

## 4. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES



*Section 4 provides a summary of information presented in Section 1.3 of the Final EIS, including the affected environment. This section also contains, where indicated, clarification and updates such as changes in the existing environment, changes in guidance documents, or changes based on new information or additional studies conducted since the Final EIS was published (listed in Section P.4.5). Table P-1 summarizes changes in the affected environment or impacts since the Final EIS and notes the significance of any new impacts. The sections below follow the same order as presented in the Draft EIS and Final EIS.*

### 4.1 HUMAN ENVIRONMENT

This section summarizes the affected environment and environmental consequences described in Section 3.8 of the Draft EIS and Section 1.3.1 of the Final EIS, and includes general updates to the existing environment where indicated.

#### 4.1.1 SOCIO-ECONOMIC CHARACTERISTICS

The *Community Impact Assessment* (February 2009), the Draft EIS, and the Final EIS for the project used 1990 and 2000 Census data, along with other sources of demographic and economic data, as the basis for analysis. Since the Final EIS was published in May 2010, data from the 2010 Census has been released. The boundary of the Demographic Study Area has not changed, but some 2000 Census block groups in the Demographic Study Area were subdivided for the 2010 Census. For this Draft Supplemental Final EIS, social and economic characteristics described in the Draft EIS and Final EIS were updated where applicable based on updated population and economic data (including the 2010 census). Updated demographic characteristics are presented in greater detail in **Appendix D**, which includes the memo *Updated Census Tables for Monroe Connector/Bypass* (Atkins, October 2012).

**Population Growth.** During the period between 2000 and 2010, both Union and Mecklenburg counties and the Demographic Study Area experienced population growth. Union and Mecklenburg counties grew at rates (62.8 percent and 32.2 percent, respectively) higher than that of the state (18.5 percent). Population growth in the Demographic Study Area between 2000 and 2010 (49.3 percent) was consistent with the growth experienced between 1990 and 2000 (49 percent) that was presented in the Draft EIS and Final EIS. Areas of growth between 2000 and 2010 were also consistent with those presented in the Draft EIS (Figure 3-1) and Final EIS. As shown in **Figure 4-1**, the largest percent increases in population from 2000 to 2010 generally occurred in and around the communities of Stallings and Indian Trail in western Union County and near Matthews within Mecklenburg County. Areas with negative or low growth are located within and around Monroe and Marshville.

**Race and Ethnicity.** Whites, African Americans, and Hispanics were the three largest racial/ethnic groups within the Demographic Study Area in 2010 as well as in 2000. There was a slight decrease in the percentage of the African American population in the study area between 2000 and 2010, as well as an increase in the Hispanic population. Specifically, the African American percentage of the Demographic Study Area's population decreased from 16.2 percent to 15.6 percent between 2000 and 2010, while the Hispanic population increased from 8.8 percent to

14.3 percent. However, the general locations of these populations within the study area remain the same.

**Income.** As was the case in 2000, the median family incomes for Mecklenburg County (\$67,375) and Union County (\$71,538) as reported in the 2010 Census were higher than the state average (\$56,153). Generally, the lowest incomes in the Demographic Study Area are reported around Monroe and the highest incomes are reported in the western portion of Union County near Stallings and Hemby Bridge.

**Housing.** Based on a review the ACS 5-Year Estimates (2006-2010) for age of housing, 54 percent (23,475) of the homes in the Demographic Study Area have been built since 1990, including 28 percent (12,347) that have been built since 2000. Most of these newer homes have been built in the western portion of the Demographic Study Area (west of Rocky River Road).

**Employment.** The following information was obtained from the North Carolina Department of Commerce Division of Employment Security. In 2011, total employment in Mecklenburg and Union Counties was 550,568 and 52,119, respectively. The increase in total employment between 2000 and 2011 in Mecklenburg and Union Counties was 6.8 percent and 14.6 percent, respectively.

In 2000 and 2011, the sector that provided the highest number of jobs in Mecklenburg County was Trade, Transportation, and Utilities, although the percentage of jobs in that sector declined from 24.8 percent to 21.4 percent between 2000 and 2011. The Professional/Business sector provided the second highest number of jobs in both 2000 and 2011, with 21.4 percent and 20.7 percent of total employment, respectively. The Education and Health Services sector provided the third highest number of jobs in Mecklenburg County; and this sector saw a large increase in percentage of total employment between 2000 and 2011 (from 11.1 percent to 17.5 percent).

In 1990, the Manufacturing sector by far provided the highest percentage of jobs in Union County at 40.7 percent. In 2000, the Manufacturing sector still provided the highest percentage of jobs in Union County, but the percentage fell to 28.9 percent. By 2011, the percentage of jobs in Union County in the Manufacturing sector fell to 18.7 percent and dropped to third in terms of total employment. In 2011, Education and Health Services moved to the top in terms of total employment in Union County at 22 percent, a large increase over 13.3 percent in 2000. Trade, Transportation, and Utilities provided the second highest number of jobs in 2011, with 20.6 percent of total employment.

**Conclusion.** Overall, there have not been any significant changes in the demographic characteristics of the study area since the Final EIS. The minor changes described above are applicable to all DSAs and the Preferred Alternative. Therefore, the conclusions presented in Sections 1.3.1.1 and 2.5.1.1 of the Final EIS are still valid. The Monroe Connector/Bypass project would not serve a specific economic development purpose, but local planners believe that the project is vital to the economic well-being of Union County, and will assist in attracting more non-residential uses to Union County.

#### **4.1.2 COMMUNITY RESOURCES**

Community resources information is presented in Section 1.3.1.2 of the Final EIS. As described below, there have been no changes to neighborhoods in the project study area since the Final EIS. One additional community facility (a church) has been located in the Preferred Alternative project corridor, but it would not be impacted by the Preferred Alternative or any of the DSAs.

**Neighborhoods.** The project study area contains a number of named neighborhoods and other communities located within six municipalities and unincorporated areas of Union County and Mecklenburg County. Based on parcel data and field reviews, there are approximately 20 named neighborhoods within the DSA corridors, varying from small to large, and recent construction to older subdivisions. Figures 1-3a-c in the Final EIS show the general location of existing named neighborhoods in relation to the DSAs. Newer subdivisions within the DSAs include Fairhaven, Lake Park, Bonterra Village, Arbor Glen, Silverthorne, and Glencroft.

An estimated 12,347 housing units were constructed in the Demographic Study Area between 2000 and 2010. However, this new construction has not been occurring within the DSA corridors. Based on a review of parcel data available from Union County, no new neighborhoods have been platted or constructed within the DSA corridors since the Final EIS was published in May 2010. The annual number of building permits issued in Union County as a whole has notably decreased since 2006 (US Census Bureau Web site:

<http://censtats.census.gov/bldg/bldgprmt.shtml>). In 2011, only 692 building permits (all single family) were issued, compared to 3,953 in 2006. Based on the fact that no new neighborhoods have been constructed within the DSA corridors, no updates are required to the neighborhood information presented in Section 3.2 of the Draft EIS and Section 1.3.1.2 of the Final EIS, as summarized in the following paragraphs.

All DSAs would impact nine neighborhoods. The majority of these impacts would involve minor right-of-way encroachment and/or changes in access. Two neighborhoods, Acorn Woods and Poplin Farms, would experience the relocation of homes in the midst of their neighborhoods, regardless of which DSA is selected. DSAs C, D, C1, D1, C2, D2, C3, and D3 would involve relocations in three neighborhoods, while the remaining DSAs (A, B, A1, B1, A2, B2, A3, and B3) would require relocations in only two neighborhoods. None of the DSAs would result in the total displacement of a neighborhood.

As a result of design refinements to the Preferred Alternative, potential impacts to two neighborhoods (Suburban Estates and Windward Oaks) were eliminated and impacts to Bonterra Village were modified in response to the residents' request for revised access, as described in Section 2.5.1.2 of the Final EIS. Neighborhood impacts associated with the Preferred Alternative are presented in Table 2-5 of the Final EIS.

Generally, more neighborhood impacts would occur in the western portion of the Preferred Alternative between Stallings and Indian Trail. This area is more densely developed and suburban in nature than the eastern portion of the project. Community cohesion impacts may occur and could include the effects of neighborhood division, social isolation, changes in community character, and increased/decreased neighborhood or community access. The majority of the neighborhoods in the project study area have a suburban or agrarian visual character, which could be altered by the presence of a major toll facility.

**Community Resources.** Community resources located in the Monroe Connector/Bypass project study area and discussed in this section are shown on **Figures 4-2a-c**. Community facilities in the project study area near the DSAs include churches and cemeteries, schools and colleges, and parks and recreation areas. These resources provide basic needs and services to communities and neighborhoods in the area and are concentrated generally in the city and town centers. As expected, the number of community facilities decreases outward from the city and town centers.

Community resources information was obtained in part from the North Carolina Center for Geographic Information and Analysis, Union and Mecklenburg Counties' Geographic

Information System (GIS) Departments, ADC Map Books, and initial field reviews conducted in April and May 2008. A detailed analysis of community facilities is provided in the *Community Impact Assessment* (PBS&J, February 2009). For this document, GIS data and online mapping were reviewed in September 2012 and revealed only one additional community resource within the Preferred Alternative project corridor since the Final EIS, the Sardis Baptist Church, located at 3602 Unionville-Indian Trail Road West in Indian Trail. While the church is located within the project corridor, labeled as C2 on **Figure 4-2a**, it would not be impacted by the Preferred Alternative or any of the DSAs. In addition, one church identified in the Draft EIS has changed names; Morgan Mill Baptist Church is now Lee Park Baptist Church (labeled as C9 on **Figure 4-2b**).

Based on this review of updated data, the information and conclusions provided in Sections 3.2.3 and 3.2.4 of the Draft EIS and Section 1.3.1.2 of the Final EIS are still valid.

*Churches and Cemeteries.* All DSAs would impact three to five church properties, but no church buildings would be impacted. The Preferred Alternative impacts three church properties.

*Schools and Colleges.* Four schools are located within or immediately adjacent to the DSA corridors: Central Piedmont Community College (CPCC), Stallings Elementary School, Sardis Elementary School, and Forest Hills High School. All DSAs would temporarily impact school bus routes during construction, as well as result in modifications of existing routes and/or promote new bus routes. NCTA will coordinate with Charlotte Mecklenburg Schools and Union County Public Schools regarding minimizing impacts to school bus routes.

All DSAs would have a minimal indirect impact on Central Piedmont Community College (CPCC) through a change in access. Implementation of DSAs A, B, A1, B1, A2, B2, A3, or B3 also would require a small amount of right of way from the CPCC property in the southeast quadrant of the existing I-485/US 74 interchange to accommodate improvements to the interchange.

*Parks and Recreational Facilities.* There is one park and one recreation facility located within the DSAs. The Matthews Sportsplex is currently under construction and is located on a 160-acre property owned by Mecklenburg County in the southwest quadrant of the existing I-485/US 74 interchange. DSAs A, B, A1, B1, A2, B2, A3, and B3 would require approximately 2.25 acres from the Matthews Sportsplex. The minor encroachments on the edge of the parcel are not anticipated to impact access or any future use of the property for park purposes.

Carolina Courts, a private recreation facility, is a 44,000 square-foot facility located at 7210 Stinson Hartis Road, to the southwest of the proposed Indian Trail-Fairview Road interchange. The entire Carolina Courts property would be purchased and entitled to relocation benefits under DSAs that use Corridor Segment 2 (DSAs C, D (Preferred Alternative), C1, D1, C2, D2, C3, and D3). Based on a hardship situation, NCDOT purchased the Carolina Courts property in 2012 and is currently working with Carolina Courts to allow them time to have a new building constructed before moving out of the existing facility.

#### **4.1.3 LAND USE AND TRANSPORTATION PLANNING**

As described in Section 1.1.7 of the Final EIS, the Monroe Connector/Bypass project is included as a toll facility in the *MUMPO 2035 LRTP*, and is recognized as a regionally significant project. This is still the currently adopted LRTP.

Both the Monroe Connector (STIP Project R-3329) and Monroe Bypass (STIP Project R-2559) projects are included in the current *2012–2020 State Transportation Improvement Program*

(STIP) as multi-lane freeways on new location, as they were in the 2009-2015 STIP current at the time of the Final EIS.

Since the DSAs are generally on new location, direct land use changes from any of the DSAs would include converting the land needed for right of way from its existing use to transportation use. This land includes a wide variety of uses, such as industrial, commercial, residential, recreational, agricultural, and undeveloped. Land use plan updates and indirect land use impacts as a result of the Preferred Alternative are discussed in **Section 4.5**.

#### **4.1.4 RIGHT-OF-WAY ACQUISITION AND RELOCATIONS**

Potential residential and business relocation impacts within each of the DSAs are presented in Table 3-6 of the Draft EIS. The detailed *Relocation Reports* prepared by Carolina Land Acquisition (January 2009) are included in Appendix C of the Draft EIS. There have been no changes in the project corridor since the *Relocation Reports* were prepared that would require an update to the relocation impacts presented in the Draft EIS. There was no change in the number of relocations estimated for the Preferred Alternative between the Draft EIS and Final EIS. In addition, no new homes or businesses have been constructed in the Preferred Alternative corridor since the Final EIS.

Since the approval of the original ROD in August 2010 (rescinded July 2012), NCDOT has acquired three commercial properties, 22 residential properties, and one vacant parcel under hardship situations within the Preferred Alternative corridor. Requests for right-of-way acquisition for hardship situations are being considered on a case by case basis. If another alternative is selected for implementation, any properties purchased by NCDOT that are not needed could be resold.

#### **4.1.5 ENVIRONMENTAL JUSTICE**

As presented in Section 3.5 of the Draft EIS and summarized in Section 1.3.1.5 of the Final EIS, the Monroe Connector/Bypass project was evaluated for the potential for disproportionately high and adverse impacts on minority and low-income populations in two ways: 1) impacts that result from building and operating any new road (e.g., taking of land, noise impacts, air impacts, etc.) and 2) impacts that result specifically from tolling the proposed facility. The first category of impacts mainly involves people who are living in the immediate vicinity of the project. The second category involves people who are potential users of the road – a much broader geographic area.

The general locations of African American populations, Hispanic populations, and low-income populations based on the 2010 Census are shown in **Figures 4-3, 4-4, and 4-5**. The general locations of these populations have not changed notably from what was presented in the Draft EIS based on the 2000 Census (Figures 3-4, 3-5, and 3-6 of the Draft EIS), but there are six additional 2010 block groups within the Demographic Study Area with Hispanic percentages that exceed the county percentage by more than ten percentage points. However, there are not anticipated to be any new impacts to minority populations since no new homes or businesses have been constructed in the Preferred Alternative corridor since the Final EIS was published.

Based on information presented in Section 3.5 of the Draft EIS, the construction of any of the DSAs was determined not to have a disproportionately high and adverse impact on minority and low-income populations. The *Relocation Reports* (January 2009) estimate a low percentage of minorities would be relocated by the DSAs and that no disproportionate impacts to low-income households would occur. Based on an examination of the updated US Census information

presented in **Section 4.1.1** and **Appendix D** of this document, there have not been significant changes in the study area demographics that would change the conclusion presented in Section 2.5.1.5 of the Final EIS, which is that construction of the Preferred Alternative would not have a disproportionately high and adverse impact on minority and low income populations. The project would not deny, reduce, or delay receipt of project benefits to low-income or minority groups.

As stated in Section 1.3.1.5 of the Final EIS, one benefit of the project would be reduced traffic on existing alternate non-toll routes, including US 74. As shown in Section 5 of the *Year 2035 Build Traffic Operations Technical Memorandum* (PBS&J, February 2009), and summarized in Section 2.6.3.2 of the Draft EIS, existing US 74 would have fewer segments and intersections operating at an unacceptable level of service in 2035 if the project is constructed versus the No-Build Alternative. In addition, based on comparisons of annual average daily traffic (AADT) on US 74 between the 2035 No-Build<sup>1</sup> and the 2035 Build<sup>2</sup> scenarios, all but one of nine segments along US 74 would see a decrease in 2035 AADT under the Build scenario. Completing the project would benefit all motorists, including low-income motorists who may choose not to use the toll facility or may tend to use it less frequently. Therefore, impacts to low-income and/or minority populations resulting from implementing the Monroe Connector/Bypass as a toll facility are not anticipated to be disproportionately high and adverse.

#### **4.1.6 LIMITED ENGLISH PROFICIENCY**

Executive Order 13166 "Improving Access to Services for Persons with Limited English Proficiency" requires all recipients of federal funds to provide meaningful access to persons who are limited in their English proficiency. The US Department of Justice defines Limited English Proficiency (LEP) individuals as those "who do not speak English as their primary language and who have a limited ability to read, write, speak, or understand English" (67 FR 41459).

The Demographic Study Area meets the US Department of Justice's Safe Harbor threshold requirement for presence of an LEP population, as identified in guidance issued by the USDOT's *Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient Persons* (2005). This guidance defines the safe harbor threshold as either five percent of the total Demographic Study Area adult population or 1,000 adult persons within a particular language group who speak English less than "Very Well." Data was used from the ACS 5-Year Estimates (2006-2010) to identify adults aged 18 or older who speak English less than "Very Well" by language group. Results of the LEP analysis are presented in **Appendix D** and summarized below.

The ACS data indicate the presence of a Spanish language group that exceeds the Safe Harbor threshold. The Demographic Study Area includes approximately 5,600 Spanish-speaking adults that speak English less than "Very Well." Individual block groups with the highest percentages of Spanish-speaking adults that speak English less than "Very Well" are generally located in and around Monroe, generally south of the DSAs.

<sup>1</sup> 2035 No-Build volumes from HNTB's *NCDOT STIP Project R-3329 & R-2559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum* (March 2010)

<sup>2</sup> 2035 Build volumes from Wilbur Smith Associates' *Traffic Forecast for TIP Projects R-3329 & R-2559 Monroe Connector/Bypass* (September 2009)

Provisions have been made for Spanish-speaking people at past public meetings regarding the project. Specifically, an interpreter was provided at the first citizens informational workshop in 2007, but no requests for language assistance were received. At subsequent public workshops, NCDOT or consultant staff with the ability to speak Spanish were in attendance and could serve as interpreters if needed. In accordance with the Safe Harbor provisions, written translations of vital documents will be provided for the LEP language group (Spanish), if requested, in addition to other measures assuring meaningful access. These other measures include providing notice of citizens' Right to Language Access for all future meetings associated with this project, and use of interpreters when deemed warranted to assist with public participation.

## **4.2 PHYSICAL ENVIRONMENT**

### **4.2.1 NOISE**

Section 4.1 of the Draft EIS provides details of the noise analysis conducted for the DSAs (*Final Traffic Noise Technical Memorandum for Administrative Action Environmental Impact Statement Monroe Connector Bypass*, March 2009), referred to here as the *2009 Traffic Noise Technical Memorandum*.

Based upon the *2009 Traffic Noise Technical Memorandum*, the numbers of impacted receptors range from 108 impacted Category B receptors for DSA B2, to 130 impacted Category B receptors for DSA C1. Category B receptors in the project area are mostly residential (with some churches) and the impacts to Category B receptors are primarily substantial increase impacts. The numbers of Category C (business) impacts range from nine to eleven for DSAs that use DSA Segment 18A (DSAs A, B, A1, B1, A2, B2, A3, and B3) to 28 to 31 for DSAs that use DSA Segment 2 (DSAs C, D, C1, D1, C2, D2, C3, and D3). The higher numbers of business impacts for DSAs using DSA Segment 2 occur along existing US 74.

Impacted receptors are receptors expected to experience traffic noise impacts either by approaching or exceeding the FHWA Noise Abatement Criteria (NAC) for the applicable activity category, as listed in Table 4-1 in the Draft EIS, or by a substantial increase in exterior noise levels (as defined in NCDOT's Traffic Noise Abatement Policy). Impacted receptors do not include noise-sensitive receptors that would be relocated by the project.

Since the Final EIS was published, FHWA adopted new noise standards and NCDOT released an updated noise policy. The new standards revised the Activity Categories for the FHWA Noise Abatement Criteria, as shown in **Table 4-1**. However, for the activity categories present in the project study area, the activity criteria did not change. Category A uses stayed the same. Category B previously included a variety of noise-sensitive uses such as residences, recreation areas, playgrounds, parks, motels/hotels, schools, churches, libraries and hospitals, but now is only for residences. Category C used to include developed lands, properties or activities not included in Category A or B. Category C now includes the activities, excluding residential, that were previously in Category B. Category C uses are now Category E.

**TABLE 4-1: Noise Abatement Criteria**

Activity Category	Activity Criteria <sup>1</sup> L <sub>eq(h)</sub> <sup>2</sup>	Evaluation Location	Activity Description
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B <sup>3</sup>	67	Exterior	Residential
C <sup>3</sup>	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section4(f) sites, schools, television studios, trails, and trail crossings
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E <sup>3</sup>	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	Undeveloped lands that are not permitted

1. The L<sub>eq(h)</sub> Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
2. The equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with L<sub>eq(h)</sub> being the hourly value of L<sub>eq</sub>.
3. Includes undeveloped lands permitted for this activity category.

The new FHWA Noise Abatement Criteria activity categories do not change the numbers of impacted receptors reported in the Draft EIS. The impacted churches are now in Category C and the impacted businesses are in Category E. The impact criteria do not change for these uses.

In the Draft EIS, three locations were identified where noise barriers were preliminarily determined to be feasible and reasonable. The three preliminary noise barriers are listed in Table 4-6 of the Draft EIS, and shown in Figure 4-1a-c of the Draft EIS. Two of the preliminary noise barriers apply to all the DSAs. These are Barrier N4-1 for the Acorn Woods/Gold Hill neighborhoods and Barrier N7-2 for the Avondale Park neighborhood. Barrier N9-1 for the Glencroft neighborhood is recommended for DSAs A, B, C, D (Preferred Alternative), A1, B1, C1, and D1.

As described in Section 2.5.2.1 of the Final EIS, the noise analysis for the Preferred Alternative (DSA D) was updated in the Final EIS to incorporate design changes and updated traffic forecasts prepared since the Draft EIS was circulated. An addendum to the 2009 traffic noise study was prepared for the Preferred Alternative, titled *Addendum Traffic Noise Technical Memorandum for Administrative Action Environmental Impact Statement Monroe*

*Connector/Bypass* (January 2010), referred to here as the *2010 Traffic Noise Addendum*. The updated study reported that the Preferred Alternative would impact 124 Category B receptors (all residences) and 29 Category C receptors (businesses), based on the previous FHWA Noise Abatement Criteria Activity Categories. Compared to the results presented in Table 4-5 of the Draft EIS, two additional residences and one additional business were predicted to be impacted by future traffic noise from the Preferred Alternative. This is due to the design changes that reduced the right of way required at the Preferred Alternative's interchanges with Unionville-Indian Trail Road and Austin Chaney Road and left in place additional noise sensitive receptors near the proposed right of way.

The *2010 Traffic Noise Addendum* recommended the same three preliminary barriers for the Preferred Alternative as was recommended in the *2009 Traffic Noise Technical Memorandum*, except that Barrier N4-1 became longer and the number of benefited receptors increased from 16 to 26 receptors.

The original Date of Public Knowledge for the project, prior to the July 2012 rescission of the ROD, was the ROD's approval date of August 2010. The new Date of Public Knowledge will be after July 2011, and therefore will be after the date new FHWA noise standards became effective (July 13, 2011) and after the NCDOT's updated Traffic Noise Abatement Policy became effective (July 13, 2011). NCDOT also published a *Traffic Noise Analysis and Abatement Manual* (August 2011) to accompany the updated policy.

Because new standards, policy, and guidance manuals became effective (July 13, 2011) subsequent to the previous traffic noise studies (2009 and 2010), and because the Date of Public Knowledge will occur after the effective date of the new FHWA noise standards (July 13, 2011), a *Traffic Noise Analysis Update for the Monroe Connector/Bypass* was prepared for the Preferred Alternative (Atkins, November 2013) (referred to here as the *2013 Traffic Noise Analysis Update*). The updated noise analysis incorporates the new FHWA standards and NCDOT policy and the procedures included in the NCDOT *Traffic Noise Analysis and Abatement Manual*.

As shown in the *2013 Traffic Noise Analysis Update*, Build Condition year 2035 traffic volumes are predicted to impact 192 receptors in the vicinity of the proposed Preferred Alternative. This compares to 153 impacted receptors along the project under the Preferred Alternative identified in the *2010 Traffic Noise Addendum*, an increase of 39 receptors. The increase in number of impacted receptors is due to the use of a different truck percentage in the noise model. In previous studies, in accordance with the allowable procedures at the time, one-half the truck percentages from the traffic forecast were included in the model. The updated noise analysis includes the full truck percentages provided in the traffic forecast.

Consideration for noise abatement measures was given to all impacted receptors in the *2013 Traffic Noise Analysis Update*. Traffic noise abatement measures are preliminarily recommended as feasible and reasonable in five locations for the benefit of 144 receptors in the vicinity of the project, based on available information. Previous recommendations for noise barriers for the Preferred Alternative documented in the *2010 Traffic Noise Addendum* included three noise barriers as preliminarily reasonable and feasible, benefiting 61 receptors. **Table 4-2** is a summary of the recommended noise abatement measures. The locations of preliminary noise barriers are shown on **Figure 4-6a-c**.

**TABLE 4-2: Monroe Connector/Bypass Preferred Alternative Preliminary Recommended Noise Barriers<sup>1</sup>**

<b>Barrier Name<sup>1</sup></b>	<b>Barrier Description</b>	<b>Number of Impacted Receptors Benefited</b>	<b>Total Number of Benefits</b>
NW2C	Along the shoulder of WB Monroe Connector/Bypass near White Oak Lane and Strand Drive	22	28
NW4 (Previously Wall N4-1)	Along the shoulder of EB Monroe Connector/Bypass near Beverly Dr	34	25
NW7B (Previously Wall N7-1)	Along the shoulder of EB Monroe Connector/Bypass near Avondale neighborhood (Dusty Hollow Rd)	32	38
NW11 (Previously Wall N9-1)	Along the shoulder of WB Monroe Connector/Bypass near Glencroft Dr	21	38
NW12	Along the cut slope of EB Monroe Connector/Bypass near Phiifer Cir.	6	8
<b>TOTALS</b>		<b>102</b>	<b>144</b>

1. This assessment is based upon preliminary design and preliminary mapping and is a preliminary recommendation. It is subject to change based on final design and the public involvement process.

More noise barriers are preliminarily recommended as reasonable and feasible in the *2013 Traffic Noise Analysis Update* compared to previous studies due to changes in the way reasonableness is determined. Reasonableness is now calculated using a maximum allowable barrier area per benefited receptor (previous procedures used a maximum allowable cost per benefited receptor). In addition, common noise environments (often these are areas located between the same interchanges) are now used to consider abatement measures for noise-sensitive receptors of similar types.

While there are updates to the traffic noise impacts presented in the Final EIS, the traffic noise analysis results summarized in the *2013 Traffic Noise Analysis Update* do not represent significant new adverse impacts. Although the number of predicted noise impacted receptors increased from 153 to 192 (an increase of 39 impacted receptors) without noise barriers in place, the numbers of impacted receptors that would benefit from the preliminarily recommended noise barriers also increased from 61 impacted receptors benefitting to 102 impacted receptors benefitting. Overall, the total number of benefitted receptors increased from 61 receptors to 144 receptors. In addition, the same changes to procedures and standards would apply to all the Detailed Study Alternatives, and NCDOT expects that changes in results would be similar for all the Detailed Study Alternatives.

**4.2.2 AIR QUALITY**

The air quality assessment performed for the project was described in Section 4.2 of the Draft EIS. Air pollutants evaluated include those with a National Ambient Air Quality Standard (NAAQS), mobile source air toxics (MSAT), and potential construction-related air quality impacts. Section 1.3.2.2 of the Final EIS provides updates to transportation conformity and MSATs, and Section 2.5.2.2 of the Final EIS includes a discussion of climate change and greenhouse gas emissions.

Since the Final EIS, there have been updates to the NAAQS and transportation conformity, as discussed below.

**National Ambient Air Quality Standards and Existing Conditions.** The US Environmental Protection Agency (EPA) has established primary and secondary NAAQS for six criteria air pollutants: carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), lead (Pb), particulate matter (PM), and sulfur dioxide (SO<sub>2</sub>). **Table 4-3** lists the current NAAQS (EPA Web site: [www.epa.gov/air/criteria.html](http://www.epa.gov/air/criteria.html)). The primary standards are set at a limit intended to “protect the public health with an adequate margin of safety,” and the secondary standards are set at a limit intended to “protect the public welfare from known or anticipated adverse effects (effects to aesthetics, crops, architecture, etc.)” (Federal Clean Air Act 1990, Section 109; 42 USC 7409). The primary standards are established with a margin of safety, considering long-term exposures for the most sensitive groups in the general population (i.e., children, senior citizens, and people with breathing difficulties).

**TABLE 4-3: National Ambient Air Quality Standards**

Criteria Pollutant	Averaging Time	Standard	Standard Type	Form
Carbon Monoxide	8-hour	9 ppm	Primary	Not to be exceeded more than once per year
	1-hour	35 ppm		
Lead	Rolling 3-month Average	0.15 µg/m <sup>3</sup> <sup>(1)</sup>	Primary and Secondary	Not to be exceeded
Nitrogen Dioxide	1-hour	100 ppb	Primary	98 <sup>th</sup> percentile, averaged over 3 years
	Annual	53 ppb <sup>(2)</sup>	Primary and Secondary	Annual mean
Ozone	8-hour	0.075 ppm <sup>(3)</sup>	Primary and Secondary	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter <10 micrometers (PM10)	24-hour	150 µg/m <sup>3</sup>	Primary and Secondary	Not to be exceeded more than once per year on average over 3 years
Particulate Matter <2.5 micrometers (PM2.5)	Annual	12 µg/m <sup>3</sup>	Primary	Annual mean, averaged over 3 years
	Annual	15 µg/m <sup>3</sup>	Secondary	Annual mean, averaged over 3 years
	24-hour	35 µg/m <sup>3</sup>	Primary and Secondary	98 <sup>th</sup> percentile, averaged over 3 years
Sulfur Dioxide	1-hour	75 ppb <sup>(4)</sup>	Primary	99 <sup>th</sup> percentile of 1-hour daily maximum concentrations, averaged over 3 years
	3-hour	0.5 ppm	Secondary	Not to be exceeded more than once per year

Source: EPA Web site: [www.epa.gov/air/criteria.html](http://www.epa.gov/air/criteria.html), accessed April 1, 2013.

<sup>1</sup> Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m<sup>3</sup> as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

<sup>2</sup> The official level of the annual NO<sub>2</sub> standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

<sup>3</sup> Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard (“anti-backsliding”). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

<sup>4</sup> Final rule signed June 2, 2010. The 1971 annual and 24-hour SO<sub>2</sub> standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Comparing the NAAQS table below with the one in the Draft EIS (Table 4-8) that was referenced in the Final EIS, there have been some changes to the standards listed for lead, nitrogen dioxide, ozone, and sulfur dioxide. For lead, the quarterly average is no longer listed. For nitrogen dioxide, a 1-hour primary standard has been added. For ozone, the 1-hour average and the 1997

8-hour average are no longer listed. For sulfur dioxide, the annual arithmetic mean and the 24-hour average primary standards are no longer listed, and a 1-hour average primary standard has been added. None of these changes affect the analysis of air quality for the Monroe Connector/Bypass.

Pollutants that have a NAAQS are called criteria pollutants. An area that exceeds the NAAQS for one or more criteria pollutants is said to be in “non-attainment” of the NAAQS enforced under the Clean Air Act. The designation of an area is determined on a pollutant-by-pollutant basis. The EPA classifies areas as either in attainment or non-attainment. Non-attainment areas for ozone, carbon monoxide, and some particulate matter are further classified based upon the degree of exceedance(s) over the NAAQS (e.g., marginal, moderate, serious, severe, and extreme). Attainment areas are categorized as either “in attainment” or as a “maintenance area for attainment”, which means that the urban area has exceeded NAAQS levels for one or more pollutants in the past. Efforts in these maintenance areas must be made in order to maintain the status quo and not exceed the NAAQS (EPA Web site: [www.epa.gov/oar/oaqps/greenbk](http://www.epa.gov/oar/oaqps/greenbk)).

The Charlotte-Gastonia-Rock Hill air quality region remains in attainment for nitrogen dioxide, lead, particulate matter, and sulfur dioxide (EPA Web site: [www.epa.gov/oar/oaqps/greenbk](http://www.epa.gov/oar/oaqps/greenbk)). Additional detailed information regarding these criteria air pollutants can be found in the *Air Quality Technical Memorandum for the Monroe Connector Bypass* (PBS&J, February 2009). Similarly, the region was and is in maintenance for carbon monoxide and non-attainment for ozone, as described below.

*Carbon Monoxide.* Except for Mecklenburg County, all other areas within the Charlotte-Gastonia-Rock Hill air quality region are designated as attainment for carbon monoxide. Mecklenburg County is a maintenance area for carbon monoxide (EPA Web site: [www.epa.gov/oar/oaqps/greenbk](http://www.epa.gov/oar/oaqps/greenbk)).

*Ozone.* On June 15, 2004, the Charlotte-Gastonia-Rock Hill air quality region was designated as a moderate non-attainment area for the 1997 8-hour ozone NAAQS (EPA Web site: [www.epa.gov/oar/oaqps/greenbk](http://www.epa.gov/oar/oaqps/greenbk)). The region includes the following counties in North Carolina: Mecklenburg, Gaston, Lincoln, Cabarrus, Rowan, Union, and the southern portion of Iredell. The urbanized area of eastern York County, South Carolina, also is included.

Compliance with the 1997 ozone standard was required by June 15, 2010 unless the area qualified for an extension. On May 31, 2011, EPA took final action to extend the applicable attainment date for the region to June 15, 2011. On November 15, 2011, EPA made a determination of attainment for the region based on monitoring data for the 2008-2010 monitoring period. The final rule became effective on April 6, 2012 (*Federal Register*, Vol. 77, No. 45, March 7, 2012).

As published in the May 21, 2012, Federal Register (Volume 77, Number 98), the Charlotte-Rock Hill air quality region was designated a marginal non-attainment area for the 2008 8-hour ozone standard, with an effective date of July 20, 2012 (EPA Web site: [www.epa.gov/air/oaqps/greenbk/hindex.html](http://www.epa.gov/air/oaqps/greenbk/hindex.html)). The region includes all of Mecklenburg County and parts of Cabarrus, Gaston, Iredell, Lincoln, Rowan, and Union Counties in North Carolina, as well as part of York County in South Carolina.

**Transportation Conformity.** Section 176(c) of the Clean Air Act Amendments (42 USC 7506(c)) requires that transportation plans, programs, and projects conform to the intent of the State Implementation Plan (SIP). Conformity requirements apply to transportation plans,

programs, and projects funded or approved by the FHWA or the Federal Transit Administration (FTA) in areas that do not meet, or previously have not met, NAAQS for ozone, carbon monoxide, particulate matter, or nitrogen dioxide (*Fact Sheets on Highway Provisions*, FHWA Web site: [www.fhwa.dot.gov/safetealu/factsheets/conformity.htm](http://www.fhwa.dot.gov/safetealu/factsheets/conformity.htm)).

Under the transportation conformity regulations, a regional transportation conformity determination is required every time a Metropolitan Planning Organization (MPO) approves an update or amendment to its long range transportation plan (LRTP) and transportation improvement program (TIP).

In addition to the regional conformity determination for LRTPs and TIPs, FHWA also must make a project-level conformity determination. For all pollutants, a project-level conformity determination can be made only if the project is included in a conforming LRTP and TIP. In addition, for carbon monoxide (CO) and particulate matter (PM), a project-level conformity finding requires a localized conformity analysis, known as a “hot-spot” analysis.

For the Monroe Connector/Bypass project, transportation conformity determinations are required for two pollutants: ozone and carbon monoxide. The conformity requirements apply to these pollutants because the Metrolina region as a whole is designated as a nonattainment area for the 2008 8-hour ozone standard and Mecklenburg County is designated as a maintenance area for carbon monoxide.

**Regional Conformity Determinations for LRTPs.** As discussed in the Final EIS Section 2.5.2.2, MUMPO at that time had an approved LRTP with a horizon year of 2035, which was adopted on March 24, 2010. USDOT approved a conformity determination for this LRTP update on May 3, 2010. Since the Final EIS, there have been three amendments to the 2035 LRTP for MUMPO.

- Amendment 1 is dated July 20, 2011, with a FHWA/FTA conformity finding on December 19, 2011.
- Amendment 2 is dated June 20, 2012, with a FHWA/FTA conformity finding on July 6, 2012.
- Amendment 3, the latest conformity determination, is dated May 22, 2013, with a FHWA/FTA conformity finding on May 29, 2013.

The associated conformity determinations included the Monroe Connector/Bypass; therefore, the proposed project remains in a conforming LRTP.

CRTPPO is currently preparing a new air quality conformity analysis as part of the 2040 Metropolitan Transportation Plan (MTP), which will update the 2035 LRTP. FHWA approval is expected in May 2014.

**Regional Conformity Determinations for TIPs.** MUMPO currently has an approved TIP covering the years 2012 through 2018. The 2012–2018 TIP is a direct subset of the respective conforming 2035 LRTP. The FHWA and FTA approved a regional conformity determination for the MUMPO 2012-2018 TIP on December 19, 2011.<sup>3</sup> The current TIP is valid for four years. Therefore, an update to MUMPO’s 2009-2015 TIP is required by 2016. The latest conforming

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<sup>3</sup> The December 19, 2011 conformity determination for the Metrolina Region is titled: *Final Conformity Analysis and Determination Report for the Metrolina Area: Cabarrus-Rowan MPO, Mecklenburg-Union MPO, and Gaston Urban Area MPO 2012-2018 Transportation Improvement Program, 2035 Long Range Transportation Plan Amendments and Projects from the 2012-2018 State Transportation Improvement Program for the Donut Area Counties of Lincoln, Iredell, Gaston, and Union*

TIP includes the Monroe Connector/Bypass.

**Project-Level Conformity.** The DSAs for the project are generally consistent with the project descriptions (freeway) and project lengths (approximately 20 miles total) included in the LRTP.

As described in Section 4.2.5.1 of the Draft EIS, a localized hot-spot analysis for project-level conformity is not required. The requirements for carbon monoxide hot-spot analysis (codified at 40 DFR 93.116 and 93.123) were reviewed and a determination was made that the findings of the Draft EIS are still valid.

**Mobile Source Air Toxics.** FHWA issued new MSAT Guidance on December 6, 2012 (*Interim Guidance on Mobile Source Air Toxic Analysis in NEPA*). The Guidance states “All MSAT analysis beginning on or after December 20, 2012 should use the MOVES model. Any MSAT analysis initiated prior to that date may continue to operate under the previous guidance and utilize MOBILE6.2.” MSAT analysis for this project was completed in 2009 and did not require a quantitative analysis, and therefore need not be updated. Therefore, the MSAT analysis presented in Section 1.3.2.2 and Appendix E of the Final EIS is still valid.

### **4.2.3 FARMLAND**

Section 4.3 of the Draft EIS presents information on farmland soils in the project area. Section 1.3.2.3 of the Final EIS presents updated impacts to prime and important farmland soils within the DSAs based on soils surveys and lists of farmland soils for Union County and Mecklenburg County published by the NRCS on June 19, 2009 and April 29, 2009, respectively. The Final EIS also presents updated agricultural census information. All DSAs would involve the use of prime and statewide important farmland soils. As stated in the Final EIS Section 2.5.2.3, the Preferred Alternative right of way would impact 184 acres of prime farmland soils and 751 acres statewide important farmland soils.

Since the Final EIS was published, the NRCS published updated soils surveys and lists of farmland soils for Union County (July 26, 2012) and Mecklenburg County (July 6, 2012). Upon review of the updated surveys, it was determined that there are no changes to the designation of any soils located within the DSAs; therefore the farmland soils information presented in the Final EIS and the farmland conversion impact ratings presented in Section 4.3.4.2 of the Draft EIS are still valid. As stated in Section 2.5.2.3 of the Final EIS, the soils impacted by the Preferred Alternative do not meet the threshold for consideration of protection under the Farmland Protection Policy Act of 1981 (FPPA), and therefore no further coordination with the NRCS is required.

As stated in Section 4.3.3.2 of the Draft EIS, Union County has a voluntary farmland preservation program; however, there are no participating farm parcels located within the DSAs. This information was verified based on a review of Union County GIS data for Voluntary Agricultural Districts in June 2013 (<http://maps.co.union.nc.us>).

Based upon a review of updated information, there are no changes to the farmland impacts presented in the Final EIS.

**Farm Displacements.** As reported in Section 4.3.4.3 of the Draft EIS, the *Relocation Reports for the Monroe Connector/Bypass* (Carolina Land Acquisition, January 2009) note that all DSAs would include three farm displacements. Because much of eastern Union County is still rural, it is anticipated that there would be suitable replacement property available for farm relocation. There are no updates to this information as presented in the Draft EIS and referenced in the Final EIS.

#### **4.2.4 UTILITIES AND INFRASTRUCTURE**

As presented in Section 4.4 of the Draft EIS and Section 1.3.2.4 of the Final EIS, all DSAs, including the Preferred Alternative, have the potential to impact electric power, water and sewer facilities, natural gas, telecommunications, and railroads. For this document, utility information was verified and updated as appropriate through review of various Union County plans and reports, conversations with Union County Public Works staff, and internet research.

Since the Final EIS was published, Union County completed a *Comprehensive Water and Wastewater Master Plan* (Black & Veatch, December 2011), available from the Union County Department of Public Works. The plan includes an analysis of water and sewer demand and capacity through 2030 along with recommended improvements to meet demand. The recommendations focus on extending water transfer agreements with neighboring jurisdictions and purchasing additional capacity at existing wastewater treatment plants. This additional water and sewer information does not change the findings of the Draft EIS or Final EIS, which are that utility impacts can be addressed through coordination with utility providers during final design and construction so that no services are substantially disrupted.

#### **4.2.5 VISUAL RESOURCES**

Impacts to visual resources are presented in Section 4.5 of the Draft EIS and summarized in Section 1.3.2.5 of the Final EIS. Based on a windshield survey of the project study area, there have not been any notable changes to the visual character of the project study area. Therefore, the information on visual resources presented in the Draft EIS and Final EIS is still valid.

#### **4.2.6 HAZARDOUS MATERIALS**

Section 4.6 of the Draft EIS presents information on hazardous materials. This information is also summarized in Section 1.3.2.6 of the Final EIS. Based on the assessment presented in Section 4.6.2 of the Draft EIS, DSAs A, B, A1, B1, A2, B2, A3, and B3 would impact six to seven potentially contaminated sites, while DSAs C, D, C1, D1, C2, D2, C3, and D3 would impact 11 to 12 sites. Generally, the DSA corridor segments utilizing portions of US 74 had the highest numbers of potentially contaminated sites. All potential impacts were rates as “low” impact, meaning there would be little to no impacts to cost or schedule if the project would directly affect the site.

For the Final EIS, an updated hazardous materials evaluation was prepared by the NCDOT Geotechnical Engineering Unit for the Preferred Alternative in December 2009. As presented in Section 2.5.2.6 of the Final EIS, the Preferred Alternative corridor includes three sites with minor soil contamination, a fourth site with an estimated 70 cubic yards of petroleum contaminated soil, and a fifth site with an estimated 85-175 cubic yards of petroleum contaminated soil. All of these sites can be addressed during final design and construction. The NCDOT Geotechnical Engineering Unit reviewed the Preferred Alternative corridor in October 2012 and verified that no additional potentially contaminated sites are present beyond those identified in the Final EIS. Therefore, the evaluation of hazardous materials presented in the Final EIS is still valid.

#### **4.2.7 FLOODPLAINS AND FLOODWAYS**

Information on floodplains and floodways is presented in Section 4.7 of the Draft EIS. Updated information, including a correction to the number of floodway crossings, is presented in

Section 1.3.2.7 of the Final EIS. The Flood Insurance Rate Maps (FIRMs) developed for Union County in November 2008 and for Mecklenburg County in November 2009 were used to calculate impacts to floodplains and floodways in the Final EIS. These are still the most current FIRMs available according to the North Carolina Floodplain Mapping Program Web site ([www.ncfloodmaps.com/firm\\_indexes.htm](http://www.ncfloodmaps.com/firm_indexes.htm)); therefore, impacts to floodplains and floodways as presented in the Final EIS and summarized below are still valid.

The project study area includes nine named streams with defined floodplains; six of these streams also have defined floodways. As shown in Table 1-5 of the Final EIS, the number of floodplain crossings associated with the DSAs ranges from ten to fourteen, and the number of floodway crossings ranges from four to seven. The number of bridge crossings over streams ranges from five to nine and the number of major culverts or pipes (>72 inches in diameter) ranges from 33 to 38.

The Preferred Alternative would include six bridge crossings and 35 major culverts or pipes. There would be five floodway crossings and 11 floodplain crossings. All stream crossings would be perpendicular or near to perpendicular, which would minimize impacts to the associated floodplains. All bridges or culverts designed for the project will be sized to ensure that no increases to the extent and level of flood hazard risk will result from such encroachments. As included in Section 2.5.2.7 of the Final EIS, a floodplain finding was made in accordance with Executive Order 11988 that there is no other practicable alternative to reduce impacts to floodplains.

## **4.3 CULTURAL RESOURCES**

### **4.3.1 HISTORIC ARCHITECTURAL RESOURCES**

Information on historic architectural resources is presented in Section 5.2 of the Draft EIS and Section 1.3.3.1 of the Final EIS. Information on historic architectural resources in relation to the modified designs for the Preferred Alternative is provided in Section 2.5.3.1 of the Final EIS.

As reported in Section 2.5.3.1 of the Final EIS, the Preferred Alternative would not result in an Adverse Effect to a historic property on or eligible for listing on the National Register of Historic Places (NRHP). For this document, NCDOT historians determined there is no new information on historic resources for the Preferred Alternative, and the effects determinations are still valid.

### **4.3.2 ARCHAEOLOGICAL RESOURCES**

Information on archaeological resources is presented in Section 5.3 of the Draft EIS and Section 1.3.3.2 of the Final EIS, and summarized as follows. No NRHP eligible sites have been discovered by previous archaeological investigations and no currently recorded NRHP sites are located in or near the Monroe Bypass portion of the project study area (east of US 601). For the western (Monroe Connector) portion of the project study area (west of US 601), a field review was conducted in 2003. The study indicated a long history of erosion and soil disturbance in Union County and low probability that sites worthy of further investigation are located in the project study area.

As presented in Section 2.5.3.2 of the Final EIS, an additional archaeological assessment was prepared for the Preferred Alternative to identify archaeological resources that may be impacted. The Office of State Archaeology confirmed that an updated archaeological evaluation for the Monroe Bypass portion of the project was not required; therefore, an updated assessment was

prepared only for the Monroe Connector portion of the project between I-485 and US 601. Twenty archaeological sites were identified, all of which were determined not eligible for the NRHP. However, further work was recommended at the Hasty-Fowler-Secret Cemetery (Site 31UN351\*\*) where human remains were suspected to be present within the Area of Potential Effects (APE).

Since the Final EIS was published, based on the recommendations of the archaeological assessment, an intensive ground penetrating radar survey was conducted at the Hasty-Fowler-Secret Cemetery in May 2012, as documented in the *Ground Penetrating Radar Survey at the Hasty-Fowler-Secret Cemetery* (New South Associates, April 2013). According to the survey, there is no indication of possible burials outside the area with extant markers. As included in the project commitments, all possible burials identified in the survey will be treated as potential human graves and treated appropriately under North Carolina burial removal laws.

With the exception of the Hasty-Fowler-Secret Cemetery survey, NCDOT archaeologists determined there is no other new information on archaeological resources for the Preferred Alternative. Therefore, the finding that the project would have No Effect on archaeological resources on or eligible for listing on the NRHP is still valid.

### **4.3.3 SECTION 4(F) AND SECTION 6(F) RESOURCES**

Section 4(f) and Section 6(f) resources are afforded special considerations from federal actions. Section 4(f) resources include publicly-owned parks, recreation areas, and wildlife and waterfowl refuges as well as significant historic sites under public or private ownership. Section 6(f) resources include public recreation sites and facilities that have utilized funding through the Land and Water Conservation Fund Act.

As presented in Section 1.3.3.3 of the Final EIS, there is one Section 4(f) resource within the DSA corridors, the Matthews Sportsplex. There are no Section 6(f) resources. Section 2.5.3.3 of the Final EIS states that the Preferred Alternative would not impact any Section 4(f) or Section 6(f) resources. For this document, the DSA corridors were reviewed using GIS data and aerial imagery to identify any new potential Section 4(f) resources. The list of Land and Water Conservation Fund grants on the National Parks Service Web site was also reviewed to identify any new grants in the DSA corridors. No additional Section 4(f) or Section 6(f) resources were identified in the DSA corridors. Therefore, the finding reported in the Final EIS is still valid.

## **4.4 NATURAL RESOURCES**

### **4.4.1 SOILS, GEOLOGY, AND MINERAL RESOURCES**

Information about soils, geology, and mineral resources is presented in Section 6.1 of the Draft EIS and Section 1.3.4.1 of the Final EIS. Soil types within the DSA corridors are listed in Table 1-6 of the Final EIS. There are also several active and inactive mines in Union and Mecklenburg Counties. Soil limitations can be overcome through proper engineering design. It is expected that abandoned mine shafts can be accommodated in the design and construction of the roadway.

Since the Final EIS was published, the Natural Resource Conservation Service (NRCS) published updated soil surveys for Union County and Mecklenburg County on July 26, 2012 and July 6, 2012, respectively. However, the updated soil surveys do not include changes to any soils located within the DSA corridors; therefore, the soils and mineral resources information presented in the Final EIS is still valid for all DSAs, including the Preferred Alternative.

#### **4.4.2 WATER RESOURCES**

Water resources are discussed in Section 6.2 of the Draft EIS and Section 1.3.4.2 of the Final EIS. Since the Final EIS was published, the North Carolina Department of Environment and Natural Resources Division of Water Quality (NCDWQ) has updated the Section 303(d)-listed streams in the project study area. The Final EIS notes that Stewarts Creek was included in the Draft 2008 303(d) list. Stewarts Creek within the project study area is now listed on the 2012 Final North Carolina 303(d) list, along with the portions of North Fork Crooked Creek, South Fork Crooked Creek, and Richardson Creek within the project study area (NCDWQ Web site: <http://portal.ncdenr.org/web/wq/ps/mtu/assessment>).

There have also been updates to National Pollutant Discharge Elimination System (NPDES) permits for dischargers to streams in the project study area. Table 1-7 in the Final EIS identifies the eight permitted discharges into streams that run through the project study area. Since the Final EIS was published, there have been updates to the permitted flow for two of the NPDES permits (<http://portal.ncdenr.org/web/wq/swp/ps/npdes>). The permitted flow for the Monroe wastewater treatment plant increased from 1.9 million gallons per day (MGD) to 12.5 MGD and the permitted flow for the John Glen water treatment plant was reduced from not limited to 0.9 MGD.

For this document, the NCDWQ Web site was reviewed to verify the best usage classifications and water quality plans applicable to streams in the project study area. There have been no updates to the best-usage classifications of the named stream segments in the study area since the Final EIS was published. The basinwide water quality plans included in Section 6.2.2.4 of the Draft EIS are still up to date.

The updated water resources information presented above does not change the discussion of water resources impacts and mitigation discussed in Section 6.2.3 of the Draft EIS and Section 2.5.4.2 of the Final EIS. Therefore, the findings for the Preferred Alternative presented in Section 2.5.4.2 of the Final EIS, as well as the project commitments related to water resources presented in Table PC-1 of the Final EIS, remain valid.

#### **4.4.3 NATURAL COMMUNITIES AND WILDLIFE**

Natural communities include terrestrial (land-based) communities and aquatic communities, and their respective wildlife resources. Information on natural resources and wildlife is presented in the *Natural Resources Technical State Report for the Monroe Connector/Bypass* (ESI, December 2008) and summarized in Section 6.3 of the Draft EIS and Section 1.3.4.3 of the Final EIS. As described in Section 6.3.5 of the Draft EIS, terrestrial communities would be impacted permanently by project construction from clearing and paving. Table 6-3 of the Draft EIS provides the acreage of terrestrial communities by habitat type that would be impacted by each DSA. Table 2-10 of the Final EIS presents potential impacts to terrestrial communities from the Preferred Alternative.

Based on a review of 2012 aerial imagery compared to 2007 aerial imagery (the most recent available when the Draft EIS was developed), there is one area near the western end of the project, between Stinson-Hartis Road and Eaton Avenue, where trees were cleared and buildings (Carolina Courts) constructed within the proposed right of way for DSA Segment 2 after the natural communities field surveys were conducted. DSA Segment 2 is included in DSAs C, D (the Preferred Alternative), C1, D1, C2, D2, C3, and D3. The area within the proposed right of way where trees were cleared totals 3.9 acres that were classified as Mesic Mixed Hardwood Forest in the Draft EIS (Figure 6-1) and Final EIS that should now be classified as

Urban/Disturbed. **Table 4-4** is an updated version of Table 6.3 from the Draft EIS that reflects the change of 3.9 acres of Mesic Mixed Hardwood Forest to Urban/Disturbed within the proposed right of way for DSAs that include DSA Segment 2.

**TABLE 4-4: Potential Impacts to Terrestrial Communities by Detailed Study Alternative (updated Table 6.3 of the Draft EIS)**

DSA	Agriculturally Maintained (acres)	Basic Mesic Forest (Piedmont Subtype) (acres)	Mesic Mixed Hardwood Forest (Piedmont Subtype) (acres)	Piedmont/ Low Mountain Alluvial Forest (acres)	Pine Forest (acres)	Suc-cessional (acres)	Urban/ Disturbed (acres)	Open Water (acres)	Total (acres)
A	546	29	433	26	19	101	230	10	1,394
B	552	27	430	22	19	97	234	8	1,389
C	494	20	396	24	16	105	212	10	1,277
D	499	17	393	20	16	101	215	8	1,269
A1	608	25	360	21	10	88	237	10	1,359
B1	613	22	357	17	10	84	240	8	1,351
C1	555	15	323	19	6	92	219	10	1,239
D1	560	13	320	15	6	88	222	8	1,232
A2	561	29	439	27	19	101	232	10	1,418
B2	566	27	436	23	19	97	235	8	1,411
C2	509	20	402	25	16	105	213	10	1,300
D2	514	17	399	21	16	101	216	8	1,292
A3	622	25	366	22	10	88	238	10	1,381
B3	627	22	363	18	10	84	241	8	1,373
C3	570	15	329	20	6	92	220	10	1,262
D3	575	13	326	16	6	88	223	8	1,255

Source: Data in table was calculated using GIS with data from the *Jurisdictional and Community Impacts Technical Memorandum for the Monroe Connector/Bypass* (ESI, January 2009) and functional engineering designs.

NOTE: The acreages for DSAs containing DSA Segment 2 (DSAs C, D, C1, D1, C2, D2, C3, and D3) were updated to reflect the conversion of 3.9 acres of Mesic Mixed Hardwood Forest to Urban/Disturbed following publication of the Final EIS.

As shown in the table, the conversion of the forested area causes a small reduction (four acres) in the acreage of forested land to be impacted by eight of the 16 DSAs, including the Preferred Alternative (DSA D), and therefore would not result in any increase in impacts to natural communities as reported in the Final EIS.

All of the DSAs, including the Preferred Alternative, would have direct impacts on terrestrial communities and the animals that inhabit them. Destruction of natural communities along the Preferred Alternative right of way would result in the loss of foraging and breeding habitats for the various animal species that inhabit the area. Habitat fragmentation also is expected to occur under the No-Build Alternative due to projected continued growth in population and development in Union County.

Aquatic communities in the DSAs include both intermittent and perennial streams, as well as still-water ponds. The locations of these resources within the Preferred Alternative corridor have been verified by jurisdictional determinations from NCDWQ and the USACE, as described in **Section 4.4.4**. These determinations are valid until October 1, 2015, and therefore the locations of aquatic communities and potential impacts to these communities as reported in the Final EIS are still valid and no updates are required at this time. Potential impacts to aquatic communities discussed in the Final EIS include fluctuations in water temperature as a result of

the loss of riparian (forest) vegetation, and temporary and permanent impacts to aquatic organisms as a result of increased sedimentation. Impacts to aquatic communities and wildlife from erosion and sedimentation will be minimized through implementation of a stringent erosion-control schedule and the use of Best Management Practices (BMPs), as discussed in Section 2.5.4.2 of the Final EIS.

Updated information regarding indirect and cumulative impacts to natural communities and wildlife is presented in the *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013) and **Section 4.5** of this document.

#### **4.4.4 WATER RESOURCES IN FEDERAL JURISDICTION**

Jurisdictional resources are discussed in Section 6.4 of the Draft EIS and Section 1.3.4.4 of the Final EIS. Project construction for any of the DSAs cannot be accomplished without infringing on surface waters, including streams, wetlands, and ponds. Streams may be bridged, filled, relocated, or placed in a culvert by project construction. Wetlands may be either partially or completely filled. In some instances, larger wetland areas may become hydraulically disconnected from an adjacent stream.

Table 1-8 in the Final EIS presents the amount of streams, wetlands, and ponds estimated to be impacted by each DSA. The impacts were calculated using the functional design estimated construction limits plus 40 feet, in accordance with NCDOT procedures, and take into account avoidance and minimization measures that have been incorporated into the project, including the bridging of streams and wetlands. Based on the functional designs prepared for all the DSAs, DSA A2 would have the greatest intermittent stream impacts (totaling 13,374 linear feet), and DSA A3 would have the greatest perennial stream impacts (12,383 linear feet). DSA D1 would have the least intermittent stream impacts (11,121 linear feet), and DSA D (Preferred Alternative) would have the least perennial stream impacts (9,794 linear feet). DSA C would have the most wetland impact (11.0 acres), and DSA D3 would have the least impact (6.6 acres).

Table 2-11 in the Final EIS presents the impacts to water resources for the Preferred Alternative based on the refined functional design's estimated construction limits plus 40 feet. There have been no changes to the refined functional design for the Preferred Alternative; therefore, the estimated impacts to jurisdictional resources presented in Table 2-11 of the Final EIS are still valid. These impacts include 12,729 linear feet of intermittent streams, 10,353 linear feet of perennial streams, 3.1 acres of ponds, and 8.1 acres of wetlands.

Based upon field reviews conducted by NCDOT, USACE and NCDWQ on May 26 and 27 and June 9 of 2010, jurisdictional determination forms were received from NCDWQ on August 5, 2010, and from the USACE on October 1, 2010. These forms confirm the locations of jurisdictional resources within the Preferred Alternative corridor. In accordance with Section 404 of the Clean Water Act, these determinations can be relied upon for a period up to five years (in this case, October 1, 2015).

Mitigation would be required for the anticipated impacts to Waters of the US, and will be provided through the in-lieu fee program of the NCDENR Ecosystem Enhancement Program (EEP). A conceptual mitigation plan for the Preferred Alternative that includes the EEP has been prepared, and is described in Section 2.5.4.4 of the Final EIS. Following issuance of the Record of Decision in August 2010 (since rescinded), the USACE issued a Section 404 permit for the project on April 15, 2011. Due to the appellate court decision (See **Section P.4.5**), the USACE suspended the Section 404 permit on May 21, 2012, and NCDWQ withdrew the Section 401 permit on June 8, 2012. As a result of the extended preparation time for this Draft

Supplemental Final EIS, the USACE decided on April 17, 2013 to revoke the Section 404 permit until a new Record of Decision is issued and updated information is submitted in a new application. A copy of the permit revocation letter is included in **Appendix C**.

#### **4.4.5 PROTECTED SPECIES**

Information on protected species is presented in Section 6.5 of the Draft EIS and Section 1.3.4.5 of the Final EIS, and is based on the analysis documented in the *Natural Resources State Technical Report for the Monroe Connector/Bypass* (ESI, December 2008). The US Fish and Wildlife Service (USFWS) lists four species under federal protection that are considered to have ranges extending into Union County and/or Mecklenburg County (USFWS Web site: [http://www.fws.gov/raleigh/species/cntylist/nc\\_counties.html](http://www.fws.gov/raleigh/species/cntylist/nc_counties.html)). These species are listed in Table 1-9 in the Final EIS, along with the bald eagle, which has been delisted but is still federally-protected by the Bald and Golden Eagle Protection Act. As reported in Section 6.5.4 of the Draft EIS and Section 1.3.4.5 of the Final EIS, a biological conclusion of No Effect was determined for Michaux's sumac, smooth coneflower, and bald eagle. A biological conclusion of May Affect, Not Likely to Adversely Affect was determined for Schweinitz's sunflower, and a biological conclusion of Unresolved was determined for the Carolina heelsplitter and its designated critical habitat.

Following publication of the Draft EIS, a Biological Assessment was prepared to evaluate protected species that may be impacted by the Preferred Alternative. The *Biological Assessment for the Monroe Connector-Bypass Project (R-3329/R-2559)* (The Catena Group, May 2010) examined impacts to endangered plant species and freshwater mussels. A summary of the Biological Assessment is presented in Section 2.5.4.5 of the Final EIS. The USFWS concurred with the following biological conclusions, as presented in the Biological Assessment, on July 29, 2010:

- Michaux's sumac – No Effect
- Smooth coneflower – No Effect
- Schweinitz's sunflower – May Affect/Not Likely to Adversely Affect
- Carolina heelsplitter – May Affect/Not Likely to Adversely Affect
- Carolina heelsplitter Designated Critical Habitat – May Affect/Not Likely to Adversely Affect

A copy of the USFWS concurrence letter is included in **Appendix C**. Conservation measures were proposed in the Biological Assessment and accepted by USFWS to further ensure a conservative approach to the analysis of the project's impacts on the Carolina heelsplitter. These measures included funding continued operation of US Geological Survey stream gauge on Goose Creek for five years and providing funding to the Carolina Heelsplitter Conservation Bank in the Flat Creek watershed in Lancaster County, South Carolina in the amount of \$150,000 to support ongoing research and surveying efforts, as well as protect, manage, and monitor land in the conservation bank. These conservation measures have been implemented.

In September 2012, additional surveys were performed in the project area for Schweinitz's sunflower (*Helianthus schweinitzii*), Michaux's sumac (*Rhus michauxii*), and Georgia aster (*Symphotrichum georgianum* or *Aster georgianus*) to update the findings of the Biological Assessment. Additional surveys were not conducted for smooth coneflower because it is not listed as potentially occurring in Union County. It is listed as potentially occurring in Mecklenburg County, but the Preferred Alternative corridor only extends slightly into

Mecklenburg County and there is no potential for impacts. Georgia aster is currently listed as a candidate species in both Union and Mecklenburg Counties, but the species may be elevated in the future and therefore was included in the surveys.

Surveys were performed visually using systematic overlapping transects to cover all suitable habitat areas. As stated in a project memorandum to file dated October 1, 2012, no plants of any of the three species were found. Therefore, the biological conclusions for Schweinitz's sunflower and Michaux's sumac as reported in the Final EIS and Biological Assessment are still valid. It is anticipated these conclusions would be the same for other DSAs. NCDOT and FHWA will coordinate with USFWS to monitor the status of the potential listing of Georgia Aster (*Symphytotrichum georgianum*) and Savannah Lilliput (*Toxolasma pullus*) throughout construction.

Updated field surveys of the Carolina heelsplitter population in the critical habitat portion of Goose Creek, from the Rocky River confluence to the NC 218 crossing, were conducted in 2011 as part of a Biological Assessment for an NCDOT bridge replacement project (Project B-5109). These surveys located a total of twelve live individuals, and one fresh dead shell. The majority of the individuals were estimated to be less than 5 years of age based on shell condition and growth rests, indicating relatively recent reproduction. These twelve live individuals were the most that have ever been recorded in Goose Creek in one year. From 1993 to 2010, the combined total of live individuals found was only nineteen. Repeated survey efforts in Duck Creek in 2011 and 2012 have not located any live individuals.

In October 2012, additional freshwater mussel surveys were performed in the project area. As documented in the *Freshwater Mussel Survey Report Update* (The Catena Group, May 2013), streams identified during the 2009 surveys that contained robust freshwater mussel populations (South Fork Crooked Creek, Stewarts Creek, and portions of Crooked Creek and Richardson Creek) were re-evaluated in 2012 since these streams could potentially support the federally endangered Carolina heelsplitter (*Lasmigona decorata*). As was the case in 2009, the Carolina heelsplitter was not found in any of the surveyed streams. Therefore, the biological conclusions for this species and its critical habitat as reported in the Final EIS and Biological Assessment are still valid.

In addition to August 2011 letters requesting additional information or clarifications of project information, USFWS on December 20, 2012, sent a letter to NCDOT recommending re-initiation of consultation under Section 7 of the Endangered Species Act, among other comments. Copies of these letters are provided in **Appendix C-2**. FHWA and NCDOT met with USFWS representatives on July 10, 2013 to discuss the results of the draft quantitative ICE update (meeting minutes are provided in **Appendix C-2**).

On August 28, 2013, NCDOT and FHWA submitted a *Draft Technical Report on Direct, Indirect, and Cumulative Impacts to Federally Listed Species* (Michael Baker Engineering, Inc., August 2013). In response to USFWS comments provided on September 30, 2013, NCDOT submitted a letter to USFWS on October 23, 2013 requesting re-initiation of Section 7 informal consultation for the project, along with a new *Biological Assessment* (The Catena Group, October 2013) and a revised *Draft Technical Report on Direct, Indirect, and Cumulative Impacts to Federally Listed Species* (Michael Baker Engineering, Inc., October 2013). These documents are included in **Appendix C-2**. The *Draft Technical Report* considers the additional surveys and analysis conducted after the Final EIS, including the updated field surveys described above and the *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013) summarized in **Section 4.5**. The following findings are presented in the *Draft*

*Technical Report on Direct, Indirect, and Cumulative Impacts to Federally Listed Species*  
(Michael Baker Engineering, Inc., October 2013):

- Updated field surveys for protected plants and the Carolina heelsplitter within the project area found no new populations, thus there is no change in the anticipated direct effects of the project.
- For the Schweinitz's sunflower, findings indicate that for the Future Land Use Study Area (FLUSA) under the 2030 Build Scenario, there is a four percent greater decrease in land exhibiting habitat characteristics that might support the species as compared to the change predicted under the 2030 No-Build Scenario.
- For the Carolina heelsplitter and Carolina heelsplitter critical habitat, since there are no predicted changes in land use within the Sixmile Creek and Goose Creek watersheds from the 2030 No-Build to the 2030 Build Scenario, there are no indirect or cumulative land use impacts. There are also no differences in the impervious surface levels or percent impervious cover between the 2030 Build and 2030 No-Build Scenarios for the two watersheds.

The biological conclusions presented in the October 2013 *Biological Assessment* are the same as those presented in the original May 2010 *Biological Assessment*. NCDOT and FHWA are currently working with USFWS to reach concurrence on the biological conclusions presented in the new (October 2013) *Biological Assessment*. USFWS consultation will be complete prior to issuance of the Combined Final Supplemental Final EIS/ROD.

## **4.5 INDIRECT AND CUMULATIVE EFFECTS**

The following is a summary of the *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013). The document is included in its entirety in **Appendix E-1** and selected supporting documentation referenced in the document is provided in **Appendix E-2**.

**Background.** The FHWA rescinded its Record of Decision (ROD) for the project on July 3, 2012. This action was in response to the decision of the United States Court of Appeals for the Fourth Circuit to vacate the United States District Court decision in *NC Wildlife Federation v NCDOT* and remand the decision for further review and analysis by the agencies.<sup>4</sup>

Since that time, the NCDOT and the FHWA have conducted additional research, investigation and analysis on the potential indirect and cumulative effects on land use and water quality in the project area. The NCDOT and the FHWA developed the *Indirect and Cumulative Effects Quantitative Analysis Update* (Michael Baker Engineering, Inc., November 2013) to update the quantitative indirect and cumulative effects analysis for land use (Quantitative ICE) for the Monroe Connector/Bypass project and to determine whether the quantitative indirect and cumulative effects water quality analysis included in the Final EIS as Appendix H remains appropriate.

### **4.5.1 METHODOLOGY**

The scope of the work for the update of the Quantitative ICE generally included the following activities:

<sup>4</sup> NC Wildlife Federation v NC DOT, US Court of Appeals for the 4<sup>th</sup> Circuit, May 3, 2012, p 15

1. Review conditions and trends in the study area and update baseline land use data,
2. Review the regional travel demand model socioeconomic projections, developed for MUMPO, including how other studies have used the projections, and determine the most appropriate data set for the ICE analysis of future land use,
3. Develop the future No-Build and Build land use scenarios and thoroughly explain the methods used to estimate induced growth,
4. Report revised induced growth results and conclusions based on the updated land use scenarios, and
5. Review measures that localities and others could adopt to minimize any impacts of future development, whether induced or not, on sensitive environmental resources.

The Quantitative ICE update summarizes the conclusions reached in the evaluation of ICE and describes the data collected, methodologies used and analysis conducted for the ICE for the project. The update also re-evaluates and considers data and analytical research relevant to the project area, and new information relevant to the analysis of the indirect and cumulative effect on land use, water quality, and federally designated threatened and endangered species and their critical habitat in the surrounding area. Since the Carolina heelsplitter (federally protected freshwater mussel) lives in two watersheds in the study area, water quality is a major focus area of the updated analysis. Thus, results are reported for both the overall study area and at the watershed level.

**How Was the Study Area Land Use Data Updated?** In reviewing conditions in the study area, the study team analyzed the following:

- Conducted new interviews with local planners
- Incorporated the 2010 Census and reviewed and analyzed growth trends and conditions in the study area
- Identified and incorporated new, reasonably foreseeable proposed or approved development activity
- Reviewed new planning documents (such as new land use plans and new capital improvement plans) and identified differences in future growth plans and related infrastructure.

The additional research found some changes in existing land uses and some updates to future expectations of land use change and development. Overall, the evidence strongly indicates that Union County has a history of relatively fast growth and continues to exhibit factors that would continue to encourage growth rates that exceed the regional average regardless of whether the proposed project is completed.

**How Was Existing Land Use Modeled for this Study?** Existing land use was modeled using a combination of parcel level GIS data from Mecklenburg and Union Counties, raster (image) format GIS data describing undeveloped land cover and a cross check against aerial imagery. These sources were combined to model the land uses in the study area in a land cover raster image. Given the age of various data sources available, the most recent date to which the existing land use could be reasonably updated is 2010.

**How Was Future Growth Estimated?** Several different agencies and organizations forecast or project growth in North Carolina to the county level. Federal law requires every MPO to estimate the long-term travel needs of their respective regions in their Metropolitan

Transportation Plans (MTP). Most MPOs must also assess the air quality impacts of their MTPs for compliance with the Clean Air Act. Thus, MPOs develop future demographic projections (including employment and households) for small geographic units called traffic analysis zones (TAZs). These projections typically consider projections from other state and federal agencies and private organizations. As noted above, the Quantitative ICE analysis requires a data source that enables future projection of land use at a detailed geographic level. Since the MPO's projection process and future projections have been determined to be acceptable for complying with the Clean Air Act and other federal regulations, which includes a public review process, they were considered the best available and reasonable source for estimating future growth in the context of the ICE analysis for this project. Furthermore, as described below, an in-depth review was conducted of the MPO projection process, the data origins and assumptions, and as necessary, assumptions were tested regarding the Monroe Connector/Bypass in order to fully understand the appropriate use of the data.

#### **4.5.2 HOW WERE THE MPO SOCIOECONOMIC PROJECTIONS DEVELOPED?**

MUMPO developed its latest projections in 2009 for use in its most recent (2035) Long-Range Transportation Plan (LRTP). These projections were developed using a spreadsheet workbook based model called a Land Use Allocation Model (LUSAM). The LUSAM model relied, in turn, on previous projections developed in 2005 by MUMPO and its regional partners at other surrounding MPOs and Rural Planning Organizations (RPOs). Those projections supported the 2030 LRTP.

The 2005 Projections (which were used in the 2030 LRTP) were developed through a process with three main components, a Top-Down projection, a Bottom-Up projection and input from an advisory group on the final projections. The development of the TAZ-level projections relied first on the Top-Down process to project future growth at the regional level and then allocate the regional growth to the county level. Dr. Thomas Hammer conducted the Top-Down analysis and his report, *Demographic and Economic Forecasts for the Charlotte Region*, documents his methodology and results. Dr. Hammer used a highly detailed, employment and earnings based model to estimate regional growth and then allocated that growth to counties based on detailed statistical relationships based on his research into 227 other counties in 29 other metropolitan areas across the eastern US.

A subsequent Bottom-Up process allocated the county-level growth to the TAZ level within each county. Different parts of the Metrolina region used different approaches to the Bottom-Up process, but for the MUMPO area, which included most of Union County, a process prepared by Paul Smith of UNC-Charlotte provided the initial allocation. Mr. Smith's report *Mecklenburg-Union Metropolitan Planning Organization Population Projections and Employment Allocations, 2000-2030* documents his methodology and results. Mr. Smith's process focused on the household (and by default population) allocation and the allocation of population-chasing employment. Population-chasing employment is that employment associated with retail and services that tend to follow population growth. Non-population-chasing employment was distributed solely based on the input of staff and expert panel participants. Mr. Smith's allocation process started with the county-level control totals developed in the Top-Down process, existing baseline data (2000), and the influence of the land development factors chosen and ranked by expert panels. Within Union County, there were eight land development factors used to assess the attractiveness and capacity of each TAZ in the county to draw future growth. As was the case with the Top-Down projections, the Bottom-Up steps used input from local planners and jurisdictional representatives to review and refine the projections prior to adoption.

**Review of Metrolina Socioeconomic Projection Versions.** The study team reviewed and analyzed the Metrolina Regional Model (MRM) Socioeconomic Projections and assessed them for use in the ICE analysis. The review included an assessment of the following factors:

1. Review of the various socioeconomic projection versions developed by the MPO and the assumptions upon which they rely
2. Analysis of the specific methodology used with the Travel Time to Employment factor in the allocation of growth within Union County
3. Re-evaluation of the Travel Time to Employment factor where the Monroe Connector/Bypass was removed from the analysis
4. Assessment of other studies that have used or analyzed the MPO projections and the conclusions they have drawn about those projections and from those projections.

From 2003 to 2009, the Charlotte Department of Transportation (CDOT), the official custodian of the MRM, in cooperation with MUMPO and other MPOs and Rural Planning Organizations (RPOs) in the region, developed various socioeconomic projections to input into the MRM in support of the MPO LRTP development. **Table 4-5** summarizes these various projections and shows a timeline of the development of these projections.

The 2009 Projections were used for the Quantitative ICE analysis because MUMPO used this data set with its most recent transportation planning approvals and the June 2013 update of its LRTP. Although MUMPO is currently working on a new set of socioeconomic projections to support its 2040 LRTP, those projections are not anticipated to be complete or fully approved nor accepted for transportation conformity purposes until May 2014 and therefore would be inappropriate to use in the analysis.

**TABLE 4-5: MRM Socioeconomic Projections Versions**

Projections Name	TAZ File Name	Projections Completed	Use for LRTP Conformity Determination	Associated Model Version	Base and Horizon Years
2009 Projections	SE_Year_091028	October 2009	MUMPO 2035 LRTP	MRM 09 v1.0 MRM 11 v1.0 MRM 11 v1.1	Base: 2005 Horizon: 2015, 2025, 2035
2008 Interim Projections	SE_Year_081119_MUMPO_interim	November 2008		None	Base: 2005 Horizon: 2015, 2025, 2035
2008 Projections	SE_Year_081024	October 2008	RFATS 2035 LRTP	MRM 08 v1.0	Base: 2005 Horizon: 2015, 2025, 2035
2005 Projections	SE_Year_taz2934	May 2005	MUMPO 2030 LRTP	MRM 05 v1.0 MRM 06 v1.0 MRM 06 v1.1	Base: 2000 Horizon: 2010, 2020, 2030

The 2009 Projections used a spreadsheet workbook modeling process (called the Land Use Allocation Model or LUSAM) that included a number of variables. A detailed analysis of those factors showed that none of the factors used to develop the projections were affected by the proposed project. In particular, the study team worked with CDOT and Paul Smith to reanalyze the Travel Time to Employment Factor used in the Bottom Up allocation process of the 2005 Projections which were used for the 2030 LRTP and which substantially provided the basis for the 2009 Projections. When Mr. Smith ran his original land use allocation models in 2004, his roadway network for his Travel Time to Employment Factor included the proposed project.

When Mr. Smith reran his allocation models in July 2012 without the proposed project in his roadway network for that factor, the results were exactly the same as the original results.

#### **4.5.2.1 Did the Monroe Connector/Bypass Influence the MPO Projections?**

A detailed assessment of the MRM socioeconomic projections reveals the following regarding the influence of the Monroe Connector/Bypass on the 2009 Projections:

- The proposed project did not affect the Travel Time to Core Employment factor in the LUSAM process, as this factor had zero weight for all districts for all LUSAM runs.
- The proposed project did not affect the Planners' Judgment factor in the LUSAM process, as this factor had zero weight for all districts in Union County for all LUSAM runs.
- The proposed project was included in the Travel Time to Employment factor used by Paul Smith in developing the 2005 Projections, but a reassessment of that factor without the proposed project (as discussed in Section 3.2 of the Quantitative ICE update) shows that the project had no influence on the projection results.
- The proposed project did not affect Dr. Hammer's projections of households and employment that were used in the 2005 Projections for county level control totals and were used in the 2008 Interim and 2009 Projections for developing the district level targets.
- There is no evidence or indication that any other factor in the LUSAM process or the other projection processes was influenced by the proposed project, and communications with CDOT and Union County planning staff indicate that the proposed project was not a consideration in development of the projections.
- A review of the distribution of projected households and employment relative to the proposed project location shows no signs that the proposed project influenced the projections.

The analysis shows that the various models used to develop the MRM socioeconomic projections are insensitive to the presence or absence of the proposed project. It was determined the methodology used by CDOT and MUMPO to develop the socioeconomic projections is effectively insensitive to any potential induced land use effects associated with the Monroe Connector/Bypass. Dr. Hammer states that he made specific adjustments to his projections for two large roadway projects (NC 16 in Lincoln County and the Garden Parkway) but not the Monroe Connector/Bypass in the Top-Down process that was used to develop total population and employment estimates. As the sensitivity analysis of Paul Smith's Travel Time to Employment Factor showed, the proposed project made no difference in the Bottom-Up allocation process. If the ICE analysis were to follow the exact same methodology used by MUMPO to calculate induced growth impacts of the Monroe Connector/Bypass then the result would be to find no induced growth, since the methodology would be blind to the accessibility impacts of the project. Therefore, other methodologies were used to estimate potential induced growth and induced land use changes associated with the proposed project, as summarized below in **Section 4.5.3**.

#### **4.5.2.2 Are There Other Information Sources that Agree with the Assessment of the MPO Forecasts?**

The NCTA hired Wilbur Smith Associates (WSA) to conduct a preliminary and then final comprehensive traffic and revenue study for the proposed project. WSA, in consultation with NCTA, hired the Kenan Institute of Private Enterprise at the University of North Carolina's Kenan-Flagler Business School (Kenan Institute) in 2009 to develop a set of TAZ-level socioeconomic projections specifically for the project's Comprehensive Traffic and Revenue Study. The Kenan Institute reviewed the 2008 Interim Projections and made two adjustments to MUMPO's socioeconomic estimates. "The first was to make region-wide adjustments consistent with the national growth expectations (the 2008 economic adjustment). The second was to reallocate growth in Union County in line with development factors and constraints."<sup>5</sup>

Looking within the project corridor, the Kenan Institute accepted the allocation of growth by the MPO in Mecklenburg County. However, it reallocated the projected population growth within Union County away from the line of high growth in the southwest quadrant of the county to the Monroe Connector/Bypass corridor because of the project. The Kenan Institute also reallocated a portion of the expansion in several high growth TAZs in the northeastern quadrant of the county towards the corridor. The Kenan Institute made these adjustments based on results of interviews with local planners, analysis of growth trends in the area, and analysis of water and sewer demand and capacity in the area. Our analysis of the Kenan Institute adjustments to MUMPO's projections showed that the Kenan Institute reallocated about 1,800 households or about 3 percent of Union County growth towards the project corridor. Further analysis of the Kenan Institute adjustments to 2008 Interim Projections showed that the reallocation of growth was similar to the growth patterns in the Draft EIS Qualitative ICE.

#### **4.5.2.3 How Did the Quantitative ICE Use the MPO Projections?**

The preceding analysis of the MPO socioeconomic projections leads to the conclusion that, if MUMPO's land use models were used to evaluate future changes between the No-Build and Build scenarios, there would be no difference between the two. The conclusions of the Qualitative ICE and research into local expectations suggest that it is unlikely that there would be absolutely no difference in land use development conditions in the study area between a No-Build and Build Scenario. Therefore, an induced growth analysis was conducted to account for the potential environmental impacts of these potential land use changes. In the analysis of potential induced land use changes, the MPO socioeconomic projections were used as control totals along with local land use plans and other regulations, to develop a scenario without the project (hereafter referred to as the No-Build Scenario). Potential induced growth and induced land use changes associated with the proposed project were estimated and that estimated induced growth was added to the No-Build land use scenario to create a new scenario that represents future conditions with the project and its growth-inducing impacts (i.e. the Build Scenario). This methodology was originally developed in consultation with the resource agencies and did not reallocate growth within the FLUSA, and is thus considered conservative in nature in that it might overestimate cumulative impacts since we did not reallocate growth between the No-Build and Build scenarios.

A reallocation approach might have resulted in shifting growth eastward in the study area by taking expected growth from the areas of northwestern and central Union County and shifting it

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<sup>5</sup> Kenan Institute Report p 29

eastward toward Wingate. This approach might have been reasonable as areas of eastern Union County will be relatively more accessible under a Build Scenario due to reduced travel times and therefore some growth that would have occurred in northwestern or central Union County under a No-Build Scenario would instead occur in eastern Union County. To err on the side of overestimating cumulative impacts, an additive approach was used where growth was added, over and above the No-Build Scenario, to create the Build Scenario without reallocation.

### **4.5.3 HOW WAS INDUCED GROWTH ESTIMATED?**

The No-Build Scenario was developed using local zoning and land use plans to determine the total build-out capacity of the study area and then using the MPO projections as a control total (total population and total employment for the study area) for determining how much of that capacity would actually develop by 2030.

The Build Scenario was developed using a combination of the four analytical techniques.

1. A scenario writing approach was used to identify areas most likely to see induced growth based on planning information and interviews.
2. A build-out analysis was conducted to see which areas had the most capacity for induced growth.
3. An accessibility analysis was completed to see which areas would most benefit from the proposed project and thus be most likely to see induced growth.
4. A Hartgen Analysis was used to estimate potential commercial growth at interchange areas.

These methods were combined to estimate the likely induced development within the FLUSA and this induced development was then added to the No-Build Scenario to create a Build Scenario. The accessibility analysis used to help determine land use effects associated with the project was based on the assumption of a “free” high-speed roadway. Since NCDOT intends to implement the project as a toll road or “priced” facility, it is possible that our results will represent a high range or conservative estimate of effects. A logical conclusion is that a toll captures some of the value that drivers’ gain in shorter travel times and therefore the accessibility improvements of new, tolled facilities are less likely to encourage induced land use changes than a free facility might. Nevertheless, there is insufficient research on induced land use changes associated with tolled facilities to estimate how much tolling would reduce potential induced land use changes. Therefore, the estimates were not adjusted to account for that factor.

In the research conducted for the ICE, two noteworthy proposals surfaced that the study team specifically considered for how those proposals might need to be addressed in the future land use scenarios. The study team investigated the proposed industrial park in eastern Union County, called Legacy Park. Based on interviews with Union County officials, CSX staff and researchers familiar with the proposal, the study team determined that the proposal was not reasonably foreseeable at this time and did not include any portion of the proposal in any future land use scenario. Additionally, the study team reviewed the draft *US 74 Revitalization Study* (HNTB, June 2013) and its recommendations for their potential impact to future land use scenarios. Since the study is still draft and has not been adopted, and since the land use and other recommendations would result in minimal changes to the land use scenario results, the study team determined it was not reasonably foreseeable to incorporate the draft plan recommendations into any future land use scenario.

**4.5.4 WHAT ARE THE RESULTS OF THE UPDATED ICE ANALYSIS?**

The following section outlines the updated results from the three updated scenarios, the 2010 Existing (Baseline), the 2030 No-Build, and the 2030 Build scenario. As with any attempt to project the future, the accuracy of these results for future years is problematic as the typical error range for long-range forecasting of households and employment is upward of 25 percent. Thus, one should interpret the future year results as the best estimate within a wide range of potential error. **Table 4-6** shows the results of all updated land use scenarios. **Figure 4-7** illustrates the updated 2010 Baseline Land Use. **Figure 4-8** illustrates the results of the updated No-Build Scenario. **Figure 4-9** illustrates the results of the updated Build Scenario.

**TABLE 4-6: Updated Land Use Scenario Results**

Land Use	Updated Baseline (2010)		Updated 2030 No-Build			Updated 2030 Build		
	Total Area (acres)	% of Total Area	Total Area (acres)	% of Total Area	Change in % from Baseline	Total Area (acres)	% of Total Area	Change in % from No-Build
Total Residential	71,500	35%	97,900	48%	13%	99,700	49%	1%
<i>Low Density</i>	55,600	28%	79,500	40%	12%	80,600	40%	0%
<i>Medium Density</i>	12,900	6%	14,900	7%	1%	15,600	8%	1%
<i>High Density</i>	3,100	2%	3,500	2%	0%	3,500	2%	0%
Commercial	3,900	2%	5,600	3%	1%	5,900	3%	0%
Industrial/Office/Institutional	7,100	4%	8,700	4%	1%	8,800	4%	0%
Transportation	12,700	6%	12,800	6%	0%	13,900	7%	1%
<b>Total Developed</b>	<b>95,200</b>	<b>47%</b>	<b>125,000</b>	<b>62%</b>	<b>15%</b>	<b>128,200</b>	<b>63%</b>	<b>2%</b>
<b>Total Agricultural</b>	<b>52,900</b>	<b>26%</b>	<b>37,500</b>	<b>19%</b>	<b>-8%</b>	<b>35,500</b>	<b>18%</b>	<b>-1%</b>
<b>Total Forested</b>	<b>51,900</b>	<b>26%</b>	<b>37,700</b>	<b>19%</b>	<b>-7%</b>	<b>36,500</b>	<b>18%</b>	<b>-1%</b>
<b>Total Other</b>	<b>1,900</b>	<b>1%</b>	<b>1,800</b>	<b>1%</b>	<b>0%</b>	<b>1,800</b>	<b>1%</b>	<b>0%</b>
<b>TOTAL</b>	<b>202,000</b>	<b>100%</b>	<b>202,000</b>	<b>100%</b>	<b>0%</b>	<b>202,000</b>	<b>100%</b>	<b>0%</b>

Notes: Results have been rounded to the nearest 100 acres and whole percent. Differences were calculated prior to rounding. Totals may appear not to equal the sum of the parts because of rounding.

Impervious surface was calculated based on the Natural Resource Conservation Service (NRCS) (formerly the Soil Conservation Service) TR-55 Manual guidance for impervious surface levels by land use category. Impervious surface results were compared to the results of the prior Quantitative ICE analysis to determine whether additional water quality modeling might be needed. Given how similar the updated results are, there appears to be little need for additional water quality modeling. The results for the Baseline, No-Build and Build Scenarios compared to the prior results are shown in **Table 4-7**.

**TABLE 4-7: Percent Impervious Cover Results from 2010 Report Compared to 2013 Report**

Watershed Name	Impervious Cover Results from 2010 Report				Impervious Cover Results from 2013 Report				Difference in Change in Build from No-Build between 2010 Report and 2013 Report
	2007 Baseline	2030 No-Build	2030 Build	Change in Build from No-Build	2010 Baseline Updated	2030 No-Build Updated	2030 Build Updated	Change in Build from No-Build	
Study Area	18%	22%	22%	0%	18%	22%	23%	1%	1%
Beaverdam Creek	6%	7%	7%	0%	6%	7%	7%	0%	0%
Richardson Creek (Upper)	14%	18%	18%	0%	14%	18%	18%	0%	0%
Rays Fork	12%	16%	17%	1%	12%	16%	17%	1%	0%
Bearskin Creek	24%	31%	31%	0%	24%	31%	31%	0%	0%
Richardson Creek (Middle)	23%	27%	29%	2%	23%	27%	30%	3%	1%
Gourdvine Creek	6%	8%	8%	0%	6%	8%	8%	0%	0%
Salem Creek	9%	13%	14%	1%	9%	13%	16%	3%	2%
Sixmile Creek	25%	30%	30%	0%	26%	31%	31%	0%	0%
Twelvemile Creek	22%	25%	25%	0%	22%	25%	25%	0%	0%
Richardson Creek (Lower)	10%	15%	16%	1%	10%	15%	17%	2%	1%
Stewarts Creek	15%	20%	22%	2%	15%	21%	23%	2%	0%
Fourmile Creek	32%	34%	34%	0%	32%	35%	35%	0%	0%
Crooked Creek	21%	25%	27%	2%	22%	26%	28%	2%	0%
Goose Creek	13%	17%	17%	0%	13%	18%	18%	0%	0%
Irvins Creek	35%	37%	37%	0%	35%	38%	38%	0%	0%
McAlpine Creek	36%	37%	37%	0%	36%	38%	38%	0%	0%
Bakers Branch	6%	8%	8%	0%	5%	8%	8%	0%	0%
Wide Mouth Branch	10%	12%	12%	0%	10%	12%	12%	0%	0%

Notes: Results have been rounded to the nearest one whole percent. Differences were calculated prior to rounding. Totals may appear not to equal the sum of the parts because of rounding.

### 4.5.5 WHAT ARE THE IMPACTS ASSOCIATED WITH THE RESULTS OF THE ANALYSIS?

The following sections summarize indirect impacts to land use and impervious surface; cumulative impacts to water quality, endangered species, land use and farmland, and wildlife habitat; indirect and cumulative impacts to traffic; and consistency with local plans.

#### 4.5.5.1 Indirect Impacts to Land Use and Impervious Surface

**Land Use Impacts.** All changes in land use within the entire study area from the Baseline to the Build Scenario are within two percent (i.e., between negative one percent and one percent) of the change that is predicted for the 2030 No-Build Scenario. Additional development (including direct and indirect effects) estimated to occur under the 2030 Build Scenario totals approximately 3,400 acres more, or about 2 percent more than the total development expected under the 2030 No-Build Scenario. The indirect land use effects are modest, totaling about 2,300 acres of additional development, an increase of less than 2 percent over the No-Build Scenario and an increase in development of about 1 percent of the total land area within the study area.

Incremental effects to agricultural and forested lands are a reduction of 2,000 and 1,200 acres, respectively, as a result of the additional developed land. The 2030 No-Build Scenario shows a 29 percent reduction in agricultural land compared to the 2010 Baseline, whereas the 2030 build Scenario shows a 33 percent reduction. The 2030 No-Build Scenario shows a 27 percent

reduction in forested land compared to the 2010 Baseline, whereas the 2030 Build Scenario shows a 30 percent reduction. For both forested and agricultural land uses, the decrease equals a change of less than one percent of total land. Overall, while there are sizeable reductions in agricultural and forested lands, the indirect impacts are small and the cumulative impacts are minimal and the small additional loss does not create a substantial overall impact. It is likely that some portion of the household increase would shift within the study area and the remainder would shift from elsewhere in the greater metropolitan area. However, in an effort to estimate the environmental impacts for each watershed without underestimating them, no portion of this induced household growth has been subtracted from elsewhere in the study area.

**Impervious Surface Impacts.** Findings show the incremental effect of the 2030 Build Scenario will be a one percent increase in impervious surface throughout the study area as compared to the change predicted for the 2030 No-Build Scenario. This results in approximately 2,000 additional acres of impervious surface. With the 2030 Build Scenario, increases in percent impervious surface as compared to the change predicted for the 2030 No-Build are found in six of the 18 watersheds in the study area. These increases are between one and three percent. There is no difference in impervious surface resulting from direct or indirect effects in the Goose Creek or Sixmile Creek watersheds between the 2030 No-Build and 2030 Build Scenarios.

#### **4.5.5.2 Cumulative Impacts to Water Quality**

As stated above, there are small differences in impervious surfaces associated with seven of the 18 watersheds in the study area. It is not anticipated that these minor changes would alter the results of the previous water quality Quantitative ICE, as they are within the standard error of such analyses. For this reason, additional water quality modeling is not required.

#### **4.5.5.3 Cumulative Impacts to Endangered Species**

The Carolina heelsplitter is found only in the Goose Creek and Sixmile Creek watersheds. No measurable differences in impervious surface were found between the 2030 No-Build and 2030 Build Scenarios within the Goose Creek or Sixmile Creek watersheds. Therefore, no indirect effects are anticipated on the Carolina heelsplitter associated with the Monroe Connector/Bypass project. As there are no indirect effects anticipated, cumulative effects to the Carolina heelsplitter are extremely unlikely, though cannot be unquestionably discounted. Potential direct effects are not anticipated, as addressed in the Biological Assessment for the species (**Appendix C-2**).

For the 2030 Build Scenario, findings indicate a four percent greater decrease of land exhibiting habitat characteristics that might support the Schweinitz's sunflower as compared to the change predicted for the 2030 No-Build Scenario based on results of this study. These reductions are likely an overestimate as the land categories included do not constitute actual habitat for the species and there will remain substantial areas available for species habitat under both the No-Build and Build Scenarios. Therefore, no ICEs to the sunflower are expected. The Biological Assessment provides more detail on direct and potential indirect and cumulative impacts.

#### **4.5.5.4 Cumulative Impacts to Land Use and Farmland**

The 2030 Build Scenario is predicted to have one percent additional conversion of land to development as compared to the conversion predicted with the No-Build Scenario. The composition of the development is different between the Build and the No-Build Scenarios. With the 2030 Build Scenario, there is more Low Density and Medium Density Residential, Commercial, and Industrial/Office/Institutional growth. The 2030 Build Scenario is predicted to

convert 2,100 additional acres of agricultural land to low density residential or other developed uses. This represents one percent greater conversion than that predicted with the No-Build Scenario for farmlands in the study area. While the raw decrease in farmland acreages seems sizeable, the vast majority of farmland loss will occur with or without the project. Therefore, the modest additional loss caused by the project does not constitute a cumulative effect.

#### **4.5.5.5 Cumulative Impacts to Wildlife Habitat**

**Total Habitat Impacts.** The 2030 Build Scenario is predicted to convert approximately three percent more undeveloped vegetated land in the study area as compared to that predicted for the No-Build Scenario. These conversions are mostly concentrated in Salem Creek and Richardson Creek – Lower, with some lesser amounts scattered among Richardson Creek – Middle, Stewarts Creek and Crooked Creek. The incremental losses represent a maximum of 9 to 12 percent additional loss relative to the Baseline conditions for the three most affected watersheds.

**Forest Fragmentation Impacts.** The forest fragmentation analysis indicates that indirect impacts will be modest but that cumulative effects may be more substantial. Nevertheless, most of the cumulative effects are likely to occur with or without the proposed project.

#### **4.5.5.6 Indirect and Cumulative Impacts to Traffic**

Traffic levels with and without the induced land use impacts of the Monroe Connector/Bypass were calculated to test the order-of-magnitude impact of induced land use on travel and congestion. Overall, these forecasted traffic levels indicate that the growth-induced impacts of the proposed project will add to the total volume of traffic in Union County and to the total vehicle miles traveled (VMT) and vehicle hours traveled (VHT) within the county, but the overall regional change in VMT is just one percent. Roads that connect to the Monroe Connector/Bypass will likely see some increases in traffic. Overall, however, the increases in traffic are modest and would not likely create substantial congestion issues within the design year of the project. In addition, relative to a No-Build Scenario, 2030 traffic on US 74 would decrease by approximately 20 percent relative to the No-Build Scenario with the induced growth and travel taken into account.

#### **4.5.5.7 Consistency with Local Plans**

Overall, the projected induced growth is consistent with local plans as most jurisdictions in the eastern portions of the study area, which are likely to see the greatest induced growth, have recently developed planning documents or economic plans that anticipate the proposed project.

### **4.5.6 HOW CAN INDIRECT AND CUMULATIVE IMPACTS BE MINIMIZED OR AVOIDED?**

Cumulative effects occur because of decisions made not just by NCDOT and FHWA, but also by other local, state and federal entities as well as private institutions and citizens. Separating, quantifying and minimizing and possibly avoiding the environmental effects from individual contributors continues to prove challenging and would require collaboration and coordination among the local governments within the study area along with the efforts of FHWA and NCDOT and other agencies.

First, one should note that the assumptions used in the methodology of this report and the reports summarized herein were generally designed to overestimate impacts to sensitive resources and water quality. Thus, the actual impacts in the future may be less than estimated

here, as current and future regulations may prove more effective in reducing impacts from development than past regulations.

Nevertheless, cities, counties, towns and developers could do more to limit development impacts to water quality and other sensitive environmental resources. In an effort to promote the use of “nature friendly” growth management strategies, the North Carolina Wildlife Resources Commission (NCWRC) developed the Green Growth Toolbox.<sup>6</sup> The handbook for the toolbox document provides a background on green growth practices, offers tips on green planning, sample land use zoning ordinances, and provides examples of green growth projects. As discussed in Section 6, practices included in the Toolbox could reduce overall cumulative effects for development throughout North Carolina. The “Green Growth Toolbox” and low-impact development (LID) techniques offer valuable tools for local governments and NCDOT to use for reducing cumulative effects to resources within the study area.

## **4.6 OTHER IMPACTS**

### **4.6.1 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES**

The following information is reproduced from Section 8.1 of the Draft EIS and Section 1.3.6.1 of the Final EIS. There have been no updates to this information.

Implementation of any of the DSAs would involve a commitment of a range of natural, physical, human, and fiscal resources. Land used for the construction of the proposed facility is considered an irreversible commitment during the time period that the land is used for a 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.

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. However, they are not in short supply and their use will not have an adverse effect upon continued availability of these resources. Any construction also would require a substantial one-time expenditure of both state and federal funds, which are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area, region, and state will benefit from the improved quality of the transportation system. These benefits will consist of improved accessibility and connectivity, savings in time, and greater availability of quality services which are anticipated to outweigh the commitment of these resources.

### **4.6.2 RELATIONSHIP BETWEEN SHORT-TERM AND LONG-TERM IMPACTS**

The following information is reproduced from Section 1.3.6.2 of the Final EIS. The date of the STIP has been updated from 2009-2015 to 2012-2018.

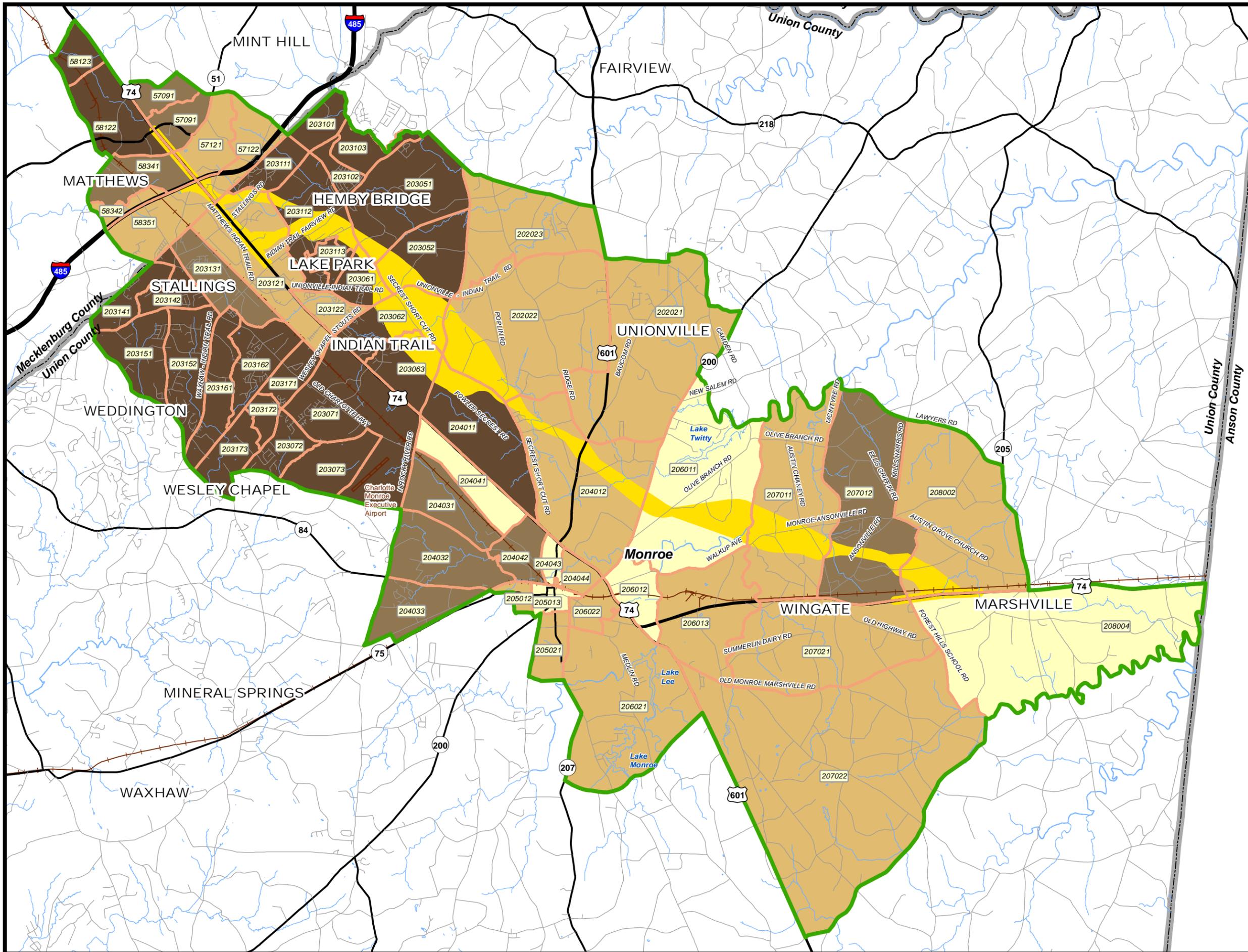
The most disruptive short-term impacts associated with the proposed project would occur during land acquisition and project construction. However, these short-term uses of human, physical,

<sup>6</sup> NCWRC, 2012. <http://www.ncwildlife.org/Conserving/Programs/GreenGrowthToolbox.aspx>

socioeconomic, cultural, and natural resources would contribute to the long-term productivity of the project study area.

The short-term local impacts and use of resources by implementation of any of the DSAs would be consistent with the maintenance and enhancement of long-term productivity. Construction of the proposed Monroe Connector/Bypass would add a vital link to the long range transportation system for the region. The project is consistent with the long range transportation goals and objectives of the NCDOT *2012-2018 STIP* and the MUMPO *2035 LRTP*. It is anticipated that the roadway would enhance long-term access and connectivity opportunities in Union County and Mecklenburg County, and would support local, regional, and statewide commitments to transportation improvement and economic viability.

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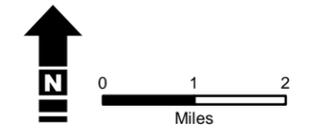
- Legend**
- 2010 Population Growth by Census Block Group
    - < 0
    - 0 - 24.99%
    - 25 - 49.99%
    - 50% or above
  - 2010 Block Groups
  - Demographic Study Area
  - Corridor Study Area
  - Interstate Highway
  - US Highway
  - NC State Highway
  - Major Road
  - Railroad
  - River / Stream
  - County Boundary
  - xxxxxx Census Block Group ID Number

**Note:** 207021 Symbolizes Census Tract 207.02 Block Group 1.



Mecklenburg and Union Counties  
North Carolina Counties

Source: U.S. Bureau of the Census, Census 2010Tiger/Line Data from ESRI. Map Printed May 2013.

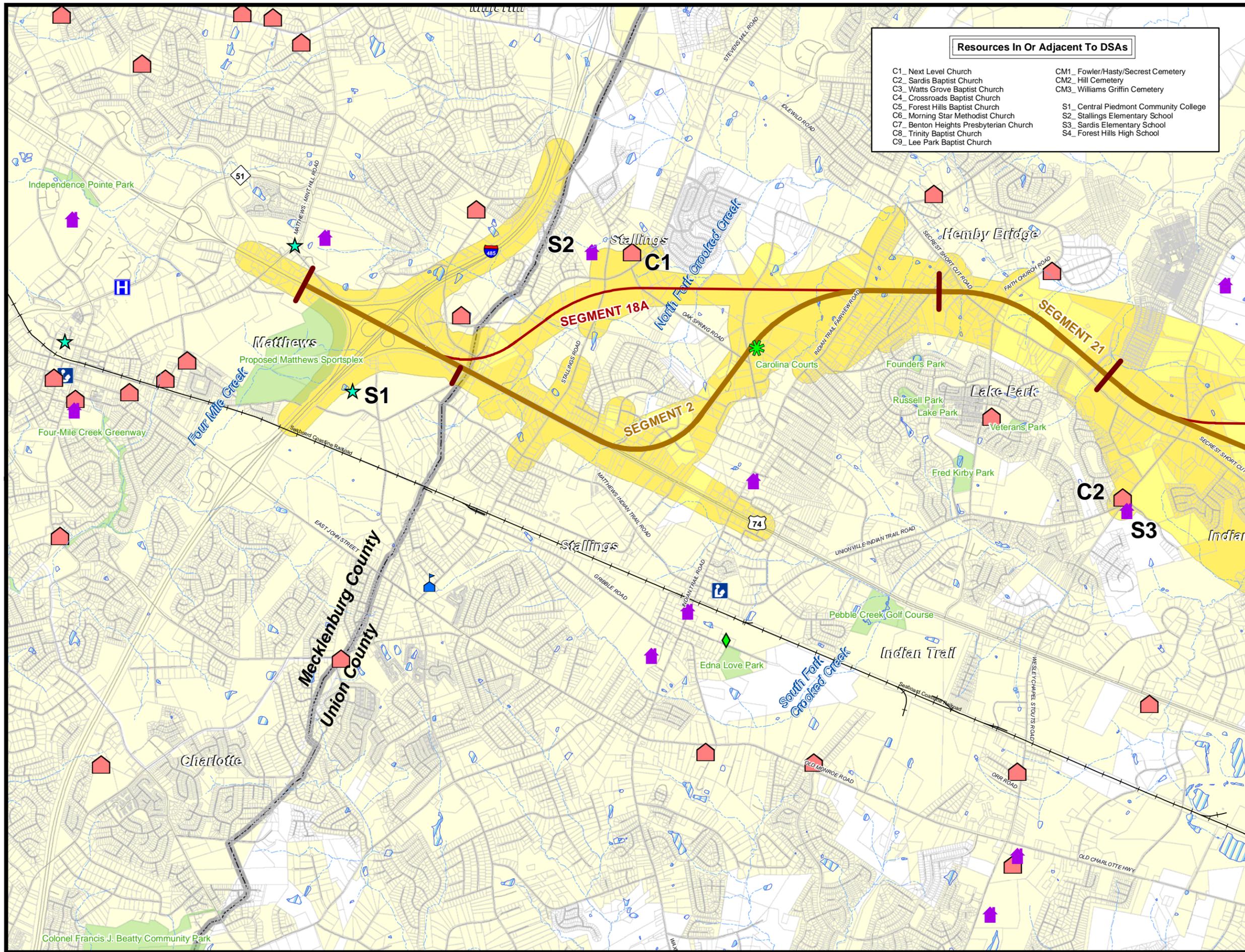


STIP PROJECT NO. R-3329/R-2559  
Mecklenburg County and Union County

**MONROE CONNECTOR/ BYPASS**

**POPULATION CHANGE (2000/2010)**

**Figure 4-1**



Resources In Or Adjacent To DSAs	
C1_ Next Level Church	CM1_ Fowler/Hasty/Secret Cemetery
C2_ Sardis Baptist Church	CM2_ Hill Cemetery
C3_ Watts Grove Baptist Church	CM3_ Williams Griffin Cemetery
C4_ Crossroads Baptist Church	
C5_ Forest Hills Baptist Church	S1_ Central Piedmont Community College
C6_ Morning Star Methodist Church	S2_ Stallings Elementary School
C7_ Benton Heights Presbyterian Church	S3_ Sardis Elementary School
C8_ Trinity Baptist Church	S4_ Forest Hills High School
C9_ Lee Park Baptist Church	

**Legend**

- Preferred Alternative
- Segment Breaklines
- Functional Design Centerline
- Railroad
- Streams
- Lakes
- Parks
- Parcels
- Corridor Study Area
- Municipal Limits
- NotableFeatures
- Cemetery
- Church
- College
- Fire Department
- Library
- Police Station
- Hospital
- Schools

- Mecklenburg and Union Counties
- North Carolina Counties

Source: Mecklenburg County and Union County GIS.  
Map Printed May 2013.

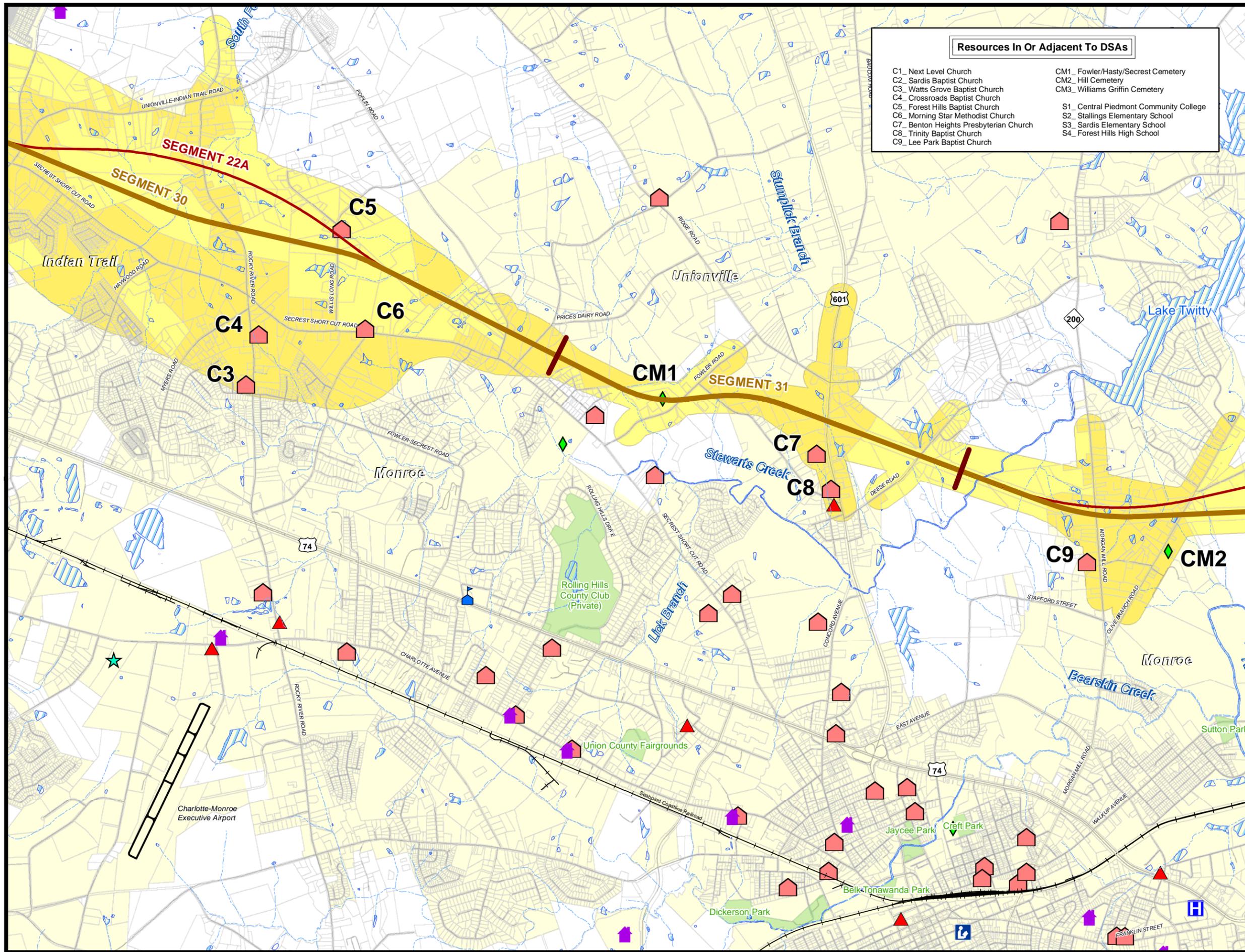
STIP PROJECT  
NO. R-3329/R-2559

Mecklenburg County and  
Union County

**MONROE CONNECTOR/  
BYPASS**

**COMMUNITY  
RESOURCES**

**Figure 4-2a**



Resources In Or Adjacent To DSAs	
C1_ Next Level Church	CM1_ Fowler/Hasty/Secret Cemetery
C2_ Sardis Baptist Church	CM2_ Hill Cemetery
C3_ Watts Grove Baptist Church	CM3_ Williams Griffin Cemetery
C4_ Crossroads Baptist Church	
C5_ Forest Hills Baptist Church	S1_ Central Piedmont Community College
C6_ Morning Star Methodist Church	S2_ Stallings Elementary School
C7_ Benton Heights Presbyterian Church	S3_ Sardis Elementary School
C8_ Trinity Baptist Church	S4_ Forest Hills High School
C9_ Lee Park Baptist Church	

**Legend**

- Preferred Alternative
- Segment Breaklines
- Functional Design Centerline
- Railroad
- Streams
- Lakes
- Parks
- Parcels
- Corridor Study Area
- Municipal Limits
- NotableFeatures
- Cemetery
- Church
- College
- Fire Department
- Library
- Police Station
- Hospital
- Schools

- Mecklenburg and Union Counties
- North Carolina Counties

Source: Mecklenburg County and Union County GIS.  
Map Printed May 2013.

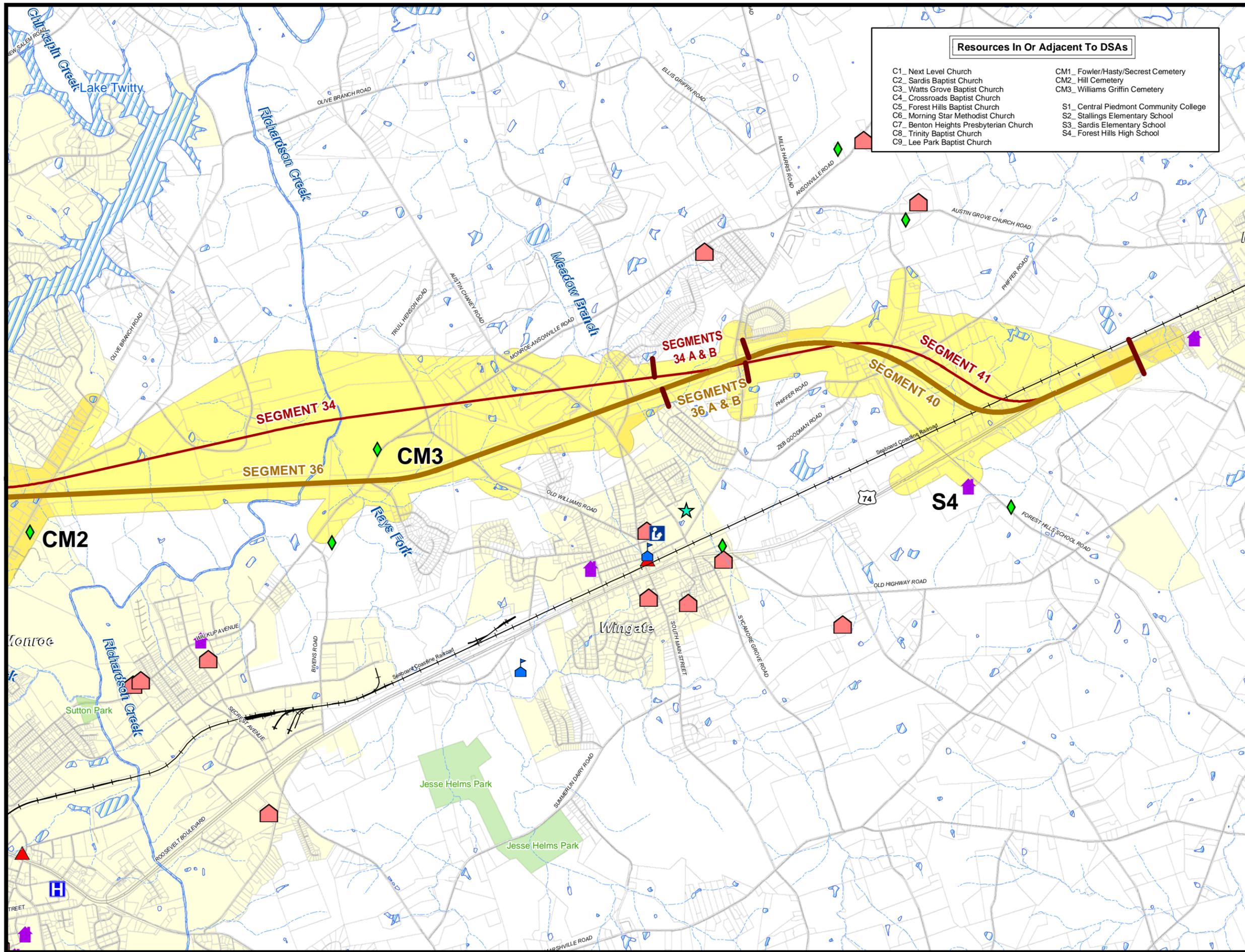
STIP PROJECT  
NO. R-3329/R-2559

Mecklenburg County and  
Union County

**MONROE CONNECTOR/  
BYPASS**

**COMMUNITY  
RESOURCES**

**Figure 4-2b**



Resources In Or Adjacent To DSAs	
C1_ Next Level Church	CM1_ Fowler/Hasty/Secrest Cemetery
C2_ Sardis Baptist Church	CM2_ Hill Cemetery
C3_ Watts Grove Baptist Church	CM3_ Williams Griffin Cemetery
C4_ Crossroads Baptist Church	
C5_ Forest Hills Baptist Church	S1_ Central Piedmont Community College
C6_ Morning Star Methodist Church	S2_ Stallings Elementary School
C7_ Benton Heights Presbyterian Church	S3_ Sardis Elementary School
C8_ Trinity Baptist Church	S4_ Forest Hills High School
C9_ Lee Park Baptist Church	

**Legend**

- Preferred Alternative
- Segment Breaklines
- Functional Design Centerline
- Railroad
- Streams
- Lakes
- Parks
- Parcels
- Corridor Study Area
- Municipal Limits
- NotableFeatures
- Cemetery
- Church
- College
- Fire Department
- Library
- Police Station
- Hospital
- Schools

- Mecklenburg and Union Counties
- North Carolina Counties

Source: Mecklenburg County and Union County GIS.  
Map Printed May 2013.

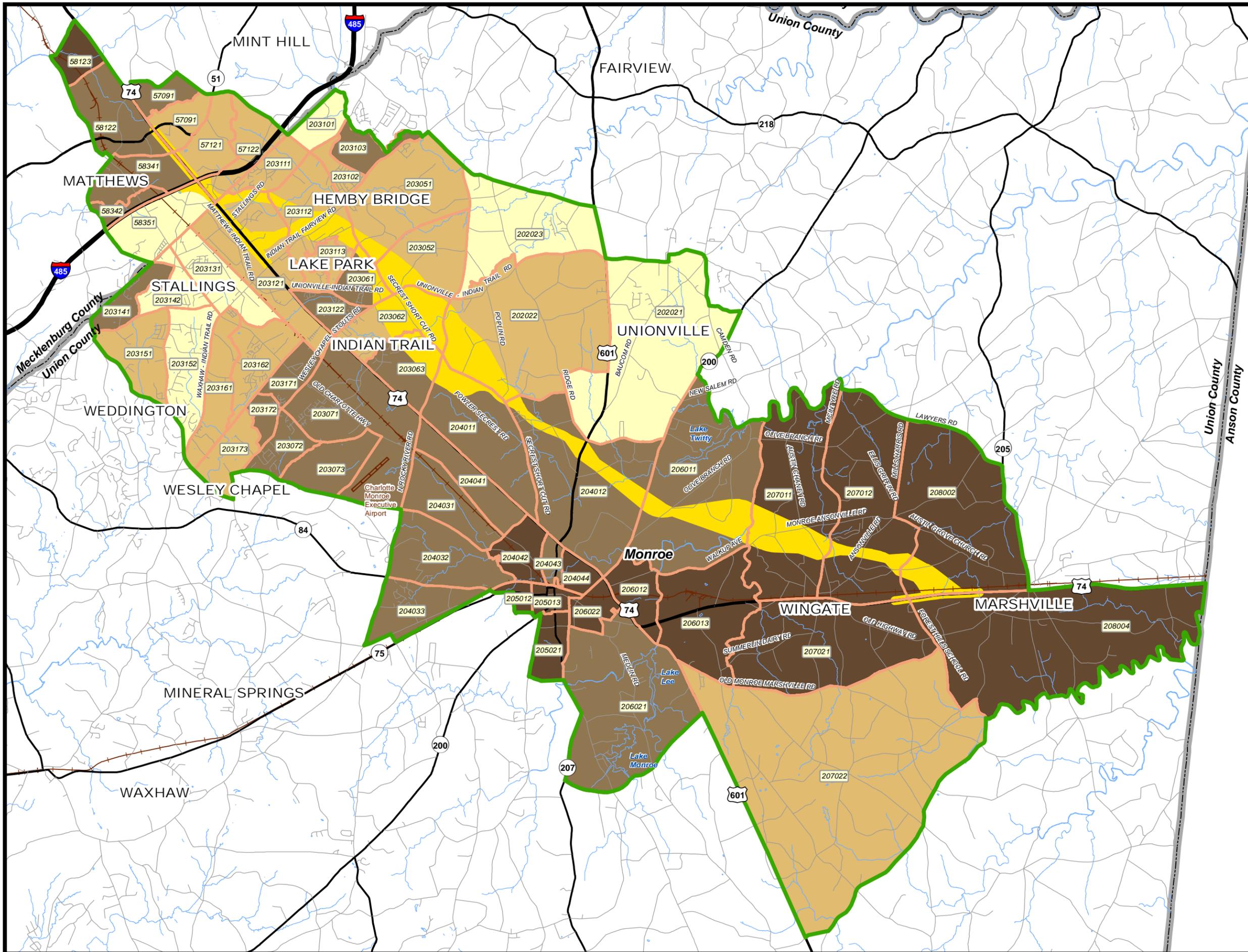
STIP PROJECT  
NO. R-3329/R-2559

Mecklenburg County and  
Union County

**MONROE CONNECTOR/  
BYPASS**

**COMMUNITY  
RESOURCES**

**Figure 4-2c**

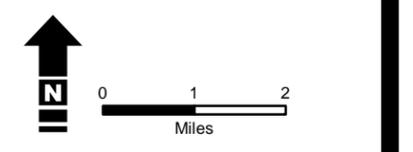


- Legend**
- 2010 Percentage African American by Census Block Group
    - 0 - 4.99%
    - 5 - 9.99%
    - 10 - 24.99%
    - 25% or above
  - 2010 Block Groups
  - Demographic Study Area
  - Corridor Study Area
  - Interstate Highway
  - US Highway
  - NC State Highway
  - Major Road
  - Railroad
  - River / Stream
  - County Boundary
  - xxxxxx Census Block Group ID Number

**Note:** 207021 Symbolizes Census Tract 207.02 Block Group 1.



Source: U.S. Bureau of the Census, Census 2010Tiger/Line Data from ESRI. Map Printed May 2013.

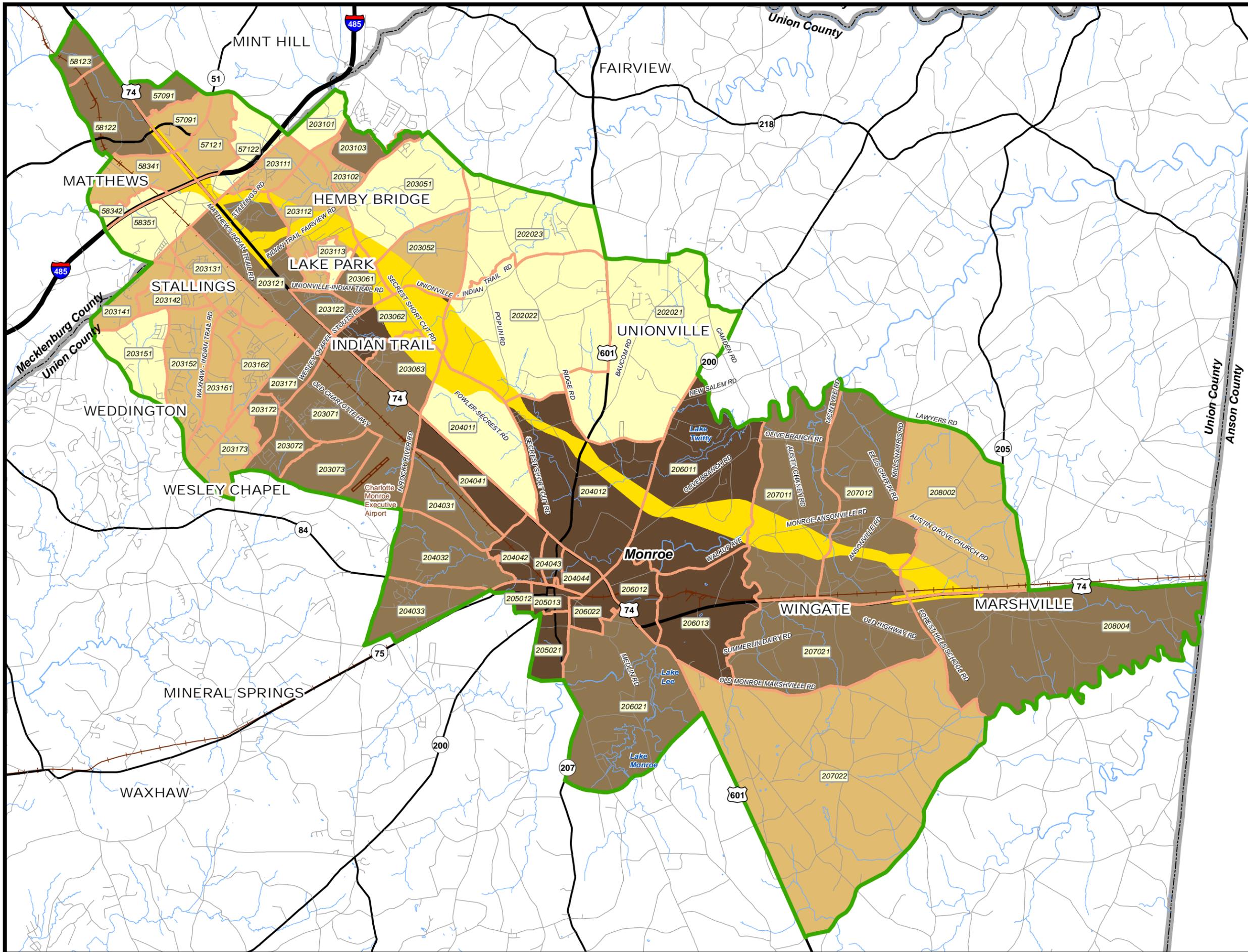


STIP PROJECT NO. R-3329/R-2559  
Mecklenburg County and Union County

**MONROE CONNECTOR/ BYPASS**

**AFRICAN AMERICAN POPULATION IN THE DEMOGRAPHIC AREA**

**Figure 4-3**



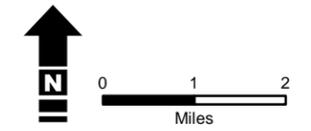
- Legend**
- 2010 Percentage Hispanic by Census Block Group
    - 0 - 4.99%
    - 5 - 9.99%
    - 10 - 24.99%
    - 25% or above
  - 2010 Block Groups
  - Demographic Study Area
  - Corridor Study Area
  - Interstate Highway
  - US Highway
  - NC State Highway
  - Major Road
  - Railroad
  - River / Stream
  - County Boundary
  - xxxxxxx Census Block Group ID Number

**Note:** 207021 Symbolizes Census Tract 207.02 Block Group 1.



- Mecklenburg and Union Counties
- North Carolina Counties

Source: U.S. Bureau of the Census, Census 2010Tiger/Line Data from ESRI. Map Printed May 2013.

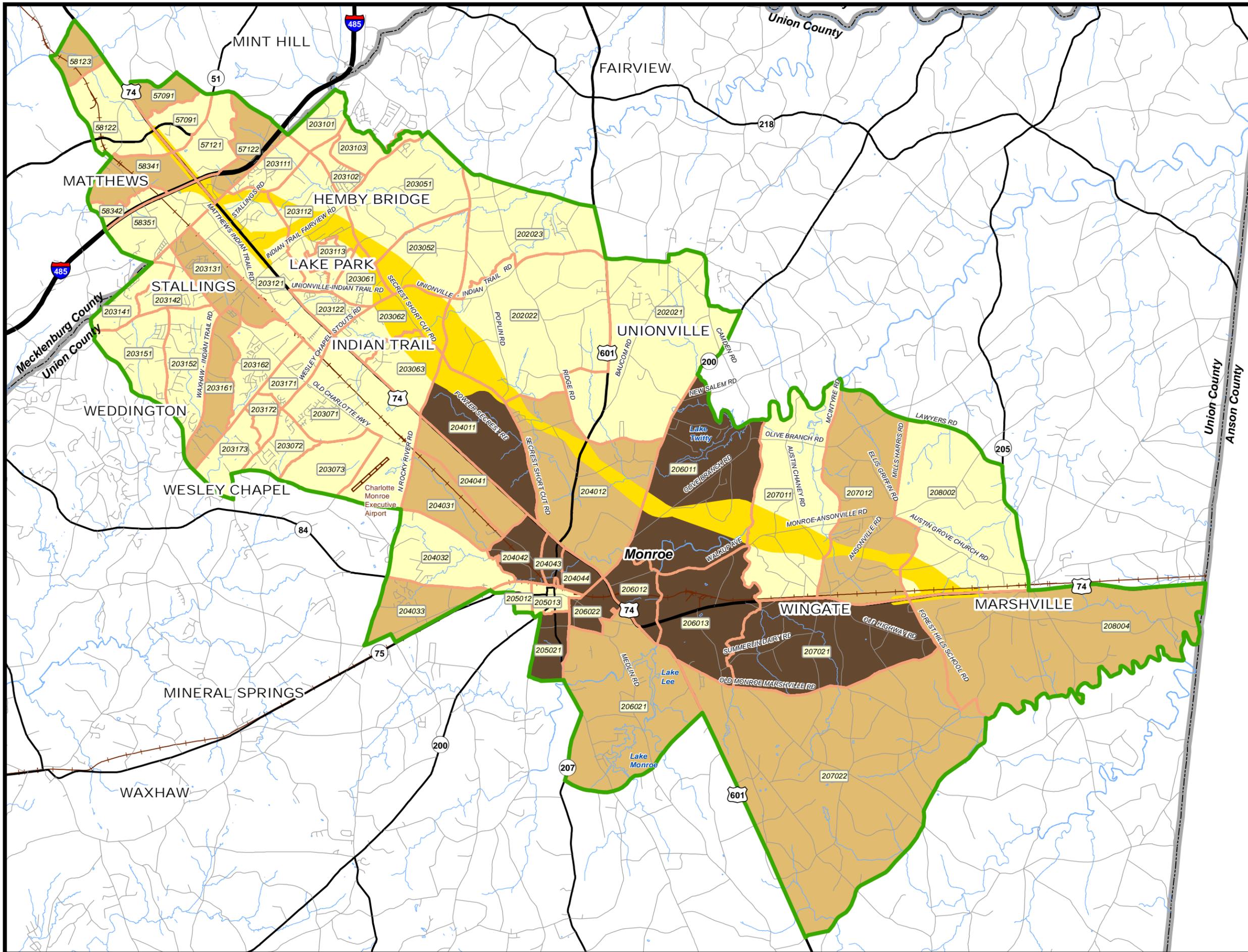


STIP PROJECT NO. R-3329/R-2559  
Mecklenburg County and Union County

**MONROE CONNECTOR/ BYPASS**

**HISPANIC POPULATION IN THE DEMOGRAPHIC AREA**

**Figure 4-4**



- Legend**
- 2010 Percentage Below Poverty Level by Census Block Group
    - 0 - 9.99%
    - 10 - 19.99%
    - 20% or above
  - 2010 Block Groups
  - Demographic Study Area
  - Corridor Study Area
  - Interstate Highway
  - US Highway
  - NC State Highway
  - Major Road
  - Railroad
  - River / Stream
  - County Boundary

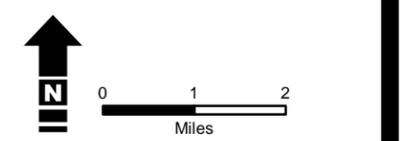
xxxxxx Census Block Group ID Number

Note: 207021 Symbolizes Census Tract 207.02 Block Group 1.



Mecklenburg and Union Counties  
North Carolina Counties

Source: U.S. Bureau of the Census, Census 2010Tiger/Line Data from ESRI. Map Printed May 2013.

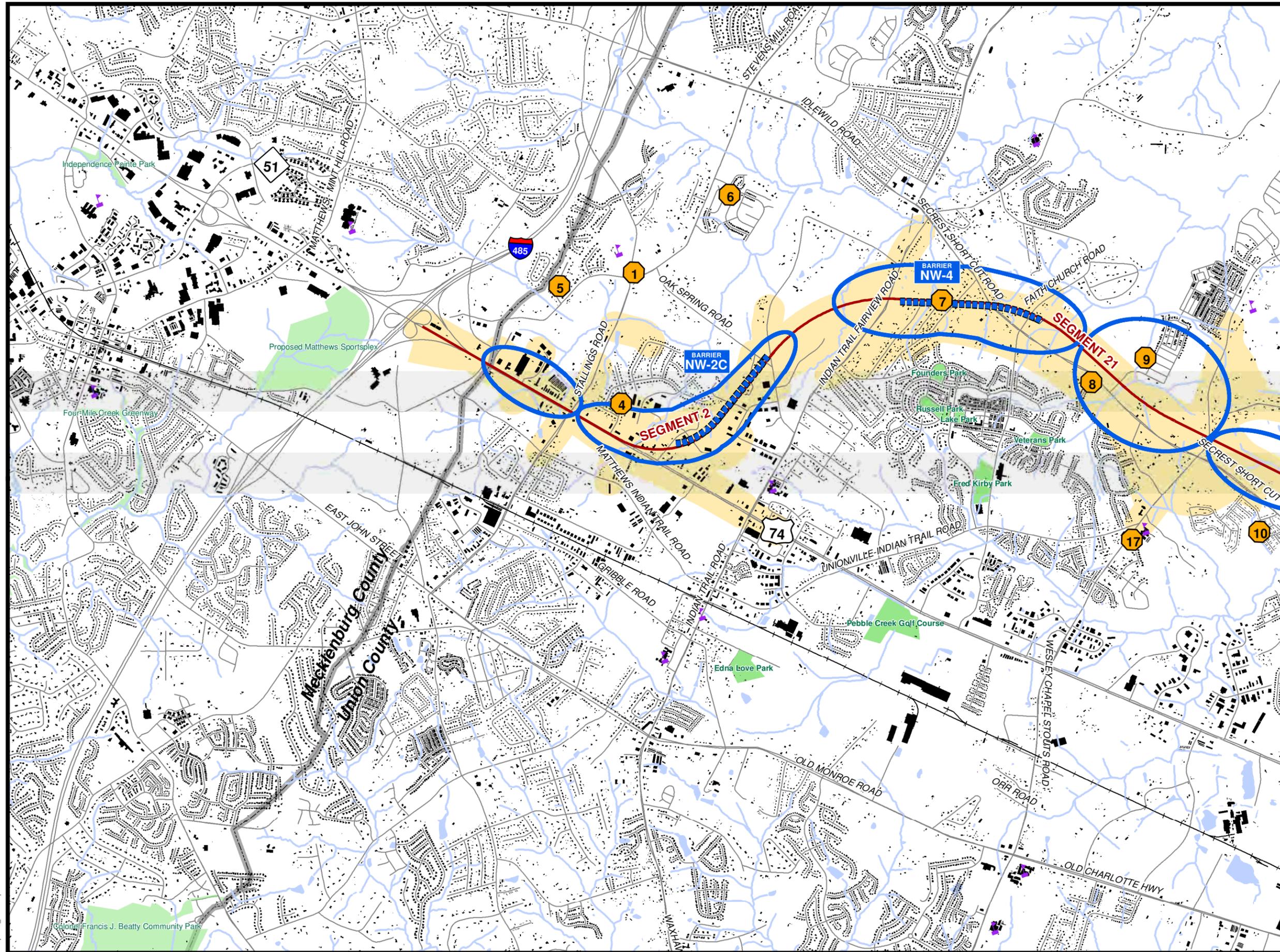


STIP PROJECT NO. R-3329/R-2559  
Mecklenburg County and Union County

**MONROE CONNECTOR/ BYPASS**

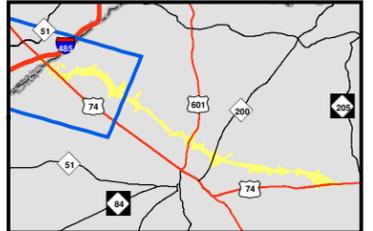
**PERCENTAGE BELOW POVERTY LEVEL IN THE DEMOGRAPHIC AREA**

Figure 4-5

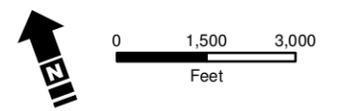


- Legend**
- Noise Measurement Site
  - Noise Barrier\*
  - Barrier Evaluation Area
  - Alternative D Centerline
  - Hydrology
  - School
  - Structure
  - Park
  - Railroad
  - Thoroughfare
  - Street
  - Lake
  - County Boundary
  - Alternative D Study Corridor

\*Noise barriers shown on this map are preliminary. The feasibility and reasonableness of potential noise barriers will be reassessed for the Preferred Alternative during final design.



Source: Mecklenburg County and Union County GIS.  
Map Printed May 2013.



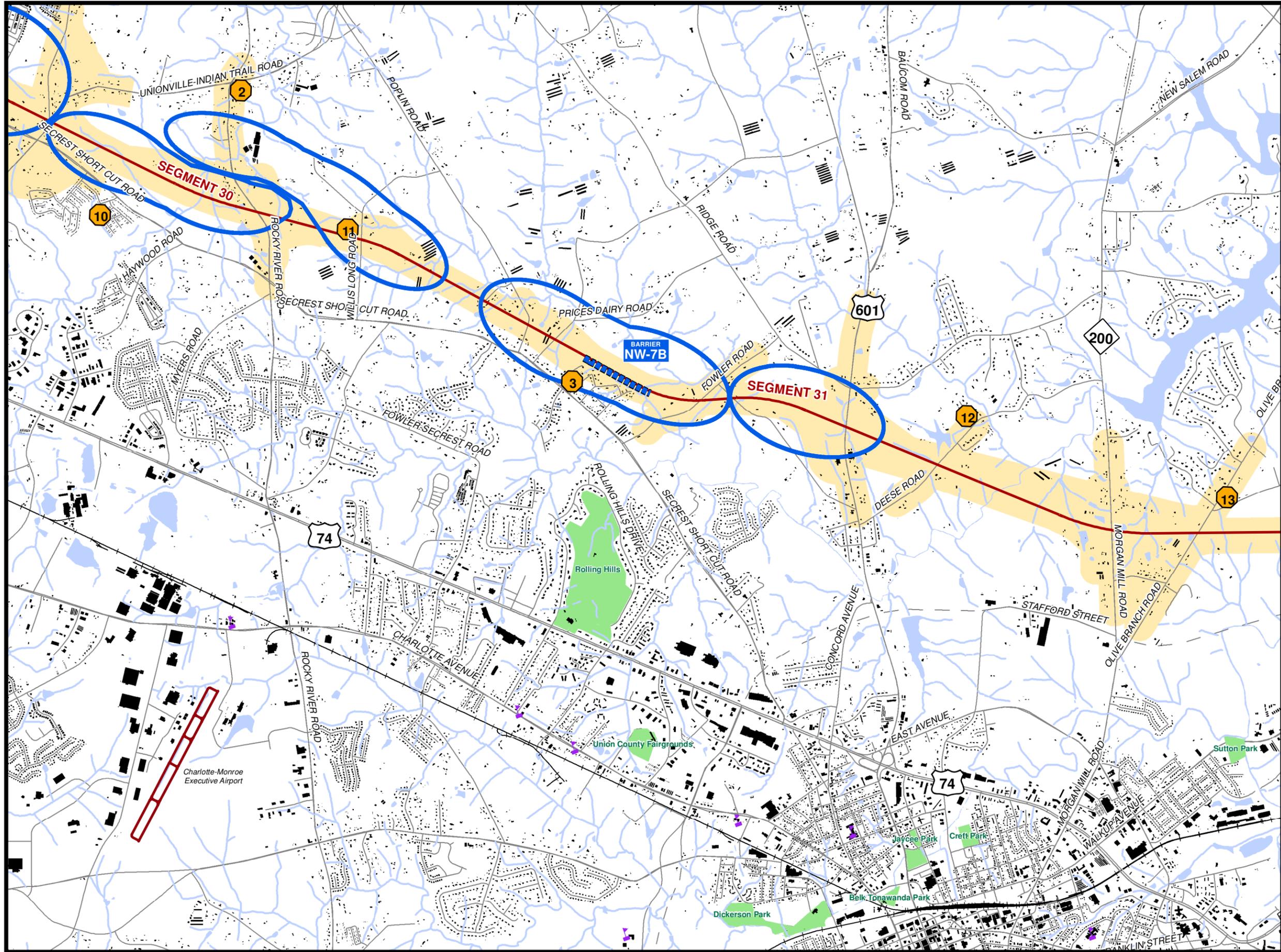
STIP PROJECT  
NO. R-3329/R-2559  
Mecklenburg County and  
Union County

**MONROE CONNECTOR/  
BYPASS**

**UPDATED NOISE  
IMPACT ASSESSMENT  
INFORMATION**

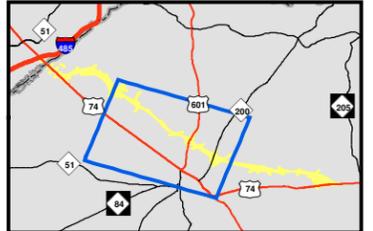
**Figure 4-6a**

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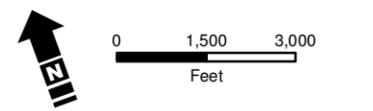


- Legend**
- Noise Measurement Site
  - Noise Barrier\*
  - Barrier Evaluation Area
  - Alternative D Centerline
  - Hydrology
  - School
  - Structure
  - Park
  - Railroad
  - Thoroughfare
  - Street
  - Lake
  - County Boundary
  - Alternative D Study Corridor

\*Noise barriers shown on this map are preliminary. The feasibility and reasonableness of potential noise barriers will be reassessed for the Preferred Alternative during final design.



Source: Mecklenburg County and Union County GIS.  
Map Printed May 2013.



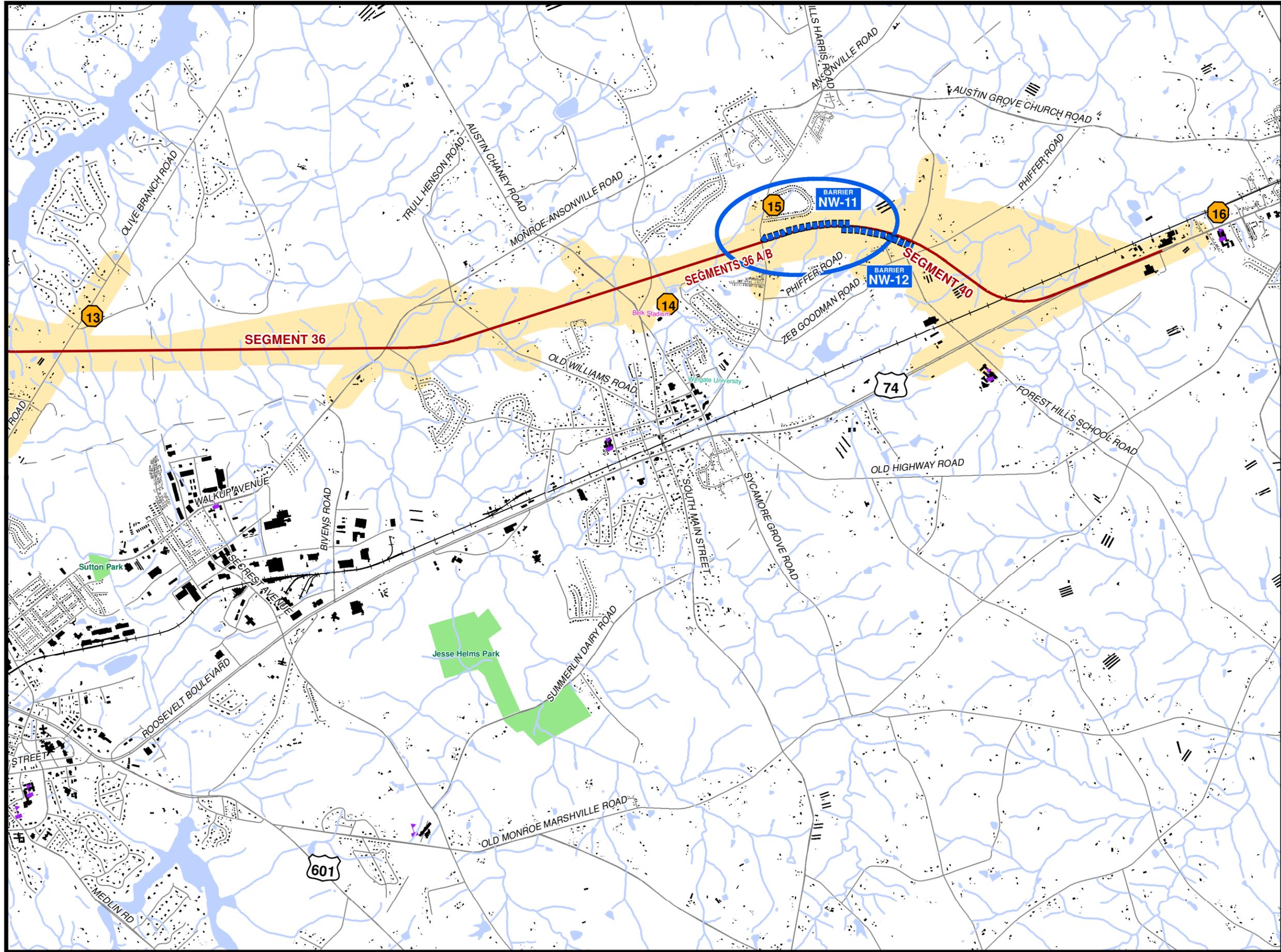
STIP PROJECT  
NO. R-3329/R-2559  
Mecklenburg County and  
Union County

**MONROE CONNECTOR/  
BYPASS**

**UPDATED NOISE  
IMPACT ASSESSMENT  
INFORMATION**

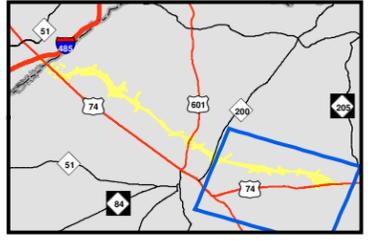
**Figure 4-6b**

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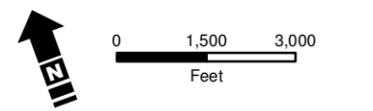


- Legend**
- Noise Measurement Site
  - Noise Barrier\*
  - Barrier Evaluation Area
  - Alternative D Centerline
  - Hydrology
  - School
  - Structure
  - Park
  - Railroad
  - Thoroughfare
  - Street
  - Lake
  - County Boundary
  - Alternative D Study Corridor

\*Noise barriers shown on this map are preliminary. The feasibility and reasonableness of potential noise barriers will be reassessed for the Preferred Alternative during final design.



Source: Mecklenburg County and Union County GIS.  
Map Printed May 2013.



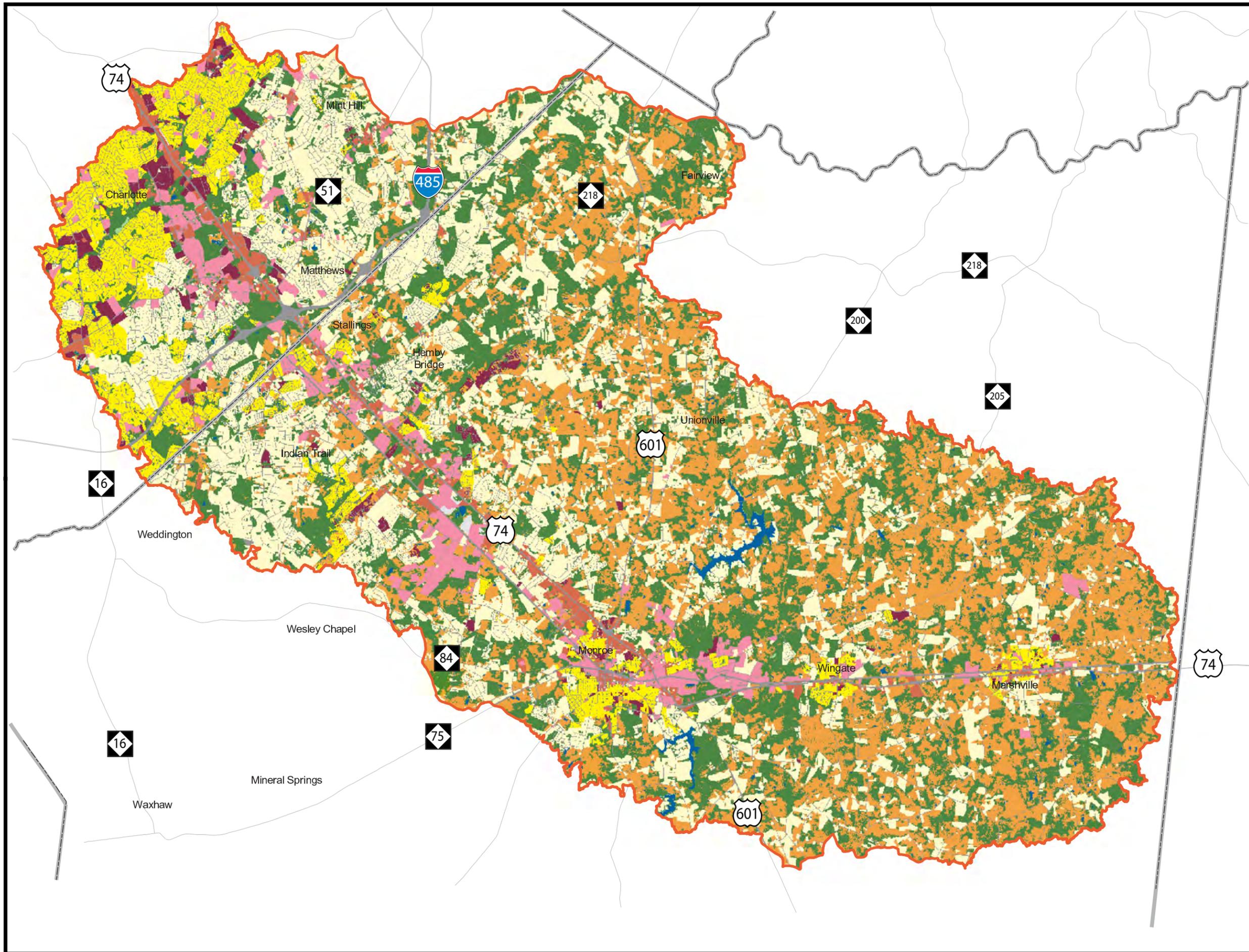
STIP PROJECT  
NO. R-3329/R-2559  
Mecklenburg County and  
Union County

**MONROE CONNECTOR/  
BYPASS**

**UPDATED NOISE  
IMPACT ASSESSMENT  
INFORMATION**

**Figure 4-6c**

E:\Update\_NoiseImpactAssessInfo.mxd 04-29-13\_JNL



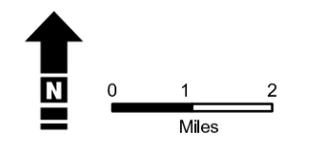
**Legend**

Existing Land Use

- Agricultural Fields
- Barren
- Commercial
- Forested
- Other Natural
- High Density Residential
- Industrial/Office/Institutional
- Low Density Residential
- Medium Density Residential
- Open Water
- Transportation
- FLUSA Boundary



Source: Draft Indirect and Cumulative Effects Quantitative Analysis Report from Michael Baker Engineering, Inc., August 2013. Map Printed August 2013.

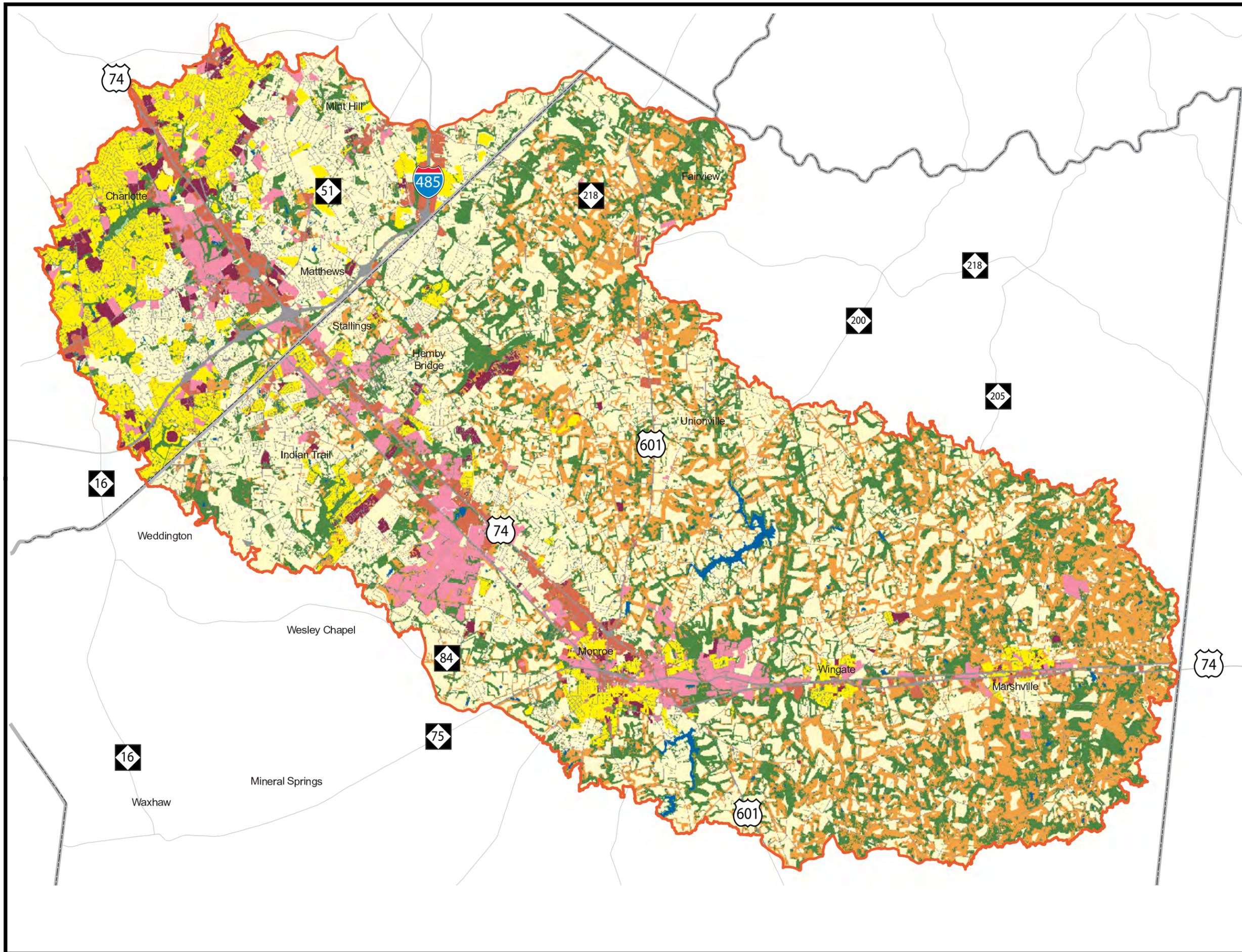


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Union County

**MONROE CONNECTOR/  
BYPASS**

**UPDATED 2010  
BASELINE LAND USE  
SCENARIO**

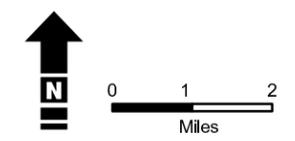
**Figure 4-7**



- Legend**
- No Build Land Use
  - Agricultural Fields
  - Barren
  - Commercial
  - Forested
  - Other Natural
  - High Density Residential
  - Industrial/Office/Institutional
  - Low Density Residential
  - Medium Density Residential
  - Open Water
  - Transportation
  - FLUSA Boundary



Source: Draft Indirect and Cumulative Effects Quantitative Analysis Report from Michael Baker Engineering, Inc., August 2013. Map Printed August 2013.

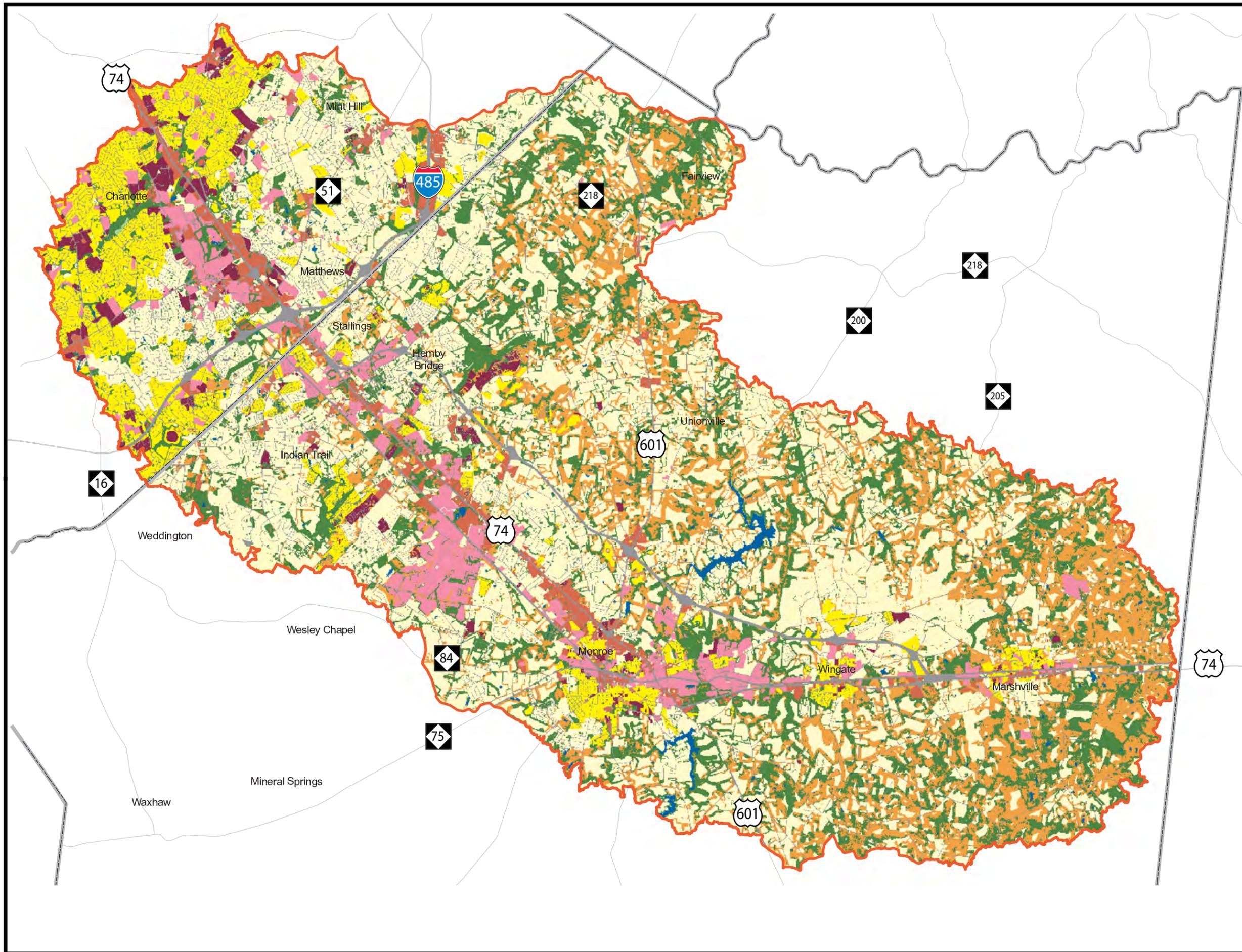


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BYPASS**

**UPDATED 2030  
NO-BUILD LAND USE  
SCENARIO**

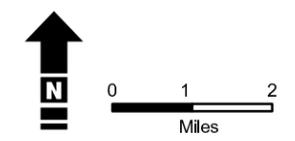
**Figure 4-8**



- Legend**
- No Build Land Use
  - Agricultural Fields
  - Barren
  - Commercial
  - Forested
  - Other Natural
  - High Density Residential
  - Industrial/Office/Institutional
  - Low Density Residential
  - Medium Density Residential
  - Open Water
  - Transportation
  - FLUSA Boundary



Source: Draft Indirect and Cumulative Effects Quantitative Analysis Report from Michael Baker Engineering, Inc., August 2013. Map Printed August 2013.



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Union County

**MONROE CONNECTOR/  
BYPASS**

**UPDATED 2030  
BUILD LAND USE  
SCENARIO**

**Figure 4-9**