaluated in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended. According to the criteria for Effect and Adverse Effect developed by the Advisory Council on Historic Preservation, potential effect is based upon the following:

- No Effect – There would be no effect, neither adverse nor beneficial, on potential cultural resources.

- No Adverse Effect – There would be an effect, but it is determined that the effect would not compromise those characteristics which qualify the property for listing on the National Register.
- Adverse Effect – There would be an effect that would compromise the integrity of the property.

As discussed in Section 3.4.1, there are six properties within the Area of Potential Effects (APE) which are either listed on the National Register of Historic Places or have been determined to be eligible for listing on the National Register. These resources, shown in Figure 3-8, include the Charles McLawhorn Houses, Alfred McLawhorn House, William Amos Shivers House, Cox-Ange House, A.W. Ange and Company Store Building, and the Renston Rural Historic District. The Cox-Ange House and Renston Rural Historic District are currently listed on the National Register. The Charles McLawhorn Historic Property is contained within the Renston Rural Historic District, so any impacts to this property are included with the historic district.

TABLE 4-7: HISTORIC RESOURCE IMPACTS

	Renston Rural Historic District
Preferred Alternative	39 acres Adverse Effect
Alternate 1B-EXT	45 acres Adverse Effect
Alternate 4-EXT	101 acres Adverse Effect
Alternate 5-EXT	0 acres No Adverse Effect

Following incorporation of design modifications to minimize impacts on the Renston Rural Historic District, including removing the proposed interchange at NC 903 (see section 2.8.1), the Preferred Alternative will use approximately 39 acres of the Historic District for right-of-way. This includes approximately 18 acres from two contributing properties, although no contributing structures will be displaced. The Preferred Alternative will avoid the other five properties either listed on the NRHP or determined eligible for listing.
None of the proposed bypass alternates would require right of way from the Alfred McLawhorn House, Cox-Ange House, or A.W. Ange and Company Store Building properties. The HPO concurred with the determination of **No Effect** for these properties on February 8, 2005. The alternates would have **No Adverse Effect** on the William Amos Shivers House (see Appendix A.2).

Bypass Alternate 1B-EXT – Although approximately 5.5 acres of the Charles McLawhorn Historic Property is located within the study corridor for Alternate 1B-EXT, the preliminary design for the alternate would avoid all direct impact to the property. At this time, no right of way would be required from this property for construction of the bypass alternate. This alternate would require approximately 45 acres of right of way within the Renston Rural Historic District. No contributing properties would be directly impacted.

Bypass Alternate 4-EXT – Alternate 4-EXT would use approximately 101 acres of the Renston Rural Historic District for right of way. This would include approximately 51 acres from ten parcels identified as contributing properties. Nine contributing structures would be displaced.

Bypass Alternate 5-EXT – Alternate 5-EXT would not adversely affect any historic properties within the project study area.

4.4.2 Archaeological Resources

Based on a 1996 archaeological overview of the project study area, it was determined that all bypass alternates under consideration would have equal likelihood of impacting prehistoric and historic archaeological sites. Therefore, NCDOT, in coordination with the State Historic Preservation Office, determined that no further detailed studies of the three corridors would need to be completed and that detailed studies would not be necessary until a Preferred Alternative was selected (see letter dated May 16, 1996 in Appendix A.2). Due to this agreement, potential impacts to archaeological resources by the three bypass alternates were not presented in the DEIS.

An archaeological survey of the preferred Alternative (Alternative 4-EXT) was conducted from March 12 through April 23, 2006. The survey identified 47 archaeological sites and one historic cemetery these are listed in Table 4-8. All of the sites were recommended ineligible for the National Register of Historic Places (NRHP), and no further work was recommended. The HPO agreed with the preliminary results of the survey on June 7, 2007 (see letter in Appendix A.2) but has not yet reviewed the archaeological survey report. The archaeological survey report was submitted to the USACE on November 6, 2007. The USACE will submit the archaeological report to HPO for their comments. The archaeological survey report (Olson 2007) is appended to this FEIS by reference. The cemetery (Slaughter cemetery [31PT590]) should be avoided during construction.

Fourteen of the identified archaeological sites lie within or near the Renston Rural Historic District. None of the sites was determined to be eligible for the NRHP as none were determined to contain significant cultural deposits and none were found to be likely to provide significant historic or prehistoric information of local, regional, national or international importance.

TABLE 4-8: ARCHAEOLOGICAL SITES IDENTIFIED WITHIN THE PREFERRED ALTERNATIVE CORRIDOR

Site Number	Description	Relation to Project Area
31PT543	Late 19th/early 20th century historic artifact scatter	NC 11 in Ayden
31PT544	Late 19th/early 20th century historic artifact scatter	NC 11 in Ayden
31PT545	Late 19th/early 20th century historic artifact scatter	NC 11 in Ayden
31PT546	Late 19th/early 20th century historic artifact scatter	NC 11 in Ayden
31PT547	Late 19th/early 20th century historic artifact scatter	NC 11 in Ayden
31PT548	Late 19th/early 20th century historic artifact scatter	NC 11 in Ayden
31PT549	Late 19th/20th century historic artifact scatter	NC 11 in Ayden

Table 4-8 Continued		
31PT550	Late 19th/early 20th century historic artifact scatter	NC 11 in Ayden
31PT551	Multicomponent historic site encompassing the Cox farm, including the Old Cox homesite and three late 19th/early 20th century historic artifact scatters	Old Snow Hill Road
31PT552	Late 19th/early 20th century historic artifact scatter	Old Snow Hill Road
31PT553	20th century historic artifact scatter	NC 102
31PT554	Late 19th/early 20th century historic house and barn site	NC 102
31PT555	Early 20th century historic artifact scatter	NC 102
31PT556	Mid- to late-20th century artifact scatter	NC 102
31PT557	Mid- to late-20th century artifact scatter	NC 102
31PT558	Mid- to late-20th century artifact scatter	NC 102
31PT559	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT560	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT561	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT562	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT563	Mid-19th century Dail Homeplace site	Renston Rural Historic District
31PT564	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT565	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT566	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT567	20th century historic artifact scatter	Renston Rural Historic District
31PT568	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT569	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT570	Prehistoric lithic scatter and mid-19th to early 20th century historic artifact scatter	Renston Rural Historic District
31PT571	Late 19th/early 20th century historic artifact scatter	Renston Rural Historic District
31PT572	Early 20th century historic artifact scatter	Forlines Road
31PT573	Late 19th/early 20th century historic artifact scatter/possible prehistoric isolated find	Forlines Road
31PT574	20th century historic artifact scatter	Forlines Road
31PT575	Late 19th/early 20th century historic house site	Forlines Road
31PT576	Late 19th/early 20th century historic artifact scatter	US 13-264A
31PT577	Early- to mid-19th century historic artifact scatter	US 13-264A
31PT578	Mid-19th century historic artifact scatter	US 13-264A
31PT579	Early 20th century historic artifact scatter	US 13-264A
31PT580	20th century historic artifact scatter	US 13-264A
31PT581	Woodland period prehistoric isolated find	US 13-264A
31PT582	Prehistoric isolated find and late 19th/early 20th century historic artifact scatter	Mabery Lane
31PT583	Late 19th/early 20th century historic house site (2 structures)	Mabery Lane
31PT584	Late 19th/early 20th century historic house site	Mabery Lane
31PT585	20th century house site	US 13-264A/Davenport Farm Rd
31PT586	Mid-19th century historic artifact scatter	Renston Rural Historic District
31PT587	20th century historic artifact scatter	NC 102
31PT588	Mid- to late-20th century historic artifact scatter	NC 102
31PT589	20th century historic artifact scatter	NC 11 in Ayden
31PT590	Slaughter Cemetery (ca. 1860s-1890s)	Renston Rural Historic District

The historic Slaughter Cemetery (31PT590) was identified in the northeastern portion of the Renston Rural Historic District. It contains five 20th century grave markers bearing 19th century

dates and it is possible that unmarked burials may also exist in the immediate area. Care should be taken to avoid impacting any marked or unmarked burials during construction of the project.

4.5 NATURAL ENVIRONMENT

This section describes potential impacts of the proposed project to the following aspects of the existing natural environment: soils, biotic communities and wildlife, and water resources.

4.5.1 Soils

Review of available information for the project area indicates that there are no soils or geological features that would preclude or alter the corridors of the three alternates under consideration. Detailed geotechnical investigations of the Preferred Alternative will be undertaken as part of the design phase.

4.5.2 Biotic Communities and Wildlife

4.5.2.1 Terrestrial Plant Communities

Table 4-9 summarizes acreages of terrestrial communities located within the study area. Impacted areas are based on slope stake limits of preliminary design plans. Maintained communities may include the impervious surface associated with the existing roads. Detailed descriptions of these communities are included in Section 3.5.2.1 and in the *Natural Resources Technical Memorandum*.

TABLE 4-9: TERRESTRIAL PLANT COMMUNITY IMPACTS (ACRES)

Terrestrial Community	Preferred Alternative	Bypass Alternate 1B-EXT		Bypass Alternate 4-EXT		Bypass Alternate 5-EXT	
	Construction limits	Corridor	Construction limits	Corridor	Construction limits	Corridor	Construction limits
Cutover	38.5	156.8	56.5	107.1	39.1	132.0	54.1
Pine Plantation	87.2	187.8	67.9	285.2	87.2	163.6	59.6
Mixed Pine-Hardwood Forest	161.2	465.7	116.3	496.7	160.3	496.6	120.7
Hardwood Swamp	0	9.0	0.1	0	0	8.4	1.3
Bottomland Forest	0	31.8	8.9	0	0	21.2	2.0
Pine Flatwoods	0.1	24.9	4.6	3.0	0.1	26.0	6.6
Maintained-Disturbed*	438.2	1,543.8	508.3	1,450.4	517.5	1,583.5	572.7
TOTAL	725.2	2,419.9	762.6	2,342.3	804.2	2,431.4	817.0

* Maintained communities may include the impervious road surface located within the project study area.

The maintained-disturbed community type accounts for the majority of the vegetative cover in all of the alternate corridors. The pine plantation community is the next most abundant community

type within the study area. Hardwood swamp communities are represented least within the study area.

4.5.2.2 Wildlife

Most of the project area is rural in character with scattered residential and small commercial developments. Large forested areas are still present near the project study area, but are limited primarily to lands immediately adjacent to the larger streams. Clearing and conversion of land for highways, railroads, agricultural, timberland, commercial, and residential uses has eliminated cover and protection for many species of wildlife, but has increased habitat for others that are able to utilize these anthropogenic habitats. There is little habitat for interior species, but woodland strips bordering small tributaries often serve as travel corridors between habitat types. Agricultural fields and residential areas not only provide food for wildlife, but also create edge habitat favored by many species.

Since the bypass would be on new location, impacts to a variety of habitats, including forested communities, will occur. Fragmentation and loss of forested habitat resulting from the new location corridors will have a greater impact on wildlife and its habitat, including the loss of potential nesting and foraging areas, and displacement of animal populations. Movement between habitats on one side of the road to the other will become more dangerous for many large and medium sized mammals such as deer, raccoon, rabbit, and opossum. Smaller mammals such as mice and squirrels, as well as reptiles and amphibians, are also expected to suffer increased mortality along the new alignment due to land clearing and traffic operations.

Measures to be implemented during design and construction of the project that can minimize impacts to local wildlife include Best Management Practices to minimize erosion and sedimentation, and the construction of culverts that can provide passage from one side of the road to the other. No bridges are recommended for wildlife crossings on this project.

4.5.2.3 Aquatic Communities

The Preferred Alternative and Alternate 4-EXT cross Simmon Branch and Gum Swamp. Bypass Alternates 1B-EXT and 5-EXT would cross Simmon Branch, Gum Swamp and Horsepen Swamp. The diversity of streams within the project study area provides habitat for a variety of aquatic species. Large streams with good water quality and a diversity of aquatic habitats are expected to support a more diverse assemblage of fish and other aquatic organisms than smaller tributaries.

Water resource impacts may also result from the physical disturbance of the forested stream buffers that adjoin most of the streams within the study area. Removing streamside vegetation increases direct sunlight penetration, which ultimately elevates water temperatures within the stream. An increase in stream water temperatures decreases the levels of dissolved oxygen in the water, often resulting in reduced species diversity. Disturbing stream buffers can also create

unstable stream banks, further increasing downstream sedimentation. Shelter and food resources, both in the aquatic and terrestrial portions of these organisms' life cycles, will be affected by losses in the terrestrial communities. The loss of aquatic plants and animals will affect terrestrial fauna that rely on them as a food source.

The removal of the riparian buffer may also increase the amount of sediment released into the stream. Temporary and permanent impacts to aquatic organisms may result from this increased sedimentation. Aquatic invertebrates may drift downstream during construction and recolonize the disturbed area once it has stabilized. Sediments have the potential to affect fish and other aquatic life in several ways, including the clogging and abrading of gills and other respiratory surfaces, affecting the habitat by scouring and filling of pools and riffles, altering water chemistry, and smothering different life stages. Increased sedimentation may cause decreased light penetration through an increase in turbidity.

Stockpiled material should be kept a minimum of 50 feet from the stream channels. In situations where water depth is 3 to 18 feet and the velocity is slow (such as in a swamp) silt fences should also be erected around any stockpiled material in order to minimize the chance of erosion or run-off from affecting the stream channel. Wet concrete should not come into contact with surface water during bridge construction as it can adversely affect aquatic life. NCDOT's *Best Management Practices (BMPs) for the Protection of Surface Waters* (1997) should be strictly enforced to reduce impacts during all construction phases.

4.5.3 Water Resources

The majority of the proposed project occurs in the Middle Neuse subbasin. However, the Preferred Alternative and Bypass Alternate 4-EXT traverse the subbasin divide and drain east and south to Swift Creek or to unnamed tributaries of Little Contentnea Creek to the west.

Short-term impacts to water quality, such as sedimentation and turbidity, may result from construction-related activities. Temporary construction impacts due to erosion and sedimentation will be minimized through implementation of a stringent erosion control schedule and the use of Best Management Practices (BMPs). The contractor will be required to follow contract specifications pertaining to erosion control measures as outlined in 23 CFR 650 Subpart B and Article 107-13 entitled *Control of Erosion, Siltation, and Pollution* pursuant to NCDOT's *Standard Specifications for Roads and Structures*. These measures include the use of dikes, berms, silt basins, and other containment measures to control runoff. Measurements include the elimination of construction staging areas in floodplains and adjacent waterways. Disturbed sites will be revegetated with herbaceous cover after construction to help reduce runoff and sediment loadings. Direct discharges into streams should be avoided whenever possible. Runoff effluent should be permitted to filter through roadside vegetation in order to remove possible contaminants and to decrease runoff velocities.

Long-term impacts on water quality are also possible due to particulates, heavy metals, organic matter, pesticides, herbicides, nutrients, and bacteria that are often found in highway runoff. The following mitigation measures to eliminate or reduce short-term and long-term water quality impacts would be incorporated wherever practicable:

- Development of roadway alignments that avoid streams and ponds to the extent possible;
- Use of design measures to protect water supplies, minimizing stream crossings, and minimizing segments of roadway that closely parallel streams;
- Use of grass shoulders, grass lined ditches, and vegetative buffers to intercept highway runoff;
- Implementation of construction practices that protect stream bottom habitat from siltation by sedimentation control, retention of riparian vegetation buffers, and restoration of stream bottom habitat taken by construction; and
- Restricting use of bridge deck drains in bridges.

4.5.3.1 Major Drainage Structures

The Preferred Alternative and each of the bypass alternates considered cross several streams or drainages for which box culverts or pipe culverts would be required to maintain hydraulic flow. Drainage areas, calculated structure sizes, and recommendations are listed in Table 4-10. Recommendations are the same for the Preferred Alternative as for Bypass Alternate 4-EXT. A detailed description of the hydraulic analysis is presented in the *Preliminary Hydrologic and Hydraulic Analysis* (Lochner 2005).

As shown in Table 4-10, for hydrologic purposes, culverts would be adequate for all stream crossings. The Merger Team concurred with the use of culverts for these crossings at a meeting in October 2005.

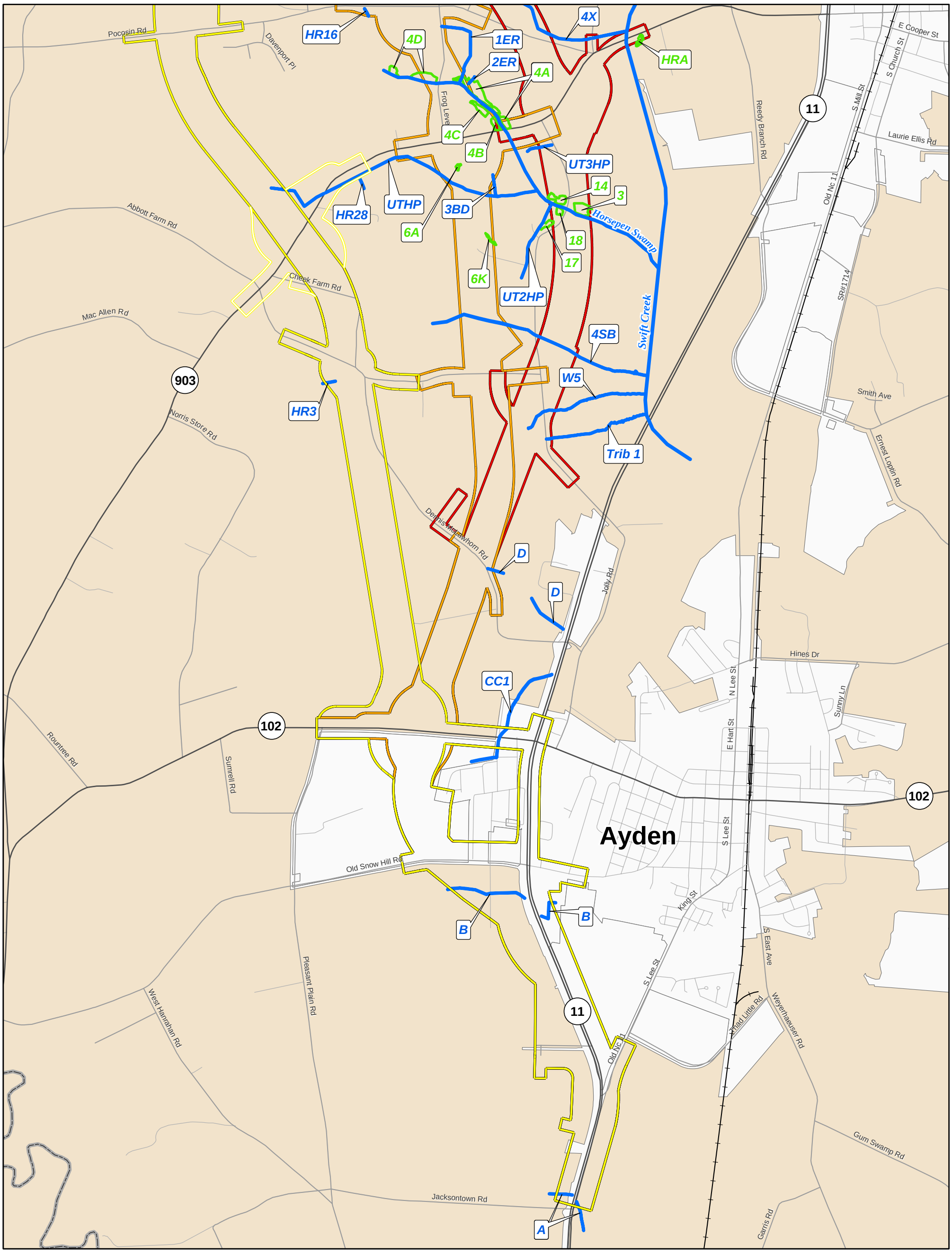
The Preferred Alternative/Bypass Alternate 4-EXT would require fewer stream crossings than the other two bypass alternates since they are located roughly along the divide between the Contentnea Creek and Swift Creek subbasins. Bypass Alternate 5-EXT would have the greatest impact on stream and swamp crossings. This alternative has the largest drainage area, resulting either in larger culvert sizes or box culverts for hydraulic maintenance.

TABLE 4-10: RECOMMENDED MAJOR DRAINAGE STRUCTURES

Bypass Alternate	Site Number	Station Number	Stream Name	Drainage Area (mi²)	Calculated Structure Size Recommendation
1B-EXT, Preferred/4-EXT, 5-EXT	1	N/A	UT to Swift Creek	0.6	upgrade existing 72" RCP *or* add second culvert
1B-EXT, 5-EXT	1a	184+10.04	UT to Swift Creek	0.2	72" RCP
1B-EXT, Preferred/4-EXT, 5-EXT	2	100+89.77	UT to Contentnea Creek	1.2	Double barrel 5' x 5' RCBC
5-EXT	3	241+44.73	Simmon Branch	0.2	**No major structure** Two (2) 60” RCP
1B-EXT	4a	263+94.13	UT to Swift Creek	0.3	84” RCP
5-EXT	4b	259+93.69	UT to Swift Creek	0.4	84” RCP
1B-EXT	5	296+64.53	UT to Horsepen Swamp	0.7	Double barrel 5' x 5' RCBC
1B-EXT	6a	327+23.11	Horsepen Swamp	1.5	Double barrel 6’ x 6’ RCBC
5-EXT	6b	295+33.86	Horsepen Swamp	2.8	Double barrel 8' x 8' RCBC
1B-EXT 5-EXT	6c	Y11 39+16.97	Horsepen Swamp	1.7	Double barrel 7’x 7’ RCBC
1B-EXT	7a	358+99.63	UT to Swift Creek	0.1	**No major structure** Two (2) 48” RCP
5-EXT	7b	354+92.77	UT to Swift Creek	0.3	Two (2) 60” RCP
Preferred/4-EXT	8a	438+15.89	Gum Swamp	0.3	Two (2) 60” RCP
1B-EXT 5-EXT	8b	426+32.49	Gum Swamp	1.2	Two (2) 84” RCP
5-EXT	8c	Y15 29+13.86	Gum Swamp	1.6	Two (2) 84” RCP

4.5.3.2 Streams

Twenty-seven jurisdictional streams are located within the study area and can be seen in Figures 4-3A and 4-3B. Eleven of the streams were entirely perennial, thirteen are entirely intermittent, and three streams grade from intermittent to perennial. There are also several streams and ditches within the study area that have been determined to be non-jurisdictional by NCDWQ. Physical characteristics of the surface waters in the study area were observed during site visits in August, September, October, and November 2002, March 2003, April, May and December 2004, and July



Legend

- Preferred Alternative
- Build Alternate 4-EXT
- Build Alternate 1B-EXT
- Build Alternate 5-EXT
- Jurisdictional Stream
- Wetland

N W E S

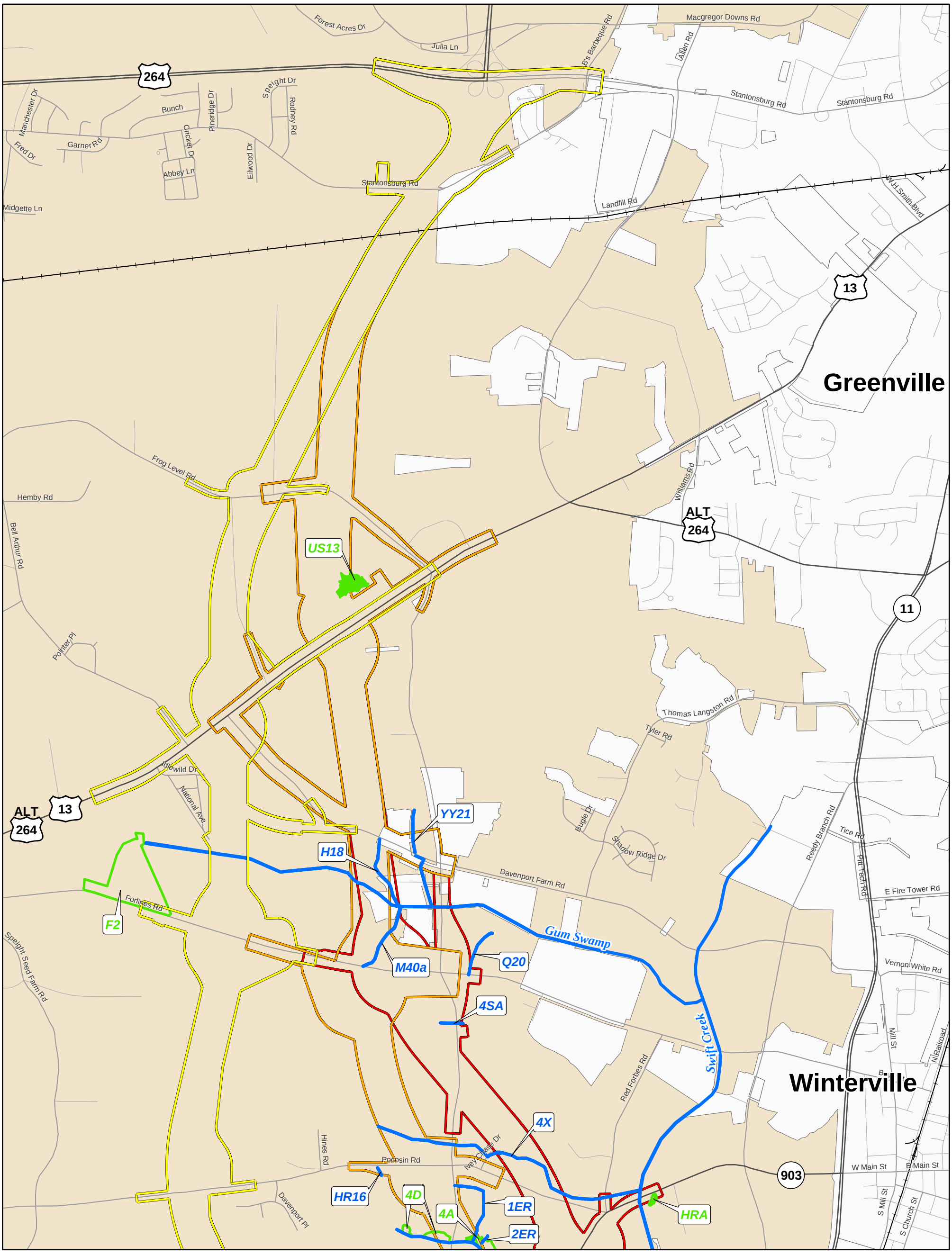
0 1,200 2,400 4,800 Feet

North Carolina
Department of Transportation

Greenville Southwest Bypass Study
(Improvements to NC 11 & US 264 Bus)

NCDOT Project Definition No.: 34411
T.I.P. No. R-2250

Figure 4-3A Wetlands and Streams



Legend

- Preferred Alternative
- Build Alternate 4-EXT
- Build Alternate 1B-EXT
- Build Alternate 5-EXT
- Jurisdictional Stream
- Wetland

N
W E
S

0 1,200 2,400 4,800 Feet

North Carolina
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(Improvements to NC 11 & US 264 Bus)

NCDOT Project Definition No.: 34411
T.I.P. No. R-2250

Figure 4-3B Wetlands and Streams

2005. All of the streams in the study area are channelized, at least for a portion of their lengths, and extend in nearly straight lines along their courses. They are also deeply entrenched, reducing the amount of over-bank flooding and floodplain access. The streams typically have a substrate of sand or silt. Stream determinations were based on information gathered during the completion of USACE "Intermittent Channel Evaluation Forms" or "Stream Quality Assessment Worksheets" and NCDWQ "Stream Classification Forms."

Table 4-11 lists characteristics of the streams found within the study area, including the stream identification code, stream name, the USACE quality assessment score (where applicable), the NCDWQ Stream Classification Score, jurisdictional status, and whether or not stream and riparian buffer mitigation will be required. A discussion of state riparian buffer rules is included in Section 3.5.4.2.

TABLE 4-11: STREAMS WITHIN THE R-2250 STUDY AREA

Stream ID	Stream Name	USACE Score	NCDWQ Score	Jurisdictional Status*	Stream Mitigation Required?	Buffer Mitigation Required?
A	UT to Swift Creek	28	19.75	Perennial	Yes	Yes
B	UT to Little Contentnea Creek	16	23.5	Intermittent (NC-11 East)	No	Yes
		24	25.5	Perennial (NC-11 West)	Yes	Yes
D	UT to Swift Creek	21	16.5	Perennial	Yes	Yes
CC 1	UT to Swift Creek	N/A	21.25	Intermittent	No	Yes
Trib 1	UT to Swift Creek	N/A	25.5	Perennial	Yes	Yes
W 5/ Simmon Branch	UT to Swift Creek	N/A	25.25	Intermittent (Jolly Rd. West)	Yes	Yes
		N/A	28.0	Perennial (Jolly Rd. East)	Yes	Yes
4SB	UT to Swift Creek	N/A	18.5	Perennial (Jolly Rd. West)	Yes	Yes
		N/A	24.5	Perennial (Jolly Rd. East)	Yes	Yes
UT2HP	UT to Horsepen Swamp	45	23	Perennial	Yes	Yes
UT3HP	UT to Horsepen Swamp	25	24.25	Intermittent	No	Yes
3BD	UT to Horsepen Swamp	26	15	Perennial	Yes	Yes
Horsepen Swamp	Horsepen Swamp	N/A	28.5	Perennial	Yes	Yes
		36	51	Perennial (Jolly Rd.)	Yes	Yes
UTHP	UT to Horsepen Swamp	N/A	37.5	Intermittent	Yes	Yes
	UT to Horsepen Swamp	39	22	Perennial	Yes	Yes
HR3	UT to Little Contentnea Creek	17	15.75	Intermittent	No	No
HR28	UT to Horsepen Swamp	28	22	Intermittent	Yes	Yes
1ER	UT to Horsepen Swamp	18	11.5	Perennial (adjacent to Frog Level Rd.)	Yes	Yes
		42	19.5	Perennial (downstream)	Yes	Yes
2ER	UT to Horsepen Swamp	49	16.5	Intermittent	Yes	Yes
HR16	UT to Horsepen Swamp	31	18.5	Intermittent	Yes	Yes
4X	UT to Swift Creek	N/A	14	Intermittent (Ivy Chase Dr. West)	Yes	Yes
4SA	UT to Swift Creek	N/A	8.0	Intermittent	Yes	Yes
M40A	UT to Gum Swamp	N/A	24.75	Intermittent	No	Yes
H18	UT to Gum Swamp	N/A	13.5	Intermittent	No	Yes
Gum Swamp	Gum Swamp	N/A	20.75	Perennial (headwaters)	Yes	Yes
		38	25.5	Perennial	Yes	Yes
Q20	UT to Gum Swamp	N/A	9	Intermittent	Yes	Yes
Swift Creek	Swift Creek	53	40	Perennial	Yes	Yes
	UT to Swift Creek	N/A	16.5	Perennial (Ivy Case Dr. East)	Yes	Yes
YY21	UT to Gum Swamp	N/A	13.5	perennial	Yes	Yes

* Jurisdictional Status is derived from information gathered during the completion of USACE Intermittent Channel Evaluation Forms or Stream Quality Assessment Worksheets and NCDWQ Stream Classification Forms

Table 4-12 contains a summary of stream impacts for the Preferred Alternative and the three bypass alternates. For the bypass alternates, impacts are shown both for the entire study corridor and for preliminary design construction limits. The Preferred Alternative would impact 1,760 linear feet of streams; this is slightly greater than the total impacts of Bypass Alternate 4-EXT (1610 linear feet) due to the slight eastward shift incorporated into the Preferred Alternative to minimize impacts to contributing properties in the Renston Rural Historic District. Relative to the other bypass alternates, Bypass Alternate 5-EXT would impact the greatest amount of streams, with direct impacts to 4,930 linear feet.

TABLE 4-12: STREAM IMPACTS (LINEAR FEET)

Stream ID	Preferred Alternative	Bypass Alternate 1B-EXT		Bypass Alternate 4-EXT		Bypass Alternate 5-EXT	
	Construction limits	Corridor	Construction limits	Corridor	Construction limits	Corridor	Construction limits
A		572.1	---	572.1	---	572.1	---
B	964.0	2,728.7	964.0	2,728.7	964.0	2,728.7	964.0
D		135.1	---	---	---	135.1	4.6
CC 1	116.1	569.5	118.4	569.5	116.1	569.5	118.4
Trib 1	---	---	---	---	---	139.0	82.2
W 5/ Simmon Branch	---	---	---	---	---	923.6	410.4
4SB	---	1,261.5	189.7			1,089.0	299.9
UT2HP	---	---	---	---	---	96.6	---
UT3HP	---	---	---	---	---	345.9	66.1
3BD	---	140.8	---	---	---	---	---
Horsepen Swamp	---	2,320.1	538.4	---	---	1,765.2	199.4
6SA	273.3	1,862.8	478.9	3,019.2	122.5	---	---
HR3	91.2	---	---	266.9	91.2	---	---
HR28	---	---	---	49.3	---	---	---
1ER	---	371.2	---	---	---	---	---
2ER	---	---	---	---	---	---	---
HR16	---	213.4	9.6	---	---	---	---
4X	---	2,075.2	301.0	---	---	2,557.5	294.5
4SA	---	---	---	---	---	519.1	68.7
M40A	---	1,221.2	960.6			1,860.7	1,437.7
H18	---	1,344.6	19.1			1,976.2	334.7
Gum Swamp	312.8	1,250.5	238.7	1,013.2	312.8	1,726.2	387.2
Q20	---	---	---	---	---	179.8	33.1
Swift Creek	---	---	---	---	---	391.9	---
YY21	---	983.0	218.8	---	---	983.5	226.0
Perennial	**1,276.8**	**10,929.8**	**2,628,6**	**3,660.3**	**1,276.8**	**9,230.5**	**2,342.1**
Intermittent	**480.6**	**6,120.0**	**1,408.7**	**4,558,6**	**329.8**	**9,329,4**	**2,584.5**
Total	**1757.4**	**17,049.7**	**4,037.3**	**8,218.9**	**1,606.7**	**18,559.9**	**4,926.6**

4.5.3.3 Ponds

There are no jurisdictional ponds within the study area; therefore, none will be impacted by this project.

4.5.4 Jurisdictional Issues

4.5.4.1 Wetlands

Wetland functions taking place within a wetland ecosystem and their perceived or measured values are generally described under six categories including: water storage or the ability to store or convey flood waters or ground water seepage, or the retardation of runoff; bank shoreline stabilization; pollutant removal; wildlife habitat; aquatic habitat; and recreation / education. Wetland scores from 0-30 indicate low quality wetlands, 31-60 are deemed medium quality, and 61-plus are considered high quality resources. Wetlands in the project area have a similar species

composition and topographic setting and, generally have similar functions occurring in the ecosystems. Many wetlands in the coastal plain of North Carolina and Pitt County were historically drained through ditching, generally to provide more tillable land or allow for commercial development. Most wetlands in the project area are relatively small in size, lie along streams, and serve an important function as riparian buffers. These wetlands also serve as islands of refuge or travel corridors for many wildlife species.

The NWI mapping (USFWS 1994a, 1994b) identifies multiple wetlands within the study area, and the field assessment of the project study area for jurisdictional wetland boundaries based on current USACE methodology (Environmental Laboratory 1987) identified thirteen (13) areas meeting the federal criteria for wetlands within the study area (see Figures 4-3A & 3B). The wetland/non-wetland boundaries were located with sub-meter Trimble™ Global Positioning System (GPS) units. A USACE Routine Wetland Determination Data Form and a NCDWQ Wetland Rating Form were completed for each wetland. Table 4-13 lists characteristics of the jurisdictional wetlands within the study area, including the Cowardin classification, NCDWQ Wetland Rating score, the riverine or non-riverine classification, and the Schafale and Weakley Classification.

TABLE 4-13: WETLANDS LOCATED WITHIN THE R-2250 STUDY AREA

Wetland Name	NCDWQ Sub-basin	Cowardin Classification	NCDWQ Wetland Classification	NCDWQ Rating	Schafale and Weakley Classification*	Riverine or Non-Riverine	Isolated / Contiguous
6K	03-04-09	PFO	Headwater Forest	19	Mesic Mixed Hardwood Forest (Coastal Plain Subtype)	Non-Riverine	Contiguous
6A	03-04-09	PFO	Bottomland Hardwood Forest	31	Mesic Mixed Hardwood Forest (Coastal Plain Subtype)	Non-Riverine	Contiguous
4B	03-04-09	PFO	Bottomland Hardwood Forest	57	Coastal Plain Small Stream Swamp (Blackwater Subtype)	Riverine	Contiguous
4A	03-04-09	PFO	Bottomland Hardwood Forest	57	Coastal Plain Small Stream Swamp (Blackwater Subtype)	Riverine	Contiguous
14	03-04-09	PFO	Bottomland Hardwood Forest	61	Coastal Plain Small Stream Swamp (Blackwater Subtype)	Riverine	Contiguous
3	03-04-09	PEM/PFO	Bottomland Hardwood Forest	29	Coastal Plain Small Stream Swamp (Blackwater Subtype)	Riverine	Contiguous
17	03-04-09	PFO	Bottomland Hardwood Forest	27	Coastal Plain Small Stream Swamp (Blackwater Subtype)	Riverine	Contiguous
18	03-04-09	PFO	Bottomland Hardwood Forest	34	Coastal Plain Small Stream Swamp (Blackwater Subtype)	Riverine	Contiguous
4C	03-04-09	PFO	Bottomland Hardwood Forest	57	Coastal Plain Small Stream Swamp (Blackwater Subtype)	Riverine	Contiguous
4D	03-04-09	PFO	Bottomland Hardwood Forest	57	Coastal Plain Small Stream Swamp (Blackwater Subtype)	Riverine	Contiguous
HRA	03-04-09	PFO	Ephemeral Wetland	25	Coastal Plain Small Stream Swamp (Blackwater Subtype)	Riverine	Contiguous
US13	03-04-07	PFO	Ephemeral / Headwater Forest	34	Nonriverine Wet Hardwood Forest	Non-Riverine	Isolated
F2	03-04-09	PFO	N/A (Pine Plantation)	48	Wet Pine Flatwoods	Non-Riverine	Contiguous

* Schafale and Weakley (1990)

Table 4-14 contains a summary of wetland impacts for the Preferred Alternative and the three bypass alternates. For the bypass alternates, impacts are shown both for the entire study corridor and for preliminary design construction limits plus 10 feet for possible clearing. The Preferred Alternative will impact 0.1 acre of wetlands. Relative to the other bypass alternates, Bypass Alternate 5-EXT would impact the greatest amount of jurisdictional wetlands, with direct impacts to approximately 1.5 acres.

TABLE 4-14: WETLAND IMPACTS (SQAURE FEET)

Wetland Name	Preferred Alternative	Bypass Alternate 1B-EXT		Bypass Alternate 4-EXT		Bypass Alternate 5-EXT	
	Construction limits + 10'	Corridor	Construction limits + 10'	Corridor	Construction limits + 10'	Corridor	Construction limits + 10'
6K	---	8,712	---	---	---	---	---
6A	---	13,068	13,068	---	---	---	---
4B	---	43,560	4,356	---	---	13,068	---
4A	---	47,916	4,356	---	---	39,204	871
4C	---	60,984	---	---	---	---	---
4D	---	82,764	---	---	---	---	---
14	---	---	---	---	---	74,052	---
3	---	---	---	---	---	104,544	65,340
17	---	---	---	---	---	1,742	---
18	---	---	---	---	---	26,136	---
HRA	---	---	---	---	---	13,068	---
US13	---	121,968	436	---	---	121,968	436
F2	4,356	---	---	126,324	4,356	---	---
Total	**4,356**	**378,972**	**22,216**	**126,324**	**4,356**	**393,782**	**66,647**

4.5.4.2 Riparian Buffers

Estimated impacts to the riparian buffers within the study area are quantified in Table 4-15. For the bypass alternates, impacts are shown both for the entire study corridor and for preliminary design construction limits. The Preferred Alternative would impact a total of 4.0 acres of riparian buffers; this is slightly greater than the total impacts of Bypass Alternate 4-EXT (3.7 acres) due to the slight eastward shift incorporated into the Preferred Alternative to minimize impacts to contributing properties in the Renston Rural Historic District. Relative to the other bypass alternates, Bypass Alternate 5-EXT would impact the greatest amount of riparian buffers, with direct impacts to 11.5 acres.

Impacts to Zone 1 are based on a buffer width of 30 feet measured landward from the top of bank or rooted vegetation. Impacts to Zone 2 are based on a buffer width of 20 feet measured from the outer edge of Zone 1. Zones 1 and 2 should consist of an undisturbed vegetated area except for uses provided in 15 NCAC 2B .0233 (6) for the Neuse River Basin and 15 NCAC 02B .0259 (6) for the Tar-Pamlico River Basin. Grading and revegetating in Zone 2 is allowed, provided that the health of the vegetation in Zone 1 is not compromised (NCDWQ 2003c).

TABLE 4-15: RIPARIAN BUFFER IMPACTS IN SQUARE FEET

Stream ID	Preferred Alternative		Bypass Alternate 1B-EXT				Bypass Alternate 4-EXT				Bypass Alternate 5-EXT			
	Construction limits		Corridor		Construction limits		Corridor		Construction limits		Corridor		Construction limits	
	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2
A	---	---	34,848	21,780	---	---	34,848	21,780	---	---	34,848	21,780	---	---
B	56,628	39,204	165,528	108,900	56,628	39,204	165,528	108,900	56,628	39,204	165,528	108,900	56,628	34,848
D	---	---	8,712	8,712	1,307	2,178	---	---	---	---	8,712	8,712	1,742	4,356
CC 1	8,712	4,356	34,848	21,780	8,712	4,356	34,848	21,780	8,712	4,356	34,848	21,780	8,712	4,356
Trib 1	---	---	---	---	---	---	---	---	---	---	8,712	4,356	4,356	4,356
W 5/ Simmon Branch	---	---	---	---	---	---	---	---	---	---	56,628	39,204	30,492	21,780
4SB	---	---	74,052	74,052	13,068	8,712	---	---	---	---	65,340	43,560	17,424	13,068
UT2HP	---	---	---	---	---	---	---	---	---	---	4,356	4,356		
UT3HP	---	---	---	---	---	---	---	---	---	---	21,780	13,068	4,356	4,356
3BD	---	---	8,712	8,712	---	---	---	---	---	---	---	---	---	---
Horsepen Swamp	---	---	143,748	100,188	30,492	21,780	---	---	---	---	104,544	69,696	13,068	8,712
UTHP	17,424	8,712	113,256	74,052	30,492	17,424	178,596	117,612	8,712	4,356	---	---	---	---
HR3	4,356	4,356	---	---	---	---	17,424	8,712	4,356	4,356	---	---	---	---
HR28	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1ER	---	---	17,424	13,068	---	---	---	---	---	---	---	---	---	---
2ER	---	---	---	---	---	---	---	---	---	---	---	---	---	---
HR16	---	---	13,068	8,712	436	436	---	---	---	---	---	---	---	---
4X	---	---	126,324	82,764	17,424	13,068	---	---	---	---	152,460	100,188	17,424	17,424
4SA	---	---	---	---	---	---	---	---	---	---	30,492	21,780	4,356	4,356
M40A	---	---	74,052	47,916	56,628	39,204	---	---	---	---	113,256	74,052	82,764	56,628
H18	---	---	82,764	52,272	871	436	---	---	---	---	117,612	74,052	21,780	13,068
Gum Swamp	17,424	13,068	74,052	47,916	13,068	13,068	60,984	39,204	17,424	13,068	100,188	65,340	21,780	13,068
Q20	---	---	---	---	---	---	---	---	---	---	13,068	13,068	1,742	1,307
Swift Creek	---	---	---	---	---	---	---	---	---	---	21,780	17,424	---	---
YY21	---	---	56,628	34,848	8,712	4,356	---	---	---	---	56,628	34,848	8,712	4,356
Total	**104,544**	**69,696**	**1,028,016**	**705,672**	**237,838**	**164,221**	**492,228**	**317,988**	**95,832**	**65,340**	**1,110,780**	**736,164**	**295,337**	**206,039**
Combined Total	**174,240**				**1,733,688**				**402,059**				**810,216**	

4.5.4.3 Mitigation Evaluation

Mitigation has been defined by the NCEPA to include efforts which: a) avoid; b) minimize; c) rectify; d) reduce or eliminate; or e) compensate for adverse impacts to the environment [40 CFR 1508.20 (a-e)]. Mitigation of wetland impacts is recommended in accordance with Section 404(b)(1) Guidelines of the CWA (40 CFR 230), FHWA step-down procedures (23 CFR 777.1 et seq.), mitigation policy mandates articulated in the USACE/EPA Memorandum of Agreement (MOA), Executive Order 11990 (42 FR 26961) (1977), and USFWS mitigation policy directives (46 FR 7644-7663) (1981).

Section 404(b)(1) Guidelines, the USACE/EPA MOA, and Executive Order 11990 stress avoidance and minimization as primary considerations for protection of wetlands. Practicable alternatives analysis must be fully evaluated before compensatory mitigation can be discussed. A sequencing (step-down) procedure is recommended in the event that avoidance is impossible. Mitigation employed outside of the highway right-of-way must be reviewed and approved on a case-by-case basis.

Avoidance and Minimization

Efforts were taken to avoid and minimize impacts to wetlands, streams, and buffers where possible during development of the preliminary design for the proposed project. Impacts can be avoided to streams, wetlands, and federally protected species with the use of environmentally sensitive design. Impacts to the jurisdictional surface waters were minimized by crossing streams at a perpendicular angle, and can be further minimized by avoiding construction activities in the stream channels, and avoiding deposition into the stream channel during roadway construction. Adjustment to the roadway alignment was made to avoid these sensitive areas. The Preferred Alternative avoids 79 percent of the total linear feet of streams in the Bypass Alternate 4-EXT corridor, 79 percent of the total acreage of riparian buffers in the corridor, and 97 percent of wetlands acreage in the corridor.

Avoidance and minimization of impacts to wetlands, streams, and buffers was also a key consideration during selection of the Preferred Alternative for the project. Due to the location of Waters of the United States and wetlands within the project study area, avoidance of all jurisdictional impacts was not possible. Each of the bypass alternates considered would cross Gum Swamp. Bypass Alternates 1B-EXT and 5-EXT would cross Horsepen Swamp and the Preferred Alternative/Bypass Alternate 4-EXT would cross a tributary of Horsepen Swamp. The Preferred Alternative/Bypass Alternate 4-EXT would cross Gum Swamp and the tributary of Horsepen Swamp further upstream than the other alternates and would avoid wetlands associated with the Horsepen Swamp drainage. The Preferred Alternative/Bypass Alternate 4-EXT would also avoid impacts to Simmon Branch, a tributary of Swift Creek, which would be impacted by the other two bypass alternates. Bypass Alternate 4-EXT was determined to have lower impacts on wetlands, streams, and buffers than the other bypass alternates under consideration; this was a key factor in its selection as the Preferred Alternative.

Other Avoidance and Minimization Measures
Best Management Practices (BMPs) will be implemented in an effort to further minimize impacts. Reduction of fill slopes at stream and wetland crossings will reduce necessary wetland impacts. Conservative use of culverts and sensitive placement of drainage structures will minimize further degradation of water quality and reduce adverse impacts on aquatic habitat viability in streams and tributaries.

Compensatory Mitigation
The USACE may require compensation under an Individual Permit if the discharge causes the loss of greater than 0.1 acres of waters of United States or if the activity causes more than 150 linear feet of perennial streambed impacts or intermittent streambed impacts if the intermittent stream has important aquatic function(s) as denoted on USACE's "Intermittent Channel Evaluation Form." In accordance with 15A NCAC 2H .0506(h), NCDWQ may require compensation for impacts to 150 linear feet or more of jurisdictional streams and/or one acre or more of wetlands.

The USACE may require compensation for all cumulative jurisdictional impacts to wetlands and perennial streambed or important intermittent streambed that result from activities authorized under an Individual Permit. The NCDWQ may require compensation for all cumulative jurisdictional stream and wetland impacts for activities authorized under a Major WQC.

Impacts incurred during project construction may require mitigation. Final compensation requirements for stream and wetland impacts are left to the discretion of USACE and NCDWQ. Appropriate compensatory mitigation requirements for wetland and stream impacts from the preferred alternative would be determined in consultation with these agencies. The North Carolina Ecosystem Enhancement Program (EEP) will coordinate with these agencies to determine the appropriate compensatory mitigation requirements and will prepare a compensatory mitigation plan. The compensatory mitigation plan would be completed prior to issuance of a Section 404 permit and Section 401 Water Quality Certification.

North Carolina Riparian Buffers
Unavoidable impacts to stream buffers in the Neuse or Tar-Pamlico River Basins are dependent upon the buffer zone where the impact occurred. Impacts to Zone 1 will require mitigation on a 3:1 basis, and impacts to Zone 2 will require mitigation on a 1.5:1 basis. Mitigation may consist of payment of a compensatory mitigation fee into the state Riparian Buffer Restoration Fund, donation of real property, or restoration or enhancement of a non forested riparian buffer. A buffer mitigation plan will be prepared by EEP and will be provided to NCDWQ prior to approval of Section 401 Water Quality Certification.

4.5.4.4 Permits and Certifications

The design and construction of the proposed project will dictate the magnitude of the impacts to surface waters. If impacts occur, permits and certifications will be required from various

regulatory agencies in charge of protecting the water quality of public water resources. Surface water systems and wetlands receive similar protection and consideration from the regulatory agencies. These permits are authorized under the Clean Water Act (CWA) and are under separate state laws regarding significant water resources. This required list of permits and certifications is based on the Preferred Alternative.

Section 401 and 404 Permits

In accordance with provisions of the CWA §404 (33 USC 1344), a permit will be required from the USACE for the discharge of dredged or fill material into "Waters of the United States." If the total impacts exceed 300 linear feet or 0.5 acres, or multiple crossings of the same stream are incurred, an Individual Permit is necessary. Due to the extensive nature of jurisdictional streams and wetlands associated with this project, it is likely that an Individual Permit may become necessary. If an Individual Permit is required, a corresponding Major 401 Water Quality Certification will be required by NCDWQ. The USACE will determine final permit requirements.

This project will require a 401 Water Quality General Certification from the NCDWQ prior to the issuance of any Section 404 Nationwide Permit or an Individual Permit. Section 401 of the CWA requires that the state issue or deny water quality certifications for any federally permitted or licensed activity that may result in a discharge into "Waters of the United States." Section 401 Certification allows surface waters to be temporarily impacted for the duration of the construction or other land manipulation. Issuance of a 401 Certification from the DWQ is a prerequisite to the issuance of a Section 404 Permit.

During construction activities, NCDOT's BMPs will be utilized, including erosion control measures.

Riparian Buffers

North Carolina Riparian Area Rules are in place for the protection and maintenance of Vegetated Riparian Buffers in the Tar-Pamlico River Basin (15A NCAC 02B .0259) and Neuse River Basin (15 NCAC 2B .0233). The rules state that roads, bridges, stormwater management facilities, ponds, and utilities may be allowed within the 50-foot riparian buffer area of subject streams where no practical alternative exists. They also state that these structures shall be located, designed, constructed, and maintained to have minimal disturbance, to provide maximum erosion protection, to have the least adverse effects on aquatic life and habitat, and to protect water quality to the maximum extent practical through the use of best management practices. Every reasonable effort must be made to avoid and minimize wetland and stream impacts.

Estimated impacts to the riparian buffers by each alternative in the study area are quantified in Table 4-14. Impacts to Zone 1 are based on a buffer width of 30 feet measured landward from the top of bank or rooted vegetation. Zones 1 and 2 should consist of an undisturbed vegetated area except for uses provided in 15 NCAC 2B .0233 (6) for the Neuse River Basin and 15 NCAC 02B .0259 (6) for the Tar-Pamlico River Basin. Grading and revegetating Zone 2 is allowed,

provided that the health of the vegetation in Zone 1 is not compromised (NCDWQ 2003c). Impacts to Zone 2 are based on a buffer width of 20 feet measured from the outer edge of Zone 1. The acreages presented in this table represent buffer areas impacted by current right-of-way design plans. The impacts are subject to change based on more detailed information which may become available during the final design phase of the project. Mitigation for impacts to riparian buffers is discussed above.

The Neuse Buffer Certification and Tar-Pamlico Buffer Certification will be requested from NCDWQ in conjunction with a 401 Water Quality Permit.

4.5.4.5 Protected Species

Complete surveys for all federally protected species were conducted along all build alternatives for the project. Prior to conducting field surveys suitable habitat was defined for each species. Suitable habitat for each species is defined in Section 3.5.4.4. Once the habitat requirements and life history information for each species were compiled, areas of likely suitable habitat were identified. These areas were established through review of project aerial photography, field notes from project wetlands delineation and determination efforts, and data from previous natural systems surveys done in the study area.

Literature searches regarding natural resources in the project area were initiated in the spring of 2002. Subsequent field work began in the summer of 2002 and continued through the summer of 2005 after additions were made to the alternative corridors. The areas of likely suitable habitat were visited and surveyed for the particular species. The field surveys first consisted of an assessment of the area's likelihood of being suitable habitat as identified in the research material and element occurrence records. Each area was visually inspected by a team of experienced biologists. If the field visit determined that the area was suitable habitat, then intensive searches for the particular species were conducted. Additional research and field investigations for the Tar spinymussel were conducted by biologists from NCDOT. Prior to conducting field surveys, North Carolina Natural Heritage Program (NCNHP) element occurrence records were reviewed to determine the status of known element occurrences in the area.

West Indian Manatee (*Trichechus manatus*)

BIOLOGICAL CONCLUSION: No Effect

No manatees were observed during the site visits in December 2004 and July 2005. Marginal habitat for the West Indian manatee exists within the project study area. Swift Creek is the only stream that contains water of minimal depth to support habitation by this species. However, there is a distinct lack of submerged aquatic vegetation in this stream to support foraging by manatees. NCNHP records were reviewed on July 26, 2005 and revealed no West Indian manatee present within the study area. Within the study area, Swift Creek is more than 15 miles from its confluence with the Neuse River, a location where the species has been identified in the past. The occurrence of West Indian manatee in the streams of this project area is highly unlikely, and a Biological Conclusion of No Effect has been rendered.

Red-cockaded woodpecker (*Picoides borealis*)
BIOLOGICAL CONCLUSION: No Effect
The project study area and project vicinity are dominated by land drained for agricultural or development purposes, or for commercial loblolly pine production. No contiguous suitable nesting or foraging habitat for the red-cockaded woodpecker occurs within the project study area. No pine dominated stands of sufficient size, age and stand characteristics are located within or contiguous to the study area. NCNHP records do not document any known red-cockaded woodpecker populations within 3.0 miles of the project study area (NCNHP records review July 26, 2005). The proposed project will have No Effect on this federally protected species.

Tar River Spinymussel (*Elliptio steinstansana*)
BIOLOGICAL CONCLUSION: No Effect
The project area spans portions of the Neuse and Tar-Pamlico watersheds in Pitt County. The Tar River spinymussel is reported to occur in both river basins; however, it is not currently known to exist in Pitt County. The substrate of streams in the study area is soft sand or mud, unlike the loose gravel beds preferred by this species. Also, the mussel prefers fast-flowing water which generally does not occur in the streams located in the study area. Furthermore, sedimentation, channelization, and nutrients have all degraded the water quality of these streams.

A survey was conducted by NCDOT in Greens Mill Run in 1994 (NCDOT 1994) and reported no suitable habitat present. A cursory survey of Swift Creek was conducted at the same time and found several forms of the eastern elliptio mussel (*Elliptio* spp.). The species was not determined at the time of the surveys. Strict enforcement of Best Management Practices (BMPs) was recommended at that time to minimize impacts to this population. Because no suitable habitat for this species is known to occur in the project area, the proposed project will have No Effect on this federally protected species.

4.5.4.6 Bald Eagle

Bald eagle (*Haliaeetus leucocephalus*)
BIOLOGICAL CONCLUSION: No Effect
NCNHP records (reviewed July 26, 2005) indicate that an active bald eagle nest was located near the US 264 and NC 43 interchange (approximately 2.5 miles north of the study area) in 2002. This nest was active for the three previous years, and fledged one chick in 2002. (No information was available for the 2003 and 2004 nesting seasons at the time of the NCNHP records search). No suitable nesting or foraging habitat for this species was observed within the study area or project vicinity. The surface waters are either too small, impacted by development or agriculture, or have a closed canopy, all of which would impair nesting and foraging activity. Furthermore, few forested riparian areas exist within the study area, as most of these areas have been eliminated or significantly impacted by agricultural activities. Given these circumstances, the proposed project will have No Effect on this species. While the bald eagle was a federally listed

species at the time the DEIS for this project was prepared, it has since been delisted. It is still protected under the Bald and Golden Eagle Protection Act.

4.6 SECTION 4(F) AND SECTION 6(F) APPLICABILITY

At the time the DEIS for this project was prepared, a final decision on whether the project would be State-funded had not yet been made. For this reason, the DEIS included a review of Section 4(f) and Section 6(f) applicability to resources in the project area, along with a Draft Section 4(f) Evaluation. As solely State funds have since been identified for the project and NCDOT will no longer seek federal funds for the project, a Section 4(f) analysis is no longer applicable to any resources in the project area.

Section 6(f) of The Land and Water Conservation Fund Act of 1965 prohibits the conversion of any property acquired or developed with the assistance of the fund to anything other than public outdoor recreation use without the approval of the Secretary of the DOI. While still applicable with the use of state funds, there were no parklands affected by the project and therefore no requirement for this type of analysis.

4.7 CONSTRUCTION IMPACTS

The Preferred Alternative is expected to result in temporary construction impacts as described below. All of the construction impacts listed below would be temporary in nature. Construction activities for the proposed facility would have air, noise, water quality, traffic flow, and visual impacts for those residents and travelers within the immediate vicinity of the project. All of the build alternates considered in the DEIS would have similar construction impacts.

4.7.1 Energy

Construction of the Preferred Alternative is expected to result in less total energy utilitzation than the No-Build Alternative. Construction of the facility would initially require the consumption of energy and resources that would not be used if the project were not built. Operation of the facility, however, would compensate for the energy lost during construction by increasing the efficiency of the regional roadway system.

Increased energy efficiency on the new facility would be attributed to its controlled access features and would result in the following:

- Decreased vehicle delays,
- More efficient vehicle operating speeds; and
- Diversion of traffic away from less convenient and less efficient roadways.

4.7.2 Noise

Noise and vibration impacts would be from the heavy equipment movement and construction activities such as pile driving. Noise control measures may include those contained in NCDOT's Standard Specifications.

4.7.3 Air Quality

The air quality impact would be temporary and would primarily be in the form of emissions from diesel powered construction equipment, dust from embankment and haul road areas, and burning of debris. Air pollution associated with the creation of airborne particles would be effectively controlled through the use of watering or other techniques in accordance with all local laws and ordinances and regulations of the North Carolina State Implementation Plans for Air Quality in compliance with the 15 NCAC 2D.0520. In addition, all construction activities would follow the NCDOT *Best Management Practices for Protection of Surface Waters* (March 1997) as applicable and NCDOT *Standard Specifications for Roads and Structures*.

4.7.4 Utilities

The proposed project will require some adjustment, relocation or modification to existing utilities. Any disruption to utility service during construction will be minimized by close coordination with utility providers and property owners in affected areas. A GUC power transmission easement will be crossed by the project.

4.7.5 Water Quality

Water quality impacts resulting from erosion and sedimentation would be controlled in accordance with NCDOT's *Standard Specifications for Roads and Structures* and through the use of NCDOT's *Best Management Practices for Protection of Surface Waters*, as applicable. Short term water quality impacts would result from erosion and sedimentation associated with the proposed construction of the outer loop. Erosion results when the ground surface is bared from clearing and earthwork operations. After entering streams, the eroded material may increase turbidity levels and sedimentation downstream.

4.7.6 Maintenance of Traffic

Maintenance of traffic and sequence of construction would be planned and scheduled so as to minimize traffic delays throughout the project. Signs would be used where appropriate to provide notice of road closures and other pertinent information to the traveling public. The local news media would be notified in advance of road closings and other construction related activities which could excessively inconvenience the community so motorists, residents, and businesses could plan their day and travel routes in advance.

Access to all businesses and residences would be maintained to the extent practical through controlled construction scheduling. Traffic delays would be controlled to the extent possible

where many construction operations are in progress at the same time.

For residents living along the proposed facility some of the materials stored for the project may be displeasing visually; however, this would be a temporary condition and should pose no substantial problem.

Construction of the roadway and bridges may require excavation of unsuitable material, placement of embankments, and use of materials such as asphaltic concrete and portland cement concrete. Disposal would be on-site in retention areas or off-site. The removal of structures and debris would be in accordance with local and state regulatory agencies permitting this operation. The contractor would be responsible for the methods of controlling pollution on haul roads, in borrow pits, other material pits, and areas used for disposal of waste materials from the project. Temporary erosion control features could consist of temporary grassing, sodding, mulching, sandbagging, slope drains, sediment basins, sediment checks, artificial coverings, and/or berms.

4.8 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Implementation of the Preferred Alternative will involve a commitment of the range of natural, physical, human, and fiscal resources. Land used in the construction of the proposed facility is considered an irreversible commitment during the time period that the land is used for highway facility. However, if a greater need arises for use of the land or if the highway facility is no longer needed, the land can be converted to another use. At present there is no reason to believe such a conversion will be necessary or desirable. All of the build alternates considered in the DEIS would involve similar commitments of resources.

Considerable amounts of fossil fuels, labor, and highway construction materials such as cement, aggregate, and bituminous material would be expended. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. They are not in short supply and their use would not have an adverse effect upon continued availability of these resources. Any construction would also require a substantial one-time expenditure of state funds which are not retrievable.

4.9 RELATIONSHIP BETWEEN SHORT-TERM IMPACTS AND LONG-TERM BENEFITS

The construction phase of the project will cause limited adverse effects on the human environment which are deemed to be of a short-term nature. There would be minor siltation of local surface waters during construction; however, careful attention would be given to these problems during design and strict adherence to the NCDOT's *Best Management Practices for Protection of Surface Waters* (March 1997) would be applied. These control measures, both temporary and permanent, would minimize adverse short-term effects and avoid any substantial long-term damage. In general, the bypass alternates considered in the DEIS would have similar

impacts on the local short-term uses of resources and the maintenance and enhancement of long-term productivity.

Another short-term effect would be the displacement or relocation of people, businesses, and non-profit organizations; however, the NCDOT's relocation and financial assistance program would minimize this inconvenience.

The proposed project would be classified as a long-term productive facility. This project, with its desirable design characteristics, would provide for safe and efficient vehicle operation. The benefits such as reduced operating costs, reduced travel time, and general economic enhancement of the area offered by the long-term productivity of this project should more than offset the short-term inconvenience and adverse effects on the human environment.

4.10 INDIRECT AND CUMULATIVE IMPACTS

An assessment of potential indirect and cumulative impacts that may result from the proposed Greenville Southwest Bypass project as well as other past, present, and reasonably foreseeable development activities within the vicinity of the project was completed using NCDOT's *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina* (2001). The information in this section is taken from the Greenville Southwest Bypass Indirect and Cumulative Impact Analysis (ICI) technical memorandum completed in May of 2006.

An Indirect and Cumulative Impacts (ICI) Study Area was developed to serve as a basis from which to gather and analyze specific demographic, land use, and environmental features and to further identify areas that may experience project related indirect and cumulative impacts. The ICI Study Area is generally bounded to the north, east, and south by census tracts and to the west by the Pitt/Greene/Lenoir County line and Little Contentnea Creek. The study area includes portions of Pitt County and the City of Greenville and all of the incorporated areas of the Towns of Winterville and Ayden.

As noted in the National Cooperative Highway Research Program (NCHRP) Report 466: Desk Reference for Estimating the Indirect Effects of Transportation Projects, transportation improvements often reduce the time-cost of travel, enhancing the attractiveness of surrounding land to developers and consumers. Development on vacant land, or conversion of the built environment to more intensive uses, is often a consequence of highway projects. Growth in population and employment attributable to a direct project impact (change in accessibility) is an indirect impact that, in turn, can produce its own effect on the environment. It should be noted that a transportation investment and the increased accessibility that it brings is just one factor in the determining the location of development. Other factors to consider include location attractiveness, consumer preferences, existence and availability of infrastructure, local political and economic conditions, and the rate and path of urbanization.

Induced growth effects fall into three general categories: (1) effects of projects planned to serve specific land development, (2) effects of projects likely to stimulate complementary development; and (3) effects of projects likely to influence interregional locational decisions. As the proposed Greenville Southwest Bypass is not planned to serve a specific land development no further analysis for this category of effect is warranted.

4.10.1 Context

Much of the economic and resultant residential growth in the Greenville/Pitt County area can be traced to the growth of the health care industry, specifically Pitt County Memorial Hospital, the Brody School of Medicine, and the presence of East Carolina University. North Carolina State Data Center statistics show that Pitt County is expected to reach a population in excess of 191,000 by the year 2030, an increase of approximately 57,500 persons or 43 percent between 2000 and 2030. The most significant areas of residential growth within the study area are found on large tracts of converted agricultural lands and those parcels previously vacant. This area is continuing to see rapid population growth fueled by other factors including; available water and sewer infrastructure; and the desire of homeowners to “move away” from the city core and “move up” to newer and larger homes. The portions of the area that are serviced by Greenville Utilities Commission are being developed at higher densities while the further western portions of the study area (serviced by well and septic service) are being developed at much lower densities.

The health care, education, retail, manufacturing, and accommodation and food service sectors constituted the largest employment sectors in Pitt County in 2004. These five sectors comprise 43,775 employees and 67 percent of the employment in Pitt County. Of the 63,307 total employed residents of Pitt County, 86 percent work within the County. In addition, nearly 12,000 people commute to work in Pitt County from neighboring counties.

The land uses along the Greenville Southwest Bypass study corridor and within the ICI Study Area are comprised of a combination of urban and rural development. Uses vary greatly in type and intensity from typical suburban development (including single and multi-family residential, retail, and commercial uses) in the northern and eastern portions of the study area to rural agricultural and large-lot residential in the western and southern portions.

Except for the northern and southern extremes of the study area, the land uses around the project alternatives are not currently served by water and sewer infrastructure. Only the incorporated (and some extra territorial jurisdictional (ETJ)) areas around Greenville, Ayden, and Winterville currently have water or sewer systems. Until infrastructure is in place the density of the area will be limited to what can be supported by well and septic, community water, and package treatment plants.

The study area includes several notable features including large areas of vacant or undeveloped land, historic resources, water resources (streams, wetlands, riparian buffers), and habitat for federally-protected species.

Recent and proposed development plans include approximately 2,000 residential housing units that are either currently under construction or have been recently approved within the Southwest Vision Area, which is the area of highest growth in the overall ICI Study Area. In addition to the R-2250 project, there were eight other projects proposed in the then 2006-2012 NC Transportation Improvement Program or 2004 Greenville Urban Area Thoroughfare Plan projects for the study area. Each of these improvements will improve capacity and increase linkages in the regional transportation system that will facilitate travel movement and improve access.

Although a significant amount of growth has taken place to date, significant acreage remains undeveloped farmland or woodlands. Vacant lands susceptible to residential development comprise approximately 900 acres that at full development will yield upwards of 4,000 additional dwelling units. Total build-out for all vacant lands would be estimated at 20 plus years.

It is estimated that the 4.1 square mile study area would, in the future, contain approximately 8,000 total dwellings with a resident population of up to 20,000 persons at 2-½ persons per dwelling unit. More recent data for the area is being developed by the City Planning Staff (April 2005 Presentation before the Greenville Planning and Zoning Commission), which may indicate an even higher amount of existing and potential development in this area. If sewer policies are amended to allow county development of sewers (without annexation), population estimates could rise to over 25,000 for the area upon full build-out. This would amount to doubling the population of the southwest quadrant within five years.

4.10.2 General Findings

After evaluating the information available, this qualitative analysis of indirect and cumulative impacts the following general characteristics hold for the region. First, growth in the Greenville region has largely been dependent on the presence and growth of the regional medical center and East Carolina University. Second, water is not considered the controlling factor when it comes to growth in the ICI Study Area. However sewer service is considered a limiting growth factor for the portion of the ICI Study Area in Greenville's planning area.

Recent transportation improvements in the Greenville region were constructed to improve congestion rather than to spur additional development.

4.10.2.1 Potential for Indirect Impacts

The methodology used to determine if the Greenville Southwest Bypass project would induce growth and affect changes in land use was comprised of a two-step process. First, the overall conditions of the study area were evaluated to define existing conditions, identify supportive factors, and determine the likelihood for growth to occur within the study area. The second step was to identify and evaluate locations where changes to land use were likely to occur as a result of an indirect/induced impact under the Build and No-Build scenarios. The No-Build evaluation describes the future development scenario that would likely occur if the project was not built. The potential for development for the Build scenario was determined by evaluating the study

area, including a one-mile radius surrounding the proposed interchange locations as well as major feeder roads, for impacts using a set of characteristics that influence the propensity for land use change.

Recent transportation projects in the Greenville region have been constructed to improve congestion on existing facilities rather than to spur additional development. At this time, the area's development potential is dependent the availability of on water and sewer infrastructure. Until this infrastructure is in place, the density of the area will be limited to what can be supported by well and septic or community water. In fact, even without construction of the Greenville Southwest Bypass, it is anticipated that current growth and rural residential and agricultural development patterns for these areas will continue within the study area throughout the planning period as they currently have been. The areas with current high growth that would predict to remain that way are: US 264 and Stantonsburg Road, Southwest Vision Area, and the Winterville extraterritorial jurisdiction (ETJ). The areas with minor to low growth are: Ayden city limits and ETJ and unincorporated Pitt County.

The construction of the Greenville Bypass will improve overall mobility in the Greenville area by providing an additional transportation corridor which will subsequently reduce traffic volumes on the local street network and major radial routes. This project will provide residents in southern and western Greenville, Pitt County and Ayden and Winterville with direct access to US 264 and the Greenville employment center. In addition, the construction of the proposed project will provide improved accessibility to the fringes of the Greenville Urban Area. With the completion of the project more areas will have shorter commute times to Pitt County Memorial Hospital and other Greenville employment centers, thus enlarging the commuteshed.

With respect to estimating the indirect impacts associated with this project; the research, interviews, and analysis suggest that growth is already occurring and will continue to occur within the majority of the ICI Study Area with or without construction of the project. The summary of the Southwest Vision Area is a prime example of this fact. Growth as an indirect impact of the construction of the bypass will be governed through adherence to local zoning, subdivision, and comprehensive plans which will direct growth to appropriate areas and within acceptable densities. A recent review of zoning cases confirms that local staff and officials are utilizing their land development regulations and land use plans as a tool to deny requests that are not in character with the existing area or are in violation of commercial, residential, and non-residential designations.

It is anticipated that any indirect impacts that occur within the ICI Study Area would be in the form of complementary land development (such as highway-retail oriented businesses) surrounding the interchange locations, potential shifts of commercial development to more accessible and visible interchange locations, and residential and associated development along the major feeder roads serving the interchange locations. As the construction of the bypass has been anticipated since the early 1970s and has been programmed into land use plans and other local

regulations and local officials are targeting development for the major feeder roads in anticipation of the construction of the bypass, no further study or analysis is recommended at this time.

4.10.2.2 Potential for Cumulative Impacts

The construction of the Greenville Bypass and any resultant induced development and complementary land development coupled with the construction of the other transportation projects listed in the TIP and other private development projects could constitute a cumulative impact on the study area. However, it is anticipated that NPDES Phase I and II stormwater rules, enforcement of Pitt and Greenville Development Standards, zoning and subdivision regulations (including those in Ayden and Winterville), wetlands regulations, and adherence to the Pitt and Greenville Comprehensive Land Use Plans will support appropriate land development and in turn minimize any development-related impacts. It is possible that encroachment-alteration effects associated with the construction of the Greenville Southwest Bypass will affect notable features located within the study area, primarily vacant land and water resources. The impact to these features as a result of the Greenville Southwest Bypass coupled with the fact that approximately 4,000 dwelling units alone are scheduled to be built in the Southwest Vision Area (with or without the Bypass), will cumulatively impact the amount of vacant/agricultural lands, acreage of wetlands, and contribute to nutrient loading of local waterways. Impacts from the Greenville Southwest Bypass project will be minimized throughout the design process and construction by use of design exceptions and best management practices.

In conclusion, it should also be noted that the construction of the Greenville Southwest Bypass and the presence of interchanges locations at Forlines Road and US 13 will increase access and mobility through this portion of the County, thus increasing the potential for highway-related development such as convenience stores, gas stations, restaurants, and hotels. Additionally, given the already strong residential growth in the area, this project is unlikely to cause complete shifts in population to the project area, but will enhance a current trend.

4.10.3 Quantitative Indirect and Cumulative Impacts

In response to NCDWQ comments on the DEIS (see section 7.3.1) and in preparation for an Individual Section 401 Water Quality Certification, watershed modeling was conducted to quantify the potential indirect and cumulative impacts of the project on area water resources. The results of this analysis are documented in the *Indirect and Cumulative Impact Water Quality Study Report* (2007) prepared for the project. The purpose of the analysis was to determine potential increases in stormwater runoff and nonpoint source loads of nitrogen, phosphorus and sediment resulting from the future development scenario projected following construction of the project, as documented in the *Indirect and Cumulative Impact Analysis* (2006).

Predictions from the modeling analyses suggest that the significant development activity expected in the project area with or without the roadway will lead to increases in storm event runoff volume and nonpoint source pollutant loading. However, overall increases are expected to be fairly small due in part to the mitigative effect of existing and expected regulations governing the

jurisdictions (Neuse Nutrient Sensitive Water rules and NPDES Stormwater Phase II). Overall increases are expected to be slightly higher if the project is constructed, relative to the No-Build scenario, although predicted increases in pollutant loads to the two impaired streams in the study area, Swift Creek and Little Contentnea Creek, do not appear to be influenced significantly by the Bypass.

4.11 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Estimated environmental impacts and costs associated with each of the bypass alternates are summarized in Table 4-16.

TABLE 4-16: SUMMARY OF ENVIRONMENTAL IMPACTS

		Preferred Alternative	Bypass Alternate 1B-EXT	Bypass Alternate 4-EXT	Bypass Alternate 5-EXT
Length of Corridor	Length on New Location	11.0	10.7	11.0	10.8
	Length on Existing	2.2	2.2	2.2	2.2
	Total Length	13.2	12.9	13.2	13.0
Relocations	Residential	39	60	42	90
	Business	1	9	2	8
	Total Relocations	40	69	44	98
Minority Populations Impacted		None	None	None	None
Parks Impacted		0	0	0	0
Schools Impacted		0	0	0	0
Churches Impacted		0	0	0	0
Major Electric Power Lines Crossed		2	3	2	3
Railroad Crossings		1	1	1	1
Historic Sites with Adverse Effect		1	1	1	0
Archaeological Sites@		0	N/A	0	N/A
Streams	Stream Crossings	8	22	9	23
	Stream Impacts* (linear feet)	1,760	4,040	1,610	4,930
Riparian Buffer	Zone 1 (square feet)*	104,540	239,580	95,830	300,560
	Zone 2 (square feet)*	69,970	161,170	65,340	204,730
	Total Buffer Impacts (square feet)*	174,410	400,750	161,170	505,290
Wetlands (acres)^		0.1	0.5	0.1	1.5
Floodplains (acres)*		0	0	0	18.3
Federally Protected Species		None	None	None	None
Prime Farmland (acres)#		268.4	767.8	753.7	811.5
Hazardous Waste Sites		15	15	15	15
Noise Impacts	No. of properties impacted without mitigation	17	28	17	17
	No. of properties impacted with mitigation	7	15	7	7
Cost	Construction Cost	$149,700,000	$153,900,000	$157,400,000	$152,000,000
	Right of Way Cost	$ 33,372,420+	$25,309,050	$22,653,250	$35,769,620
	Total Cost	$ 183,072,420+	$179,209,050	$180,053,250	$187,769,620

Relocations are calculated on existing occupied buildings.
* Impacts calculated within slope stake limits
^ Impacts calculated within slope stake limits plus 10 feet for potential clearing impacts
# Total area with soils classified as prime farmland soils. This is distinct from the designation of prime farmland soils requiring mitigation for loss per NRCS criteria—no soils in the project area were classified with this designation.
+ The right-of-way cost estimate for the preferred alternative was prepared over a year later than the cost estimates shown for the Bypass Alternates. For this reason, the right-of-way and total cost estimates for the preferred alternative are relatively higher than they would be if the right-of-way cost estimate had been prepared concurrently with the estimates for the Bypass Alternates. Right-of-way and total cost estimates shown cannot be accurately compared between the preferred alternative and any of the Bypass Alternates.

[@] Archaeological field surveys were only conducted for the Corridor 4-EXT/ Preferred Alternative.