APPENDIX H
QUANTITATIVE INDIRECT AND CUMULATIVE EFFECTS ANALYSIS
LAND USE

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Monroe Connector/Bypass (R-3329/R-2559)

Indirect and Cumulative Effects (ICE) Quantitative Analysis

Prepared for the North Carolina Turnpike Authority

NORTH CAROLINA Turnpike Authority

A Division of North Carolina Department of Transportation

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EXECUTIVE SUMMARY

E.1 Introduction and Background

The North Carolina Turnpike Authority (NCTA), a division of the North Carolina Department of Transportation (NCDOT), in cooperation with the Federal Highway Administration (FHWA), proposes to construct a project known as the Monroe Connector/Bypass, which would be a controlled-access toll road extending from US 74 near I-485 in Mecklenburg County to US 74 between the towns of Wingate and Marshville in Union County, a distance of approximately 20 miles. The proposed action is included in the NCDOT 2009–2015 State Transportation Improvement Program (STIP) as Project R-3329 (Monroe Connector) and Project R-2559 (Monroe Bypass) as a toll facility.

The Monroe Connector/Bypass Draft Environmental Impact Statement (EIS) provided a qualitative analysis of indirect and cumulative effects (ICE) (NCTA, 2009). This Technical Report provides a quantitative analysis of indirect and cumulative effects attributable to the Recommended Preferred Alternative (RPA) presented in the Draft EIS, as well as a variation of the RPA that omits the interchange at the crossing with US 601 (RPA W/O 601 Interchange).

Agency comments on the Draft EIS raised the following issues related to indirect and cumulative effects: water quality, threatened and endangered species, the extent of land use changes (i.e., "sprawl development"), and air quality. This Technical Report addresses changes in land use and associated watershed percent impervious surfaces, threatened and endangered species, and also wildlife habitat. The Mecklenburg-Union Metropolitan Planning Organization (MUMPO) is in the process of addressing air quality through the appropriate regional air quality conformity analysis. In addition, NCTA will conduct detailed water quality modeling.

This quantitative ICE analysis closely followed 2001 guidance developed by the NCDOT and North Carolina Department of Environment and Natural Resources (NCDENR) entitled *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Volume II: Practitioner's Handbook* (NCDOT & NCDENR, 2001a).

E.2 Study Area Boundaries

A Future Land Use Study Area (FLUSA) was used for the qualitative ICE analysis presented in the Draft EIS (NCTA, 2009). For the more detailed purposes of this Technical Report, the FLUSA was expanded to include all of the Goose Creek watershed, which contains designated critical habitat for the Carolina heelsplitter (*Lasmigona decorata*), a Federally listed endangered freshwater mussel species. This expanded FLUSA is referred to as the Study Area for this quantitative ICE analysis. The Study Area boundary with watershed boundaries and RPA centerline are depicted in Figure ES-1, located at the end of this Executive Summary.

The Study Area includes portions of both Mecklenburg and Union counties. There has been substantial growth in the Study Area since 2000; between 2000 and 2008, Mecklenburg County grew 26 percent and Union County grew by 55 percent. Similar and even greater growth rates were experienced in the Study Area municipalities over the same period. This growth has

caused several municipalities to modify their approach to managing growth, especially in Union County, which currently has a county-wide prohibition on new sewer connections.

E.3 Project Approach

This ICE analysis began with background research, proceeded with interviews of municipal and county planners whose jurisdiction overlapped the Study Area, and continued with follow-up interviews as necessary. Local governments provided GIS data, when available, and documents that included information on land use, zoning, new developments, updated plans, and water and sewer service. All of this information was used to develop the existing and future land use data.

The year 2007 was selected for the Baseline condition because it is the closest year to the two main elements incorporated into the land use: parcel data from 2008 and aerial photography from 2007. The North Carolina Gap Analysis Project (NCGAP) data is also a large component of the data used for this project and is from 1992; however, it was only used to describe natural land use categories, which are less likely to change dramatically (e.g., from forest to grassland or vice versa). The year 2030 was selected for the Future condition for consistency with the Draft EIS qualitative ICE assessment and for compatibility with the Traffic Analysis Zone (TAZ) forecasts.

Assumptions and/or observations that informed the process of predicting future land use included the following:

1. Growth exceeded expectations in Union County from 2000 to 2008.
2. While the recent economic downturn has reduced the pace of growth in 2009, it is expected that growth will continue in the Study Area regardless of whether the Monroe Connector/Bypass is built.
3. While growth will continue, many jurisdictions in Union County have developed zoning, post-construction ordinances, or other means (e.g., Goose Creek Site Specific Watershed Plan) to control the pace and location of future growth.
4. Growth in the Study Area will primarily be concentrated in areas with sewer services.
5. Past growth has caused a moratorium in new sewer connections in Union County. The new process for allocating sewer service, once adopted, may serve as a control on growth.
6. Developable land is more available in the eastern portion of the Study Area.
7. The Monroe Connector/Bypass will increase accessibility to the eastern portion of the Study Area.
8. Most of the small communities in the Study Area stated a desire to retain a “small-town” character.
9. Wingate and Marshville stated a desire to use the connector as a gateway to their communities.

Specific analytical assumptions that shaped the quantitative land use analysis include the following:

1. Regional TAZ forecasts for 2030 households (i.e., number of dwelling units) and employment (i.e., number of jobs) served as the primary sources of data for developing the 2030 No Build land use estimate. (TAZs are smaller in size than watersheds or jurisdictions and thus provide a relatively small-scale geography for applying control totals.) These forecasts were developed mid-decade through a cooperative process with the MUMPO jurisdictions based on land use plans in effect at the time the forecasts were developed (2004). The forecasts were originally adopted in 2004 and were reviewed and readopted in 2008 when 2035 forecasts were developed; the 2030 forecasts are the most recent regional, adopted forecasts for the horizon year of this study and they best represent the No Build land use scenario based on reviews of the forecasts and interviews with local planners.
2. Household forecasts were translated to residential acres based on low, medium and high density residential categories representing 2, 2-5, and 5 or greater dwelling units per acre, respectively. These densities were derived from the Soil Conservation Service (SCS) TR-55 Manual (SCS, 1986), which is the basis for impervious surface analysis.
3. Employment forecasts were translated to acres of commercial or industrial land use based on densities from the FHWA Social Cost of Alternative Land Development Scenarios (SCALDS) model.
4. TAZ forecasts for the 2030 No Build condition were allocated based on existing land use plans and zoning, except where higher density land use assumptions were required in order to accommodate the forecasted land use within the TAZ boundary.
5. Where forecasted land use was less than full build-out for any TAZ, the distribution of forecasted development within the TAZ was based on a proportional build-out of all undeveloped parcels within the TAZ, rather than full build-out of particular parcels.
6. 2030 land use changes associated with the RPA include interchange-area development and residential development.
7. Interchange-area development was based on a combination of land use plans, planner interviews, and build-out analysis as informed by the "Hartgen" method of rural interchange analysis, which considers several factors that are associated with different levels and types of interchange-area development.
8. Residential development was estimated to increase in amount and/or density in areas that:
    a. Would have markedly increased accessibility with the Build Alternative
    b. Would be served by water and/or sewer service
    c. Were identified through planning interviews and/or planning documents as being likely receptors for increased growth with the Build Alternative.
9. The redistribution of residential development in the 2030 RPA scenario does account for the replacement of low density residential development in the 2030 No Build condition by the RPA corridor and interchange-area development. The residential development analysis does not attempt to account for broader redistribution of residential growth in the metropolitan area that may offset the net increase in households that is projected within the FLUSA in the RPA residential development analysis.

10. The 2030 RPA W/O 601 Interchange scenario was developed as an extension of the 2030 RPA scenario, using the same overall level of development. The induced development that would have occurred around the US 601 interchange was shifted to the closest interchanges east and west, based on land use plans for those interchanges and Hartgen analysis results.
11. The impacts of tolling are generally accounted for in the traffic forecasts for the project and adjacent roads, which in turn were used in the Hartgen method component of the analysis to predict the intensity of future development at interchanges. More generally, tolling the Monroe Connector would make the new facility more attractive to peak-period and long-distance trips; these impacts to regional mobility are addressed by the land use analysis, guided by accessibility and build-out analyses and recent land use plans that consider the effects of the proposed facility.

Changes in the amount of impervious surface throughout the Study Area and within each watershed were used to analyze potential effects to certain resources, including water quality, the Carolina heelsplitter, and aquatic habitat. In order to determine the amount of induced impervious surface, each land use category was assigned an assumed level of impervious surface. This step of the analysis followed guidance in the SCS TR-55 Manual (SCS, 1986). The SCS TR-55 Manual is widely used for drainage studies and runoff calculations.

For assessment of cumulative effect, the following definition was applied: cumulative effect is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

50 CFR §402.02 provides a somewhat different definition of cumulative effect to Federally listed threatened and endangered species, specifically. This regulatory definition excludes Federal actions from those actions that must be considered as contributing to a cumulative effect. However, for the purposes of this Technical Report, Federal actions were included with the future changes that may affect protected species. This was determined to be the best approach for this study because 1) it provides a conservative (i.e., high) estimate of changes to land use, and 2) quantifying projected future Federal actions is particularly difficult. Many of the private, local, or state actions predicted in this analysis may become Federal actions in the future through permitting procedures (e.g., Clean Water Act Section 404 permit approvals by the USACE). For this study, each reasonably foreseeable future non-Federal action was considered a contributor to the cumulative effect on protected species, regardless of whether it may be a Federal action in the future.

E.4 Summary of Build Alternative Effects

The direct effect to land use from the Build scenarios is calculated to be the conversion of 1,094 acres for the RPA and 1,063 acres for the RPA W/O 601 Interchange based on footprints provided by the NCTA in December 2009. In general, there are few differences between the results of the RPA and the RPA W/O 601 Interchange; therefore, the results presented in this

summary are only for the 2030 RPA. Detailed results for the RPA W/O 601 Interchange can be found in the main body of the Technical Report. Remaining results below are presented only for the 2030 RPA. In brief, the overall level of induced development for the RPA W/O 601 Interchange is similar to the RPA, but the location is spread among interchanges to either side of US 601. These land use differences did not yield a net difference from the RPA in the percent impervious surface as reported in this study.

Indirect effects are those caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. To determine the effects caused by the action, conditions predicted for the 2030 RPA scenario were compared to conditions predicted for the 2030 No-Build scenario. Through the analysis described in the previous section, including use of the TAZ forecasts and information from interviews, mapping and plans, land use forecasts were made for the RPA and No-Build, and these land use forecasts were used to predict percent impervious surfaces within the Study Area as a whole and for individual watersheds.

It was determined that the vast majority of indirect development occurring in the Study Area by 2030 will occur with or without the Monroe Connector/Bypass project. As shown in Table ES-1, overall differences in land use between the 2030 RPA and 2030 No-Build scenarios are small relative to the overall level of development expected in the Study Area (e.g., 1,000 acres of increased development represents less than one percent of the total amount of development in the No Build Study Area [124,200 acres]). Furthermore, the net difference in acreage is accounted for by the direct impacts of the project; therefore, the net difference in land use is primarily a change in *intensity*, not total acres.

Table ES-1 shows totals for land use categories with both the No-Build and the RPA and the differences between those results. These results include both the direct (for the RPA) and indirect effects to provide a more complete calculation of the differences between the No-Build and Build scenarios.

Table ES-1: Difference in Land Use With the 2030 RPA and the 2030 No-Build Scenarios

Land Use Category	2030 No-Build Area (acres)	2030 RPA Area (acres)	Difference from 2030 No-Build (acres)
Total Residential	97,900	97,500	-400
Low Density Residential	*81,300*	*80,100*	*-1,200*
Medium Density Residential	*13,600*	*14,300*	*700*
High Density Residential	*3,100*	*3,000*	*<100**
Commercial	4,800	5,100	200
Industrial/Office/Institutional	8,500	8,700	100
Transportation	12,800	13,900	1,100**
Total Developed	**124,200**	**125,200**	**1,000**
Total Agricultural	**37,800**	**37,200**	**-600**
Total Forested	**38,200**	**37,700**	**-400**
Total Other	**1,800**	**1,800**	**0**
TOTAL	**202,000**	**202,000**	

Note: The numbers in the far right column show the net differences in acres that are predicted for the RPA scenario as compared to the No-Build scenario in 2030 throughout the Study Area. Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding.

* The difference in high density residential acres is less than 20 acres but does produce a change in rounding, so the change is represented as <100 acres to provide consistency in reporting results.

** The direct effect of the RPA is approximately 1,100 acres, which accounts for the change in transportation land use.

Based on this analysis, the expectation is that the 2030 RPA scenario would see approximately 1,200 fewer low-density residential acres, 700 additional medium density residential acres, less than 100 additional high density residential acres, 200 additional commercial acres, and 100 additional industrial/office/institutional acres in the Study Area as compared to the 2030 No-Build scenario. Most of this induced development is expected within approximately one mile of the interchanges. This is expected because the accessibility improvements are most marked around the interchanges and because local land use policy and the lack of access to sewer service, particularly north of the project in Unionville, are not conducive to additional land development or increases in density.

Table ES-2: Changes in Percent Impervious Cover with RPA as Compared to the Changes with the No-Build in 2030

Watershed Name	2030 No-Build Percent Impervious Cover	2030 RPA Percent Impervious Cover	Difference in Percentages
Study Area	22%	22%	<1%↑
Beaverdam Creek	7%	7%	No Change
Richardson Creek (Upper)	18%	18%	No Change
Rays Fork	16%	17%	1%↑
Bearskin Creek	31%	31%	No Change
Richardson Creek (Middle)	27%	29%	2%↑
Gourdvine Creek	8%	8%	No Change
Salem Creek	13%	14%	1%↑
Sixmile Creek	30%	30%	No Change
Twelvemile Creek	25%	25%	No Change
Richardson Creek (Lower)	15%	16%	1%↑
Stewarts Creek	20%	22%	2%↑
Fourmile Creek	34%	34%	No Change
Crooked Creek	25%	27%	2%↑
Goose Creek	17%	17%	No Change
Irvins Creek	37%	37%	No Change
McAlpine Creek	37%	37%	No Change
Bakers Branch	8%	8%	No Change
Wide Mouth Branch	12%	12%	No Change

Note: Shaded rows indicate watersheds crossed by the Monroe Connector/Bypass ROW. The numbers in the far right column show the net differences in percent impervious cover that are predicted for RPA scenario compared to the No-Build scenario in 2030. Results have been rounded to the nearest whole percent. Differences were calculated prior to rounding. Calculations are based on percentages of impervious surface per land use category provided in the SCS TR-55 Manual (SCS, 1986).

In aggregate, the 2030 RPA scenario shows little difference as compared to the 2030 No-Build scenario; transportation (i.e., the RPA itself) accounts for the primary difference in acres of land use from the No-Build scenario. However, the changes in the detailed land use categories are predicted to have an effect on the number of households in the FLUSA. The best estimate of that increase in households derives from applying the approximate density for each residential category to the changes in residential land use forecast by this analysis. Throughout the FLUSA, there is expected to be about 800 acres where the RPA itself or Commercial or Industrial/Office/Institutional uses would replace anticipated low density residential uses when comparing the No Build to the RPA, resulting in a reduction of about 1,200 forecasted households. The results of the RPA land use forecast, however, indicate that about 500 acres of low density residential would convert to medium density residential and about 300 acres of

undeveloped land would convert to medium density residential when comparing the No Build to the RPA. The result of those changes would be an additional 2,500 households. The net effect of the forecast land use changes, when one applies the density values above, is approximately 1,300 additional households in the FLUSA under the RPA scenario.

Associated with the increase in developed acreage is a decrease in vegetated land cover. With the 2030 RPA scenario, agricultural and forested lands decrease more than with the No-Build scenario by 600 acres and 400 acres, respectively ((Table ES-1). These additional changes represent a one percent greater decrease and less than one percent greater decrease, respectively.

As shown in Table ES-2, results indicate that the 2030 RPA scenario will increase the percentage of the Study Area covered by impervious surfaces by less than one percent more than with the 2030 No-Build scenario. For individual watersheds, increases are found in 6 of the 18 Study Area watersheds (Rays Fork, Richardson Creek - Middle, Salem Creek, Richardson Creek - Lower, Stewarts Creek, and Crooked Creek). All six of these watersheds would experience an increase in impervious surface of one or two percent. The RPA has no measurable difference in effects on the amount of impervious surface in the remaining 12 watersheds, including the Goose Creek and Sixmile Creek watersheds, where there are known occurrences of the Carolina heelsplitter.

The summary of differences provided above highlights the incremental effect of the RPA. These are the effects expected to occur by 2030 with construction of the RPA that are greater than those expected to occur with the No-Build scenario.

For analysis of cumulative impact, the incremental effects were examined in light of additional reasonably foreseeable effects in the Study Area. While total amounts of effects (e.g., acreages, percentages, or miles change in forest edge) are presented in this quantitative ICE Technical Report, actual cumulative effects attributable to the Monroe Connector/Bypass only equal the results from the "incremental impact" of this project as stated in the definition above (Section E.3). The totals are presented in this Technical Report to provide context to the reader and to help determine whether or not the direct and indirect effects attributable to the project make the total of all reasonably foreseeable effects reach a threshold at which new or additional adverse effects may be prompted.

The following sections summarize the incremental effects attributable to the Monroe Connector/Bypass for each of the issues addressed in this Technical Report. For analysis of incremental effects to certain individual resources (e.g., endangered species and wildlife habitat), it was necessary to consider multiple land use categories. Grouping of categories was based on best professional judgment of areas that would most likely encompass the resources.

Water Quality and Carolina Heelsplitter

Findings show no measurable difference in percent impervious cover between the 2030 RPA and 2030 No-Build for the Study Area as a whole (Table ES-2). For individual watersheds with the 2030 RPA, findings show no difference for 12 of the 18 watersheds, including Goose Creek and Sixmile Creek. For the remaining six watersheds, a one to two percent difference between the 2030 RPA and the 2030 No-Build was found. It is possible that in the watersheds where there

are differences from the No-Build, the RPA's incremental effect could also have a cumulative effect when considered in combination with the incremental effects of other reasonably foreseeable future projects. More detailed water quality modeling is being prepared for the Goose Creek watershed to further evaluate potential impacts on the Carolina heelsplitter.

Other Endangered Species

This study considers the species listed as Federally-endangered that occur in Mecklenburg and/or Union counties: Carolina heelsplitter (addressed in the previous section with water quality), Michaux's sumac (*Rhus michauxii*), Schweinitz's sunflower (*Helianthus schwienitzii*), and smooth coneflower (*Echinacea laevigata*).

To assess potential impacts to the Carolina heelsplitter, changes in percent impervious surface were examined within the two watersheds having known occurrences of the species. With the assessment of direct and indirect effects, no measureable differences in impervious surface were found between the 2030 No-Build and 2030 RPA within the Goose Creek or Sixmile Creek watersheds. Therefore, there would be no cumulative effect to the Carolina heelsplitter as a result of the 2030 RPA.

To assess potential impacts to the three plant species, this analysis examined changes in land exhibiting habitat characteristics that would support the species. Results of this study found an approximately one percent incremental decrease in these habitats with the 2030 RPA as compared to the 2030 No-Build throughout the Study Area.

Land Use and Farmland Conversion

The RPA is predicted to have less than one percent incremental increase in total developed land uses. However, the composition of the total additional development is different between the RPA and No-Build scenarios. With the RPA, there is more medium density residential, commercial, and industrial/office/institutional growth, such that the increase in low density residential development is six percent less than that with the 2030 No-Build (79 percent of the total predicted cumulative development with the RPA vs. 85 percent with the No-Build).

The RPA is also predicted to convert 600 acres of agricultural land to low-density residential or other developed uses. This represents less than one percent greater conversion than that predicted with the No-Build scenario for farmlands in the Study Area.

Wildlife Habitat

The 2030 RPA is predicted to convert approximately one percent greater amount of undeveloped vegetated land in the Study Area as compared to the conversion predicted for the No-Build scenario. Measurable differences are anticipated in Richardson Creek – Lower and Crooked Creek, which show a 200-acre greater decrease with the RPA.

With respect to forest fragmentation, the RPA shows a one percent decrease in miles of edge between forested and developed areas as compared to the No-Build. This incremental effect is a result of greater contiguous build-out (resulting in less fragmentation) in interchange areas.

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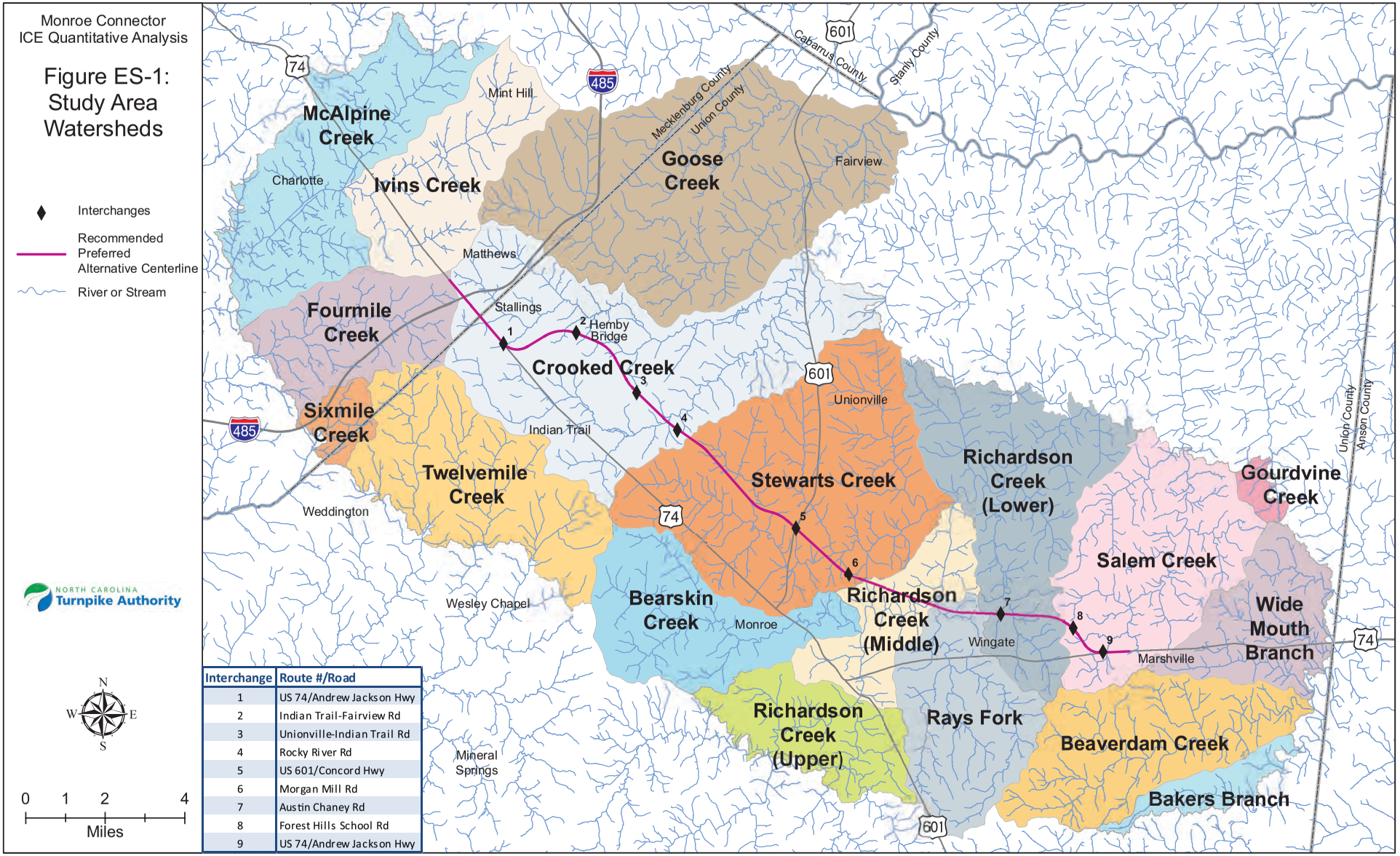
Monroe Connector
ICE Quantitative Analysis

Figure ES-1: Study Area Watersheds



Interchange	Route #/Road
1	US 74/Andrew Jackson Hwy
2	Indian Trail-Fairview Rd
3	Unionville-Indian Trail Rd
4	Rocky River Rd
5	US 601/Concord Hwy
6	Morgan Mill Rd
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

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Figures

Appendices

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1.0 INTRODUCTION AND BACKGROUND

The North Carolina Turnpike Authority (NCTA), a division of the North Carolina Department of Transportation (NCDOT), in cooperation with the Federal Highway Administration (FHWA), proposes to construct a project known as the Monroe Connector/Bypass, which would be a controlled-access toll road extending from US 74 near I-485 in Mecklenburg County to US 74 between the towns of Wingate and Marshville in Union County, a distance of approximately 20 miles (**Figure 1**). The proposed action is included in the NCDOT 2009–2015 State Transportation Improvement Program (STIP) as Project R-3329 (Monroe Connector) and Project R-2559 (Monroe Bypass) as a toll facility.

Circulated in April 2009, the Monroe Connector/Bypass Draft Environmental Impact Statement (EIS) (NCTA, 2009) provided a qualitative analysis of indirect and cumulative effects (ICE) based on a report produced earlier in the year by HNTB (Qualitative ICE Assessment) (HNTB, 2009). During the comment period for the Draft EIS, resource agencies providing input included the US Environmental Protection Agency (USEPA), US Fish and Wildlife Service (USFWS), North Carolina Department of Environment and Natural Resources (NCDENR), and NC Wildlife Resources Commission (NCWRC). Among their comments was a request for a quantitative ICE analysis to be included in the Final EIS. This Technical Report provides a quantitative analysis of indirect and cumulative effects attributable to the Recommended Preferred Alternative (RPA), as well as a variation of the RPA that omits one of the proposed interchanges (US 601). The latter was studied at the request of the USFWS. The analysis is based on extensive data regarding existing, planned and forecast land use; land use regulations; and anticipated development patterns associated with each alternative.

The quantitative ICE analysis considered four scenarios, as defined in Table 1.

Table 1: Scenarios Considered in the Quantitative ICE Analysis

Full Name of Alternative	Shortened Reference Name	Definition
Baseline Condition*	Baseline	Conditions existing in 2007
2030 No-Build Alternative**	2030 No-Build	Conditions anticipated for the year 2030 without construction of the proposed Monroe Connector/Bypass project
2030 Recommended Preferred Alternative (RPA)	2030 RPA	Conditions anticipated for the year 2030 with construction of the RPA as presented in the Draft EIS
2030 RPA without the US 601 Interchange	2030 RPA W/O 601 Interchange	Conditions anticipated for the year 2030 with construction of the RPA as presented in the Draft EIS with the exception that it would not include an interchange at the crossing of US 601.

* The year 2007 was selected for the Baseline condition because it is the closest year to the two main elements incorporated to the land use: parcel data from 2008 and aerial photography from 2007. NCGAP data (see Section 3.3 for definition) is also a large component of the data and is from 1992; however, it was only used to describe natural land use categories, which are less likely to change dramatically (e.g., from forest to grassland or vice versa).
** The year 2030 was selected for the Future condition for consistency with the Draft EIS qualitative ICE assessment and for compatibility with the TAZ forecasts.

The comments received on the Draft EIS raised the following issues related to indirect and cumulative effects: water quality, threatened and endangered species, the extent of land use changes (i.e., "sprawl development"), and air quality. This Technical Report addresses changes in land use and associated watershed percent impervious surfaces, threatened and endangered species, and also wildlife habitat. The Mecklenburg-Union Metropolitan Planning Organization (MUMPO) is in the process of addressing air quality through the appropriate regional air quality conformity analysis. In addition, NCTA will conduct detailed water quality modeling.

One resource that is the focus of this study is the Carolina heelsplitter (*Lasmigona decorata*), a Federally-listed endangered freshwater mussel species. In order to provide information useful for assessing impacts to known populations of the endangered species, this Technical Report highlights changes in the Goose Creek and Sixmile Creek watersheds. The Goose Creek watershed supports one of eleven known remaining populations of the Carolina heelsplitter and includes designated critical habitat for this species (67 Federal Register [FR] pp. 44501-44522). Also, in 2006, the USFWS reported a population of the Carolina heelsplitter in the Sixmile Creek watershed, downstream of the FLUSA in Lancaster County, South Carolina (USFWS, 2006).

The National Environmental Policy Act of 1969, as amended (NEPA), the North Carolina State Environmental Policy Act (SEPA), and the United States Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508) identify assessment of indirect and cumulative effects as a necessary component of environmental impact assessment for major Federal actions. In November of 2001, the NCDOT, in consultation with the NCDENR, released *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Volume II: Practitioner's Handbook* (NCDOT & NCDENR, 2001a). In this guidance document, the agencies agreed to the following steps that should be taken to thoroughly assess indirect and cumulative impacts (or effects):

Step 1: Definition of the Future Land Use Study Area (FLUSA)

Step 2: Identification of the FLUSA's Direction and Goals

Step 3: Inventory of Notable Features

Step 4: Identification of Important Impact-Causing Activities

Step 5: Identification and Analysis of Potential Indirect/Cumulative Effects

Step 6: Analyze Indirect/Cumulative Effects

Step 7: Evaluate Analysis Results

Step 8: Assess the Consequences and Develop Appropriate Mitigation and Enhancement Strategies

For the Monroe Connector/Bypass Draft EIS, NCTA completed Steps 1 through 5 of the NCDOT's ICE analysis process (NCDOT & NCDENR, 2001a), culminating in a qualitative assessment of indirect and cumulative effects. The analysis for the Final EIS will build on the data, research and findings of the qualitative analysis to complete Steps 6 and 7 of the NCDOT ICE analysis process. The quantitative analysis provided in this Technical Report will not include assessment of mitigation and enhancement strategies (Step 8). This final, more qualitative step is anticipated to be completed within the context of all impacts assessed in the Final EIS and after further agency coordination.

2.0 STUDY AREA BOUNDARIES

The NCDOT ICE Guidance (NCDOT & NCDENR, 2001a) indicates that the development effects of a new or improved roadway facility are most often found within one mile of an interchange, and approximately two to five miles along major intersecting roadways to the interchange. Using the ICE Guidance, it was determined for the purposes of the Draft EIS that the potential for ICE exists within about five miles of the various project alignments, which for the purpose of the study were evaluated as a single Build Alternative. This approximate five-mile radius is depicted in the Draft EIS, Figure 7-1, and is referred to in the Draft EIS (NCTA, 2009) and the Qualitative ICE Assessment (HNTB, 2009) as the Future Land Use Study Area (FLUSA).

For the more detailed purposes of this Technical Report, the Draft EIS FLUSA was expanded to include all of the Goose Creek watershed (14-digit Hydrologic Unit 03040105030020) (USGS & USDA, 1999) as well as the headwaters of some of the area streams in the FLUSA. The Goose Creek watershed is located at its closest point approximately one mile north of the RPA in northwestern Union County. Although some of the FLUSA watersheds overlap Anson County, the FLUSA was not expanded into Anson County because it lies outside the five-mile radius and does not contain special resources noted in comments on the Draft EIS. This expanded FLUSA is the area within which the Build Alternatives have the potential to affect the resources that are the subject of this Technical Report (water quality, threatened and endangered species, and land use). The expanded FLUSA is hereafter referred to as the Study Area for the quantitative ICE analysis and is depicted in Figure 2. The watersheds within the Study Area are delineated in Figure 3 and watershed areas are listed in Table 2; the Goose Creek watershed is the relatively large watershed along the northern border.

Table 2. Watersheds in the Study Area

Watershed Name	Area (Square Miles)
Beaverdam Creek	18.2
Richardson Creek (Upper)	10.6
Rays Fork	14.7
Bearskin Creek	15.2
Richardson Creek (Middle)	9.3
Gourdvine Creek	1.2
Salem Creek	21.7
Sixmile Creek	2.6
Twelvemile Creek	20.4
Richardson Creek (Lower)	23.3
Stewarts Creek	35.3
Fourmile Creek	12.1
Crooked Creek	38.3
Goose Creek	42.3
Irvins Creek	14.8

Watershed Name	Area (Square Miles)
McAlpine Creek	21.2
Bakers Branch	3.6
Wide Mouth Branch	10.8

The Study Area includes several municipalities: Charlotte, Monroe, Matthews, Stallings, Indian Trail, Weddington, Wesley Chapel, Hemby Bridge, Fairview, Unionville, Wingate, Mint Hill and Marshville. As shown in Table 3, these municipalities have undergone extensive growth since 1990. Population data for 1990 and 2000 are from the US Census and the 2008 population estimate was obtained from the North Carolina State Demographics Unit (NCSDU).

Table 3. Growth in the Study Area, 1990 to 2008

Municipality	1990 Population	2000 Population	2008 Population	% Increase from 2000 to 2008
Charlotte	395,934	540,828	683,541	26%
Monroe	16,567	26,228	37,280	42%
Matthews	13,651	22,127	28,634	29%
Mint Hill	11,567	14,922	20,748	39%
Weddington	3,803	6,696	14,420	115%
Hemby Bridge	2,876	897	1,921	114%
Wingate	2,821	2,406	4,255	77%
Stallings	2,132	3,189	12,345	287%
Marshville	2,020	2,360	3,090	31%
Indian Trail	1,942	11,905	26,954	126%
Fairview	1,830	2,495	5,105	105%
Wesley Chapel	NA	2,549	6,299	147%
Unionville	NA	4,797	7,754	62%
County Population				
Mecklenburg	511,433	695,454	877,007	26%
Union	84,211	123,677	191,108	55%

As shown in Table 3, there has been substantial growth in the Study Area since 2000. This has caused several municipalities to modify their approach to managing growth, especially in Union County, which currently has a prohibition on new sewer connections. Figure 4 shows the location of current and planned sewer services in the Study Area. However, the source for the information in Figure 4 (NC Center for Geographic Information and Analysis, 2004-2006) is less current than the evolving municipal service plans; thus, the indirect and cumulative effect analysis gives precedence to the information provided by local planners with regard to where future sewer service is anticipated to be made available.

Table 4 lists the changes in zoning, land use plans, and other jurisdictional growth management practices that have taken place since 2003/2004 when the regional forecasts were initially developed. Especially

significant are the adoption of land use/development plans by the communities of Fairview, Unionville, and Weddington; the Goose Creek Site Specific Water Quality Management Plan; and the Post Construction Ordinances developed by Stallings, Mint Hill, and Matthews, as they specifically address practices to lessen the effect of development on water quality.

Table 4. Zoning or Other Jurisdictional Changes Developed During or After 2003

Jurisdiction	Document	Year
Goose Creek Watershed	Site Specific Water Quality Management Plan for the Goose Creek Watershed	2009
City of Monroe	Land Development Plan	Last Modified 2008
	Stormwater Management Ordinance	Modified 2007
	Zoning Code (Floodplain Permits)	Modified 2008
Town of Indian Trail	Unified Development Ordinance	Established in 2008
Town of Unionville	Zoning Ordinance	Adopted October 2003
	Land Use Plan	Adopted 2006
Town of Fairview	Land Development Plan	Adopted 2005
	Flood Plain Ordinance	Modified 2009
	Land Use Ordinance	Adopted 2005
Town of Stallings	Land Use Ordinance	Updated 2009
	Post Construction Ordinance	Adopted 2008
Town of Mint Hill	Zoning Ordinance	Minor Floodplain update 2006
	Post Construction Ordinance	Adopted 2007
Town of Marshville	Land Use Ordinance	Updated 2007
Town of Wingate	Land Use Ordinance	Updated 2008
Town of Weddington	Land Use Plan	Adopted 2006
	Temporary Development Ordinance	Adopted 2008
Village of Wesley Chapel	Land Use Plan	Adopted 2003
	Floodplain and Stormwater Ordinance	Adopted 2005
City of Matthews	Zoning Code	Modified 2008
	Post Construction Ordinance	Adopted 2007
Charlotte-Mecklenburg	Zoning Ordinance	Updated 2008
	East District Future Land Use Map	Adopted 2007
Union County	Land Use Plan Map	Updated 2006
	Zoning Map	Updated 2007

3.0 PROJECT APPROACH

The following sections detail the background research (Section 3.1), interviews (Section 3.2), data used to represent the Baseline condition (i.e., existing land use) (Section 3.3), methods employed to predict future land use conditions for all 2030 scenarios (Section 3.4), other methods used in this analysis (Section 3.5), and limitations of the project approach (Section 3.6).

3.1 Background Research

Prior to the initiation of interviews, it was necessary to gain an understanding of the Study Area. Initial review began with the Qualitative ICE Assessment (HNTB, 2009) and Draft EIS (NCTA, 2009). The *Site Specific Water Quality Management Plan for the Goose Creek Watershed* (NCDENR, 2009) was reviewed to determine land use regulations for this sensitive watershed. A site visit was conducted and photographs were taken of "typical" development for each community, with a special emphasis placed on the Goose Creek watershed and areas in the immediate vicinity of the proposed Build Alternatives. Many of the municipalities in the project Study Area have websites, so each community's website was searched to determine if there were documents posted that could be of assistance in the preparation of the quantitative ICE. Relevant documents searched included planning documents, infrastructure data, tax parcel data, traffic studies, and local ordinances regulating zoning, floodplains, agricultural districts, post construction, and development. A search was also conducted of the MUMPO website for similar types of information. Information sources used during the review process are listed in Table 5.

Table 5: Documents Reviewed at Beginning of Quantitative ICE Analysis

Source	Document	Year*
Charlotte Mecklenburg Planning Department	Adopted Area Plan Infrastructure Implementation Recommendations	2007
City of Charlotte	Zoning Ordinance (City of Charlotte)	2009
City of Monroe	City of Monroe Code of Ordinances	1994
	City of Monroe, Downtown Master Plan	2008
Mecklenburg-Union Metropolitan Planning Organization (MUMPO)	2030 Long Range Transportation Plan and Air Quality Conformity Determination	2007
MUMPO	2035 Draft Long Range Transportation Plan	2009
NCDENR	Site Specific Water Quality Management Plan for the Goose Creek Watershed	2009
North Carolina Department of Environment and Natural Resources Division of Water Quality (NCDENR-DWQ)	National Pollutant Discharge Elimination Permit System Permit Number NCS000395 (Mecklenburg County and the Towns of Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville Jurisdictional Areas)	2005
NCDOT	Marshville Comprehensive Transportation Plan Study	2009a
Town of Indian Trail	The Villages of Indian Trail – A Plan for Managed Growth and Livability	2005
	Downtown Master Plan	2006
	Post Construction Storm Water Ordinance	2007

Source	Document	Year*
	Unified Development Ordinance	2008
Town of Marshville	Land Use Plan	2004
	Land Development Ordinance	2007
Town of Marshville, Town of Wingate	Strategic Plan for Economic Development, Town of Marshville, Town of Wingate	2008
Town of Matthews	Downtown Matthews Master Plan and Design Guidelines	1997
	Subdivision Ordinance	2003
	Zoning and Post Construction Ordinances	Undated
Town of Mint Hill	Comprehensive Transportation Plan	2008
Town of Wingate	Land Use Ordinance	2008
Union County	Comprehensive Plan Update: Transportation Analysis and Strategies	2008a
	Land Use Ordinance	2008b
	2009 Draft Comprehensive Plan	2009
Village of Marvin, Town of Waxhaw, Town of Weddington, Village of Wesley Chapel, and Centralina Council of Governments	Western Union County Local Area Regional Transportation Plan	2009
Village of Wesley	Village of Wesley Chapel Land Use Plan	2003

Note: *Full citations for these references (Source, Year) are located in Section 8.0.

3.2 Interviews

For the Qualitative ICE Assessment (HNTB, 2009), interviews were conducted in 2008 with planners whose jurisdiction overlapped the Study Area, e.g., the Council of Government (COG) and city planning department representatives. For the quantitative ICE analysis, members of the Project Team conducted interviews with the same organizations in August 2009, with follow-up questions if necessary. For each interview, Table 6 lists the organization that was the focus of the interview, the individual respondents, and the dates of contact.

Each interview began with an introduction of the study and its goals. A map of the Study Area was provided to facilitate communication. The purpose of the interviews was to identify changes to future land use scenarios since the 2008 interviews for the Qualitative ICE Assessment (HNTB, 2009), gather additional information on the expanded Study Area (i.e., Goose Creek watershed area), and gather any new or updated databases or GIS data that would be useful to the analysis. Requested data included:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data

- Existing land use (GIS data preferred)
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

Table 6: List of Interviews Completed in August 2009

Organization	Respondents	Date of Interview
Town of Wingate	Dryw Blanchard - Planning Director	August 12 and 25, 2009, via email exchange
Centralina COG	Bill Duston - Director Centralina COG Jana Finn - Marshville and Fairview Land Use Administrator Nadine Bennett - Former Unionville Land Use Administrator	August 17, 2009
Town of Matthews	Kathi Ingrish - Planning Director	August 18, 2009
Union County Planning	Dick Black - Director Lee Jenson - Land Use Administrator Cynthia Mabry - GIS Specialist	August 18, 2009
Town of Marshville	John Munn - Interim Planning Director	August 19, 2009
Town of Indian Trail	Shelly DeHart - Planning Director	August 19, 2009
Town of Mint Hill	Lee Bailey - Planning Director	August 21, 2009
Charlotte – Mecklenburg Planning	Garet Johnson - Assistant Director, Land Range Planning Services & Strategic Planning Services	August 24, 2009
City of Monroe	Lisa Stiwinter - Interim Director of Planning Doug Britt - Senior Planner	August 24, 2009
Union County Public Works	Ed Goscicki - Director Amy Helms - Asst. Director, Infrastructure and Development Mike Garbarak - Asst. Director, Engineering Scott Huneycutt - Asst. Director, Water	August 24, 2009
Town of Stallings	Brian Matthews - Town Manager Lynne Hair - Planning Director	August 27, 2009

Prior to the discussion, staff provided a list of the questions to the respondents. Appendix A contains complete minutes from all of the interviews. In addition to supplemental questions pertaining to the specific interviewee's location or expertise, the following 13 questions were asked during each interview:

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*
3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*
4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*
5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*
6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*
7. *Have long-term growth expectations changed since the previous interview (2008)?*
8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)?*
9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*
10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*
11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*
12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*
13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

The interviews generally took between 30 and 60 minutes to complete. Several common outcomes occurred among the interviews:

- Often, zoning maps provided the best current land use, while land use plans provided the best future land use.

- A number of the land use plans were in the process of being updated and were not yet available for this study. Older land use plans tended not to include the Monroe Connector/Bypass, while the updated plans usually included the project.

- The Traffic Analysis Zone (TAZ) -level forecasts of households and employment were generally considered to be reasonable for broader areas (i.e., municipalities), but less accurate for specific areas (i.e., section of town or major road intersection). A TAZ is the unit of geography most commonly used in conventional transportation planning models. The zones are developed using socio-economic information from the US Census.

- In every case, respondents said that their long-term population growth expectations (to 2030) had not changed since the 2008 interviews, but they expected slower growth in the near term due to the economic recession.

- Much of the growth depends on expanded water and sewer service, but respondents generally assumed these would be built within 10-15 years.

- Respondents reported very few zoning violation enforcement issues; however, they noted that natural resource protection (e.g., stream buffer enforcement at Goose Creek) was considered to be a responsibility of the State.

A summary of each interview (including follow-up interviews if conducted) is included in **Appendix A**. Based on the interviews, the existing land use plans for Monroe (except for the Rocky River Corridor), Marshville, Matthews, Mint Hill, Stallings, Wingate, Centralina COG, and Charlotte Mecklenburg do not include the Monroe Connector/Bypass. The land use plan for Indian Trail includes the project, and plans for Union County include the connector, but do not include surrounding land use changes associated with the project. The City of Monroe has developed a supplemental plan for the Rocky River Corridor that includes the Monroe Connector. The land use plans and zoning for Monroe, Matthews, and Union County are currently being updated and will include the Monroe Connector/Bypass.

The local governments provided GIS data, when available, and documents that included land use, zoning, new developments, updated plans, and water and sewer service. This information, along with the interview responses, was used to develop the existing and future land use data. The development of those datasets is described in the following sections. Based on discussions with MUMPO, TAZ forecasts were developed using currently-approved land use plans in the mid-1990s. In light of the local government input on the TAZ forecasts and the fact that they were developed prior to many of the most recent planning documents, the TAZ forecasts were used to represent the 2030 No Build land use, with some fine-tuning based on specific development plans in place such as industrial parks. The updated plans were used where appropriate to develop the 2030 Build land use.

The North Carolina Department of Water Quality (NCDWQ) was contacted with regards to the Goose Creek Buffer Rules and no violations had been reported as of December 12, 2009 (Personal Communication, Alan Johnson, NCDWQ). There is a process by which variances to the buffer in the Goose Creek Watershed can be obtained: an appeal is made by the jurisdiction to NCDWQ, then NCDWQ reviews the application and presents information to the Environmental Management Commission, which is responsible for granting or denying the variance (Personal Communication, Karen Higgins, NCDWQ). While conditions of some variances may include some level of mitigation, it is not explicitly required by or stated in the regulations.

3.3 Existing Land Use Data

Existing land cover was developed using parcel-based data from both Mecklenburg and Union counties combined with zoning layers from all the local jurisdictions and the NCGAP[1] land cover dataset, which is based on 1992 aerial photography. The existing land cover is largely a combination of these three data sets, with developed land based on current parcel data and the NCGAP data filling in the land cover types where parcels are undeveloped. Each parcel was classified as developed or undeveloped. Undeveloped properties included vacant land and farms. For parcels in the developed category, each was assigned one of five land use categories based on its zoning category and land use attributes from the parcel assessment records. The five categories were:

1. Low Density Residential
2. Medium Density Residential
3. High Density Residential
4. Commercial
5. Industrial/Office/Institutional

Spot checks for the assessment were conducted by comparing recent aerial photography (2007) of the Study Area with the assessed land use. In addition to the zoning and parcel land use attributes, Union County provided a list of parcels that had applied for tax deferral based on agricultural use. This list was used to categorize farm properties as undeveloped. Aerial photography was used to identify farm properties in Mecklenburg County and also to check for other farms in Union County that were not included in the farm deferral list provided by the County.

Once each parcel was assigned to one of these five development categories or the undeveloped category, the parcel polygon feature class was converted to a raster image with 30x30 meter cell size to match the NCGAP land cover. Each raster cell is a 30x30 meter square, or about one quarter of an acre. For undeveloped properties, the NCGAP raster dataset was used to fill in the natural and farm land covers within those areas. Since parcels do not cover all land in the Study Area, a provision had to be made to account for areas outside parcel boundaries. Since nearly all land not included within a parcel boundary is a road right-of-way, these areas were categorized as transportation uses. Figure 5 illustrates how the existing land use raster was developed. It shows for an example area how the parcels were categorized and converted to a raster and then the undeveloped areas were filled in with the NCGAP land cover.

The resulting land cover is a raster image consisting of over 900,000 individual cells, each cell categorized into one of 26 land use categories. The 26 land cover categories consist of: 5 developed categories, 1 transportation category, 2 farm categories, 16 vegetation categories from the NCGAP land cover, and 2 barren categories from the NCGAP land cover. Existing land use, or Baseline condition, is presented in

[1] The Gap Analysis Program is a national program with the mission of developing key datasets needed to assess biological diversity across the nation. The North Carolina Gap Analysis Project (NCGAP) was a state affiliate based at the North Carolina Cooperative Fish and Wildlife Research Unit and charged with developing those data for the state. A map of North Carolina's land cover was developed using Landsat TM satellite imagery acquired in 1991 and 1992.

Figure 6. To simplify the display of the land cover, many categories have been aggregated into larger categories in Figures 6, 11, 12 and 13. These aggregated categories are:

- Agricultural Fields: includes both the Agricultural Fields and the Agricultural Pasture/Hay and Natural Herbaceous.
- Barren: includes both Barren (bare rock and sand) and Barren (quarries, strip mines, and gravel pits).
- Forested: includes Coniferous Cultivated Plantation (natural / planted), Successional Deciduous Forests, Piedmont Xeric Pine Forests, Piedmont Dry-Mesic Pine Forests, Piedmont Xeric Woodlands, Piedmont/ Mountains Dry-Mesic Oak and Hardwood Forests, Piedmont Mesic Forest, Xeric Pine-Hardwood Woodlands and Forests.
- Other Natural: includes Piedmont/Mountain Submerged Aquatic Vegetation, Piedmont/Mountain Emergent Vegetation, Riverbank Shrublands, Floodplain Wet Shrublands.

3.4 Future Land Use

Future No-Build Scenario

Developing future land use scenarios began with the development of the 2030 No-Build land cover.

Lands Excluded from Development

Prior to allocating growth, stream buffers were excluded from the subset of developable parcels because development within these areas is prohibited by local and/or state regulations as summarized in **Appendix A**. Buffers were developed based on the Post Construction Ordinance regulations and NCDENR's *Site Specific Water Quality Management Plan for the Goose Creek Watershed* (NCDENR, 2009). These regulations vary somewhat between jurisdictions but generally require the following buffers: 30 feet on streams draining areas less than 50 acres; 35 feet on streams draining more than 50 acres and less than 300 acres; 50 feet on streams draining areas more than 300 acres less than 640 acres; and 100 feet plus the floodplain on streams draining more than 640 acres. Special rules apply in the Goose Creek watershed where undisturbed riparian buffers within 200 feet of waterbodies within the 100-year floodplain and within 100 feet of waterbodies that are not within the 100-year floodplain are now required (NCDENR, 2009). Buffers were developed on all streams in the National Hydrographic Dataset available for the area (USGS & USDA, 1999). While it is possible to obtain an exemption to these restrictions, it is assumed that mitigation requirements would offset any impacts.

Residential Development Allocation

Future development was largely calculated based on growth in households and employment as predicted in the MUMPO TAZ forecasts using methods consistent with NCDOT's ICE Guidance for assessing future land use (NCDOT & NCDENR, 2001b, p. A-19). The 2030 TAZ forecasts for the FLUSA were adopted by the regional MPO in the spring of 2008 and were developed in 2004 during an extensive top-down and bottom-up data collection and forecasting process. Details of this process are outlined in **Appendix B**. According to local planners, the resulting forecasts are most representative of the No-Build Scenario and thus serve as the control total basis for determining No-Build future land use.

For each TAZ, the total undeveloped (vacant or agricultural) area was determined based on the parcel categorization completed for the existing land cover (see Section 3.3). For the future scenario, each undeveloped parcel was re-categorized into one of the five development categories based on the future land use plans and zoning of the local jurisdictions. For residential properties, the land use categories equated to the following densities:

- Low Density Residential – two dwelling units (DU) per acre or fewer
- Medium Density Residential – greater than two DU per acre but fewer than five
- High Density Residential – five or more DU per acre

Household growth by TAZ based on the MUMPO's forecasts is depicted in Figure 7. The allocation for residential growth followed a four-step process, as detailed below.

Step 1 - Identification of TAZ Build-Out Capacity: The total acreage of currently undeveloped land that is zoned or planned for future residential development based on local land use plans was calculated for each TAZ to determine the total build-out capacity of that TAZ. Based on local future land use plans, each parcel was assigned a residential land use category, and the total number of possible dwelling units was determined.

Step 2: - Identification of Forecasts by TAZ: The build-out capacity values calculated in Step 1 were then compared to the household growth in the MUMPO TAZ forecasts.

Step 3 - Density Adjustments for Over-Capacity TAZs: Where projected growth based on MUMPO's TAZ forecast exceeded capacity (determined in Step 1 above), spot checking was done to determine where infill development could be expected to increase density, and parcels were reclassified to a higher residential density appropriately to allow the projected growth to "fit" within the TAZ area.

Step 4 - Distribution of Growth for Under-Capacity TAZs: Where projected growth was equal to or less than capacity, a "percentage of capacity factor" was calculated by dividing the projected growth by the capacity. This factor was used to determine the reduction of the potential build-out area necessary to represent the forecast level of growth.

Rather than selecting some parcels to build-out and others to remain undeveloped, the methodology spreads the growth across a proportionate amount of every potential parcel. This provides a more fragmented land use projection than that which might actually occur; therefore, it is a conservative estimate (i.e., overestimate), in terms of coverage, of the areas that may have future development. Given that TAZ boundaries are smaller than watershed boundaries (see Figure 8), distributing growth to control totals within the TAZs does not appear to potentially skew the indirect or cumulative effects results for watersheds.

It should be noted that only a portion of each developable parcel was converted to development for the future land use scenario, as described below, so that the total acres of development in each TAZ was maintained according to the forecasts. For example, if a TAZ had 1,000 acres of currently undeveloped parcels categorized for low density residential growth in the future (two DU per acre), the TAZ would have capacity for 2,000 households. If the TAZ was expected, based on MUMPO forecasts, to add 1,000 households in the future, the TAZ would be filling only 50 percent of its capacity. Thus, a 50 percent reduction factor would be applied to all currently undeveloped parcels in that TAZ categorized for future

low density residential development. Therefore, each of those parcels in that TAZ would be reduced in size by 50 percent to reflect the expectation that growth under the 2030 No-Build scenario will only fill 50 percent of the total capacity of low density residential development in that TAZ, and the remaining 50 percent was classified as undeveloped. These undeveloped areas retained the previously assigned NCGAP land cover category (as listed in Section 4.0).

Non-Residential Development Allocation

A similar process was completed for future non-residential development. All currently undeveloped parcels with non-residential zoning or future land use designations were summarized at the TAZ level to calculate the difference between projected growth and capacity.

The MUMPO TAZ forecasts include projections for the number of new employees by economic sector for each TAZ. Those sectors were aggregated into Office, Retail or Industrial/Warehouse employment growth. Total employment growth by TAZ is depicted in Figure 9. MUMPO TAZ forecast data is presented in Appendix B. Projected new employees were used to calculate new acres of employment-related development using the Social Cost of Alternative Land Development Scenarios (SCALDS)) model values provided in the NCDOT's ICE Guidance for assessing future land use (NCDOT & NCDENR, 2001b, p. A-14). These model values are presented in Table 7.

Table 7: Non-Residential Land Use by Employment

Employment Type	Employees/Acre
Office	52.32
Retail	21.78
Industrial/Warehousing/ Distribution	16.33

As with the residential land use analysis, the resulting values from the conversion of employees to acres of land developed were compared to the total capacity for each land use in each TAZ. Reduction factors were calculated in similar fashion to the residential process. These reduction factors were then applied to the non-residential parcels. As with residential development, the growth was spread across a portion of all developable parcels rather than selecting which parcels would develop and which would not within each TAZ.

Once both residential and non-residential development had been accounted for in the parcel and TAZ analysis, the "reduced" parcels categorized by land use were converted to 30x30-meter raster and overlaid on the existing land cover raster to create a new 2030 No-Build scenario raster image.

Future Build Scenarios

Two 2030 Build land use scenarios were evaluated as part of this study. The first, the 2030 RPA scenario, includes the RPA with all proposed interchanges; the second, the 2030 RPA W/O 601 scenario, includes the RPA with all interchanges except the US 601 interchange. The 2030 No-Build land use was used as the base for these Build scenarios.

Improvements in Accessibility/Travel Time

Generally, new roadways encourage new or additional development, in large part, because of the improvements in accessibility they provide. Therefore, an analysis of accessibility was completed to determine the areas most likely to see development increases attributable to the Monroe Connector/Bypass. In the case of the Monroe Connector/Bypass, the main areas of employment in the region are in Mecklenburg County; therefore, improving accessibility (as measured by travel time) to I-485 and the major employment centers in Mecklenburg County would be the main reason for changes in development patterns. This assertion is supported by the Qualitative ICE Assessment (HNTB, 2009) and the ICE discussion in the Draft EIS (NCTA, 2009). To identify the areas with substantially improved accessibility, the difference in travel times between the 2030 No-Build scenario and 2030 RPA scenario to the US 74/I-485 interchange was calculated for the Study Area.

Figure 10 shows the changes in driving time under the Build scenario (2030 RPA) compared to the No-Build scenario within the Study Area. This analysis was completed using the Network Analyst extension of ArcGIS and a general roadway network with posted speed limit attributes. The travel time from all intersections within the Study Area to the I-485/US 74 interchange was calculated in both the No-Build and Build scenarios. The scenarios are compared on the basis of traffic operating at posted speed limits. The difference in travel time to each intersection was calculated, and the result was converted to a raster surface using the Inverse Distance Weighted method. The resulting raster surface is an estimate of the travel time improvement between the two scenarios given the assumptions. It is mostly an illustrative tool for determining which areas will see accessibility improvements as a result of the RPA. The 2030 RPA shows improvement in accessibility, especially east of Monroe and around Wingate. There are also improvements for some sections of Unionville along NC 200 (Morgan Mill Road).

Based on this improved accessibility, as well as the availability of sewer service, the areas around Monroe and Wingate, in the eastern portions of the Study Area, are most likely to see increased growth as a result of the project. Availability of sewer service in the future was determined by using Future Public Sewer System coverage from the NC Center for Geographic Analysis. Figure 4 shows the estimates of existing and future availability of sewer service in the Study Area. Additionally, Wingate and Marshville have plans to encourage development around the interchange areas within their jurisdictions (Blanchard, 2009 and Town of Marshville and Town of Wingate, 2008). These observations were suggested in the Qualitative ICE Assessment (HNTB, 2009) and Draft EIS (NCTA, 2009), and are supported by this GIS analysis and the interviews conducted for the quantitative ICE analysis.

Hartgen Analysis of Interchanges

In addition to the accessibility analysis described above, a "Hartgen analysis" was completed for each interchange area to gauge potential for development, using methods researched by Dr. David Hartgen (NCDOT & NCDENR, 2001a, p. IV-27). A Hartgen analysis reviews the traffic volumes, distance to nearest towns, and access to sewer and water services to gauge the potential for induced development at interchanges in rural areas. The results of that analysis indicated that all interchanges except the Forest Hills School Road interchange have at least moderate potential for commercial development. Thus, the Build scenario analysis indicates that more dense growth would be expected where accessibility improves and other needed infrastructure will be available in the future. Results of this analysis are shown in **Appendix C**.

Project-Induced Growth Allocation

The additional growth attributable to the project was estimated through a combination of scenario writing (identifying the likely locations of more intense development) and build-out analysis (identifying the likely capacity for development in those areas). This process began with reviewing the plans of local jurisdictions that had accounted for the proposed Monroe Connector/Bypass (note that these are generally more recent than the plans that formed the basis of the TAZ forecasts), then reviewing zoning and land use plans for parcels around interchanges and the likelihood of future sewer and water utility access. The amount of additional development was determined based on the availability of land in the vicinity of proposed interchanges, the density allowed by zoning and land use plans for the jurisdictions and the capacity for additional development. Capacity for additional development is limited primarily by the access to sewer services. Thus, those areas around the interchanges that are not expected to receive sewer service in the future were not considered for higher density uses. Most new commercial development was allocated in the immediate vicinity of interchanges or at major crossroads nearby. Additional residential development or increases in residential density were allocated in areas near (within roughly one mile) but not immediately adjacent to interchanges. The resulting adjustments in parcel level land use from the 2030 No-Build scenario was then converted to a 30x30 meter raster land cover and overlaid on the 2030 No-Build raster.

Project-Induced Growth Conclusions

Based on this analysis, the expectation is that the 2030 Build scenario would result in approximately 1,200 fewer low-density residential acres, 700 additional medium density residential acres, less than 100 additional high density residential acres, 200 additional commercial acres, and 100 additional industrial/office/institutional acres in the Study Area as compared to the 2030 No-Build scenario. Most of this induced development is expected within approximately one mile of the interchanges. This is expected because the accessibility improvements are most marked around the interchanges and because local land use policy combined with the lack of access to sewer service, particularly north of the project in Unionville, are not conducive to additional land development or increases in density.

Distribution of induced development was determined based on capacity of available land, local plans, zoning and additional analysis. Unionville has no plans for increasing residential density or "upzoning" land to commercial use; therefore, at both the US 601 and NC 200 (Morgan Mill Road) interchanges, the extent of the induced development is limited. For commercial development, the Hartgen analysis indicates at least moderate commercial development opportunity at all interchanges except the Forest Hills School Road interchange. Thus, the 2030 Build scenario land use includes some induced commercial development at all interchanges except Forest Hills School Road. The exact location and extent of that induced commercial development is dependent on the local land use and zoning as well as on the capacity of available land.

Much of the induced industrial/office development for the Study Area is expected at the Indian Trail-Fairview Road and Austin Chaney Road interchanges, as local jurisdictions have plans for industrial parks and significant industrial or office development at these interchange locations. Most interchanges are expected to see some increase in residential development or the density of residential development. The primary limiting factor for residential development is the potential for increase in density based on local land use plans, especially in Unionville. Interchanges with limited available land and that already

have plans for extensive industrial/office development, such as Indian Trail-Fairview Road and Austin Chaney Road, have less available capacity for induced residential development.

Induced land use changes in the area of US 74 at the western terminus of the project are expected to be limited. Since most of the land in the vicinity of this interchange is already developed, there is little opportunity for additional development attributable to the RPA.

At Indian Trail-Fairview Road, approximately 50 acres of additional industrial development is expected with the Build scenario. This is consistent with the Indian Trail's zoning and land use plans for the interchange area to become a major industrial park.

At Unionville-Indian Trail Road, Indian Trail land use plans foresee a village center as the focal point of the interchange area. Land use plans call for additional commercial space to take advantage of the interchange and medium density residential in a more traditional neighborhood design. Land use changes under the Build scenario are a shift from residential to commercial for about 50 acres and increases in residential density affecting about 100 acres.

At Rocky River Road, an addition of approximately 50 acres of commercial land use is expected, with about half being converted from a different use compared to the No-Build, consistent with City of Monroe's Rocky River Land Use Corridor Plans (November 2008) for additional commercial development in this area should the RPA be built. At US 601, an additional 50 acres of commercial development, with about half being converted from residential use compared to the No-Build, is expected and is consistent with the City of Monroe zoning and plans for areas near this interchange. About 100 acres of residential land use are expected to increase in density. While this is not consistent with existing zoning for the area, it is foreseeable that additional residential density would follow commercial development in the vicinity of this interchange.

At Morgan Mill Road, additional commercial development of less than 50 acres is expected just south of the interchange, mostly converted from residential compared to the No-Build scenario. In addition, about 50 acres of increased residential density is expected in the Build scenario. Also, less than 50 acres of industrial land use, converted from residential as compared to the No-Build, is expected and is consistent with existing land use and zoning.

At Austin Chaney Road, additional industrial/office development of about 100 acres, plus additional commercial of about 50 acres is expected. Most of these additions would replace residential development as compared to the No-Build scenario. Additional or increased residential density of about 150 acres is also expected. These are generally consistent with the *Strategic Plan for Economic Development* indicating that this interchange area should be a focal point for development in eastern Union County.

At Forest Hill School Road, only new residential development is expected as the Hartgen Analysis indicated poor conditions for commercial development. About 100 acres of additional or higher density residential development is expected around this interchange.

The Qualitative ICE Assessment (HNTB, 2009) and Draft EIS suggested that growth would shift to the east based on increased accessibility to Charlotte and availability of affordable land, which could lead to less-than-projected growth in the western portion of the Study Area. Determining a basis for locations from which to "subtract" projected development was not apparent, however, from either the accessibility

analysis or the interviews with planners. Thus, to ensure that the analysis is conservative, the induced growth was reflected in the Build forecast, but the amount of growth was not reduced elsewhere to offset these increases (except where commercial development in the Build scenario replaced other developed land types such as low-density residential in the No Build scenario). The overall result of this methodology is an over-estimation of total growth in the Study Area related to the Build scenarios. From a regional perspective, it appears likely that some reductions would occur, most likely in the areas that do not show much change in accessibility with the Build scenario. These areas include those that show little improvement in travel time from the No-Build to Build scenarios, particularly the area north of the proposed Monroe Connector/Bypass, which includes the Goose Creek watershed. The area along the US 74 corridor would seem to be a candidate for reduced development as well; however, the potential for reduced congestion in that corridor with the Build scenario and the redevelopment plans anticipated along portions of the corridor could serve as factors to offset such a prediction.

Overall, the changes in land use forecast by this analysis reflect a change in intensity of land use with minimal net change in acres of development. This change would result in a net increase in households in the FLUSA. The best estimate of that increase in households derives from applying the approximate density for each residential category (1.5 dwelling units per acres for low density residential and 4 dwelling units per acre for medium density residential) to the changes in residential land use forecast by this analysis. Throughout the FLUSA, there is expected to be about 800 acres where the RPA itself or Commercial or Industrial/Office/Institutional uses would replace anticipated low density residential uses when comparing the No Build to the RPA, resulting in a reduction of about 1,200 forecasted households. The results of the RPA land use forecast, however, indicate that about 500 acres of low density residential would convert to medium density residential and about 300 acres of undeveloped land would convert to medium density residential when comparing the No Build to the RPA. The result of those changes would be an additional 2,500 households. The net effect of the forecast land use changes, when one applies the density values above, is thus about 1,300 additional households in the FLUSA under the RPA scenario.

2030 RPA w/o 601 Interchange Scenario

The 2030 RPA W/O 601 Interchange scenario was developed as an extension of the first Build scenario (2030 RPA). Without an interchange at US 601, there is unlikely to be any induced development where the proposed Monroe Connector/Bypass crosses US 601. In the 2030 RPA W/O 601 Interchange scenario, induced development that would have occurred around the US 601 interchange is shifted to the closest interchanges east and west. Thus, the overall level of induced development is similar, but the location is spread among nearby interchanges.

Figure 11, Figure 12, and Figure 13 show the 2030 No-Build, 2030 RPA, and 2030 RPA W/O 601 Interchange land uses, respectively.

3.5 Other Actions

Cumulative effects are addressed under two CEQ regulations, 40 CFR 1508.7 and 40 CFR 1508.25(a)(2). As stated in 40 CFR 1508.7, a "[c]umulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

50 CFR §402.02 provides a somewhat different definition of cumulative effect to Federally listed threatened and endangered species, specifically. However, for the purposes of this Technical Report, Federal actions were included with the future changes that may affect protected species. This was determined to be the best approach for this study because 1) it provides a conservative (i.e., high) estimate of changes to land use, and 2) quantifying projected future Federal actions is particularly difficult. Many of the private, local, or state actions predicted in this analysis may become Federal actions in the future through permitting procedures (e.g., Clean Water Act Section 404 permit approvals by the USACE). For this study, each reasonably foreseeable future non-Federal action was considered a contributor to the cumulative effect on protected species, regardless of whether it may be a Federal action in the future.

Federal Actions

Several types of Federal actions have the potential to generate cumulative effects. However, within the Study Area, the main Federal actions reasonably expected to take place through the analysis period (the year 2030) are associated with funding from the US Department of Housing and Urban Development (HUD), specifically the Community Development Block Grant (CDBG); expenditures of Federal highway funds; stimulus funds from the American Recovery and Reinvestment Act of 2009 (ARRA); and other actions that require Federal permits. These projects theoretically also could have indirect land use effects or other growth-related indirect or cumulative impacts. However, none of the projects has advanced to preparation of a NEPA document that would analyze these effects. A summary of other known federal actions in the Study Area is provided in **Appendix D**.

Two of the projects in the MUMPO Draft 2035 Long-Range Transportation Plan (MUMPO, 2009) pass through portions of the Goose Creek Watershed: Index # 3013 (STIP Project U-5007) Widening of NC 51 and Index # 3117, Widening of I-485. Both of these projects have a potential to cause ICEs in the Goose Creek Watershed. However, as is the process for the Monroe Connector/Bypass project, ICEs for these projects will be analyzed and minimized during the development of environmental documents and permits.

Non-Federal Actions

Non-Federal reasonably foreseeable actions were determined through the land use planning research and interviews detailed in Section 3.4. This process accounted for actions that will be performed by the state and local governments and private entities using data available for the Study Area communities. For cumulative effects that additionally need to consider Federal actions (i.e., all resources other than threatened and endangered species), the Federal actions described in the previous section were added into the calculations. Results from the cumulative effects analysis are presented in Section 6.0.

3.6 Limitations of Analysis

As with any attempt to forecast future growth or development, there are limitations to the accuracy and certainty of the results of these analyses. Most of these analyses rely on the land use forecasts described in earlier sections. These land use forecasts were developed using recommended methods as described in the NCDOT ICE Guidance. Specifically, the land use forecasts rely on the Socioeconomic Forecasts developed by MUMPO, and, therefore, the results are only as accurate as those forecasts. The quantities of projected development also rely on assumptions about development density, as explained in earlier sections of this chapter, and these assumptions are another limitation on the accuracy of the analysis. Thus, the process of developing the Build scenario forecasts induces uncertainty. The exact level of

uncertainty resulting from these forecasts is not possible to quantify. Despite the inability to assign a specific margin of error, given the resolution of the GIS layers used in the analysis and the size of parcels in the Study Area, all results have been rounded to the hundreds of acres, whole percentages (see also Section 4.2), and tenths of miles. While the average parcel in the Study Area is only two acres, the largest in the Study Area are over 600 acres, and the standard deviation of parcel sizes is ten acres. Given that parcels were the building blocks of the land use analysis and their range of size is so high, it is prudent to round total acreages to hundreds of acres.

In addition to assumptions about the quantities of future development, the analysis also requires assumptions about the distribution of future development. The purpose of producing the quantified scenarios is to gain an understanding of the incremental effects of the proposed action (i.e., indirect effects) as well as the overall cumulative effects to the environment. Consequently, assumptions made about the distribution of land use follow a logical construct but are not necessarily accurate. In other words, the analysis is a product of assumptions that allow reasonable estimates and comparisons to be made, but in so doing, the actual projected distribution of development is generalized according to those assumptions and does not replicate the unknown individual private land use decisions of the future. Specifically, by allocating growth within TAZs to a proportion of all developable parcels rather than selecting entire parcels to be built-out and others to remain vacant, the projected land use pattern for this analysis is more fragmented than that which would actually be expected to occur. The advantage of this approach is that it is transparent and neutral in "spreading" effects across undeveloped land within TAZs. The quantities of development projected within TAZs are accurate to the degree explained in the previous paragraph; however, it must be acknowledged that the accuracy of the distribution of effects below the TAZ level is limited, with the exception of the areas that reach build-out and those that have specifically identified future development areas in local plans. Most importantly, however, these assumptions do not affect the comparison between the No-Build and Build scenarios but rather the distribution of development in all the future land use scenarios.

For differences in acreage between scenarios, the differences were calculated based on the raw output from the land use results, prior to those results being rounded. One outcome of this is that differences reported in the tables do not always match the differences seen in comparing the reported totals for each land use category in each scenario. Standard practice is to calculate difference prior to rounding. The main reason for this standard practice is to maintain the same level of precision in showing the differences as is shown in the results for each land use category. Calculating differences between scenarios after rounding would result in the differences having a lower level of precision.

As noted throughout the methodology sections of the report, where choices in methodology were necessary, the path chosen led to results that would be conservatively high, rather than potentially underestimating effects. This is true in several cases, including the limited reduction in No Build scenario growth that would offset the increased development in the Build Alternative, despite the fact that some offsetting redistributive effects appear likely to occur somewhere within the Study Area.

3.7 Climate Change/Greenhouse Gas Emissions

The issue of greenhouse gas emissions and their effects on global climate is an important national and global issue, in which FHWA is actively engaged. FHWA has been working with other Federal agencies, including the USEPA and the U.S. Department of Energy, to evaluate effective approaches consistent

with our national goals. However, no national approach has yet been set in law or regulations, nor has the USEPA established criteria or thresholds for greenhouse gas emissions. Because a national strategy to address greenhouse gas emissions from transportation - and all other sectors - is still being developed, FHWA believes that it is premature to implement policies that attempt to incorporate consideration of greenhouse gas emissions into transportation planning.

From a NEPA perspective, it is analytically problematic to conduct a project-level cumulative effects analysis of greenhouse gas emissions on a problem that is global in nature. It is technically unfeasible to accurately model how negligible increases or decreases of CO_2 emissions at a project scale would add or subtract to the carbon emissions from around the world. Given the level of uncertainty involved, the results of such an analysis would not be likely to inform decision-making at the project level, while adding considerable administrative burdens to the NEPA process. The scope of any such analysis, with any results being purely speculative, goes far beyond the disclosure of impacts needed to make sound transportation decisions. FHWA believes this approach meets the stated purpose of NEPA, in accord and with CEQ regulations, to concentrate on the analyses of issues that can be truly meaningful to the project decision, rather than simply amassing data.

4.0 LAND USE RESULTS & IMPERVIOUS SURFACE ESTIMATION

4.1 Methodology and Results

Impervious surface acreage was estimated for the Baseline, the 2030 No-Build, and each of the future Build scenarios (2030 RPA and 2030 RPA W/O 601 Interchange). These calculations were based on the land use estimates detailed below.

Results of the land use calculations are presented in Table 8, Table 9, Table 10, and Table 11, as determined using the methodologies described in Sections 3.3 and 3.4. In addition to presenting acreage and percentage of total acreage for land uses, the following tables provide comparisons in the far right columns. In Table 9, the 2030 No-Build scenario is compared to the 2007 Baseline condition. This comparison is also depicted in Figure 14.

The predicted change between the Baseline and 2030 No-Build is then compared to the changes predicted for the two Build scenarios in Table 10 and Table 11. Figure 15 shows the difference between the 2030 No-Build and the 2030 RPA land use conditions. This difference is extremely similar to how the 2030 RPA W/O 601 Interchange compares to the 2030 No-Build as well. To illustrate this last point, Figure 16 shows the difference between the 2030 RPA and 2030 RPA W/O 601 Interchange land use conditions.

Table 8: 2007 Baseline Land Use

Land Use	Total Area (acres)	% of Total Area
Total Residential	70,000	35%
Low Density Residential	*54,400*	*27%*
Medium Density Residential	*12,700*	*6%*
High Density Residential	*2,900*	*1%*
Commercial	3,600	2%
Industrial/Office/Institutional	6,200	3%
Transportation	12,800	6%
Total Developed	**92,600**	**46%**
Agricultural Fields	20,500	10%
Agricultural Pasture/Hay and Natural Herbaceous	33,200	16%
Total Agricultural	**53,700**	**27%**
Coniferous Cultivated Plantation	1,200	1%
Successional Deciduous Forest	4,200	2%
Piedmont Xeric Pine Forests	1,000	1%
Piedmont Dry-Mesic Pine Forests	4,800	2%
Piedmont Xeric Woodlands	4,100	2%
Piedmont Dry-Mesic Oak and Hardwood Forests	16,600	8%
Piedmont Deciduous Mesic Forest	5,900	3%
Xeric Pine-Hardwood Woodlands and Forests	1,900	1%
Dry Mesic Oak Pine Forests	9,800	5%
Piedmont Mixed Bottomland Forests	1,800	1%
Piedmont Oak Bottomland and Swamp Forests	2,100	1%
Total Forested	**53,400**	**26%**
Barren (quarries, strip mines, and gravel pits)	200	0%
Barren (bare rock and sand)	100	0%
Piedmont Submerged Aquatic Vegetation	0	0%
Piedmont Emergent Vegetation	0	0%
Riverbank Shrublands	200	0%
Floodplain Wet Shrublands	0	0%
Open Water	1,600	1%
Total Other	**2,100**	**1%**
TOTAL	**202,000**	**100%**

Note: Results have been rounded to the nearest 100 acres and whole percent (see Section 4.2). Totals may appear not to equal the sum of the parts because of rounding.

Table 9: 2030 No-Build Land Use

Land Use	Total Area (acres)	% of Total Area	Difference in Percentage from Baseline
Total Residential	97,900	48%	14%
Low Density Residential	*81,300*	*40%*	*13%*
Medium Density Residential	*13,600*	*7%*	*0%*
High Density Residential	*3,100*	*2%*	*0%*
Commercial	4,800	2%	1%
Industrial/Office/Institutional	8,500	4%	1%
Transportation	12,800	6%	0%
Total Developed	**124,200**	**61%**	**16%**
Agricultural Fields	14,700	7%	-3%
Agricultural Pasture/Hay and Natural Herbaceous	23,100	11%	-5%
Total Agricultural	**37,800**	**19%**	**-8%**
Coniferous Cultivated Plantation	600	0%	0%
Successional Deciduous Forest	3,000	1%	-1%
Piedmont Xeric Pine Forests	600	0%	0%
Piedmont Dry-Mesic Pine Forests	3,100	2%	-1%
Piedmont Xeric Woodlands	2,800	1%	-1%
Piedmont Dry-Mesic Oak and Hardwood Forests	12,000	6%	-2%
Piedmont Deciduous Mesic Forest	4,500	2%	-1%
Xeric Pine-Hardwood Woodlands and Forests	1,300	1%	0%
Dry Mesic Oak Pine Forests	7,100	4%	-1%
Piedmont Mixed Bottomland Forests	1,600	1%	0%
Piedmont Oak Bottomland and Swamp Forests	1,600	1%	0%
Total Forested	**38,200**	**19%**	**-8%**
Barren (quarries, strip mines, and gravel pits)	0	0%	0%
Barren (bare rock and sand)	100	0%	0%
Piedmont Submerged Aquatic Vegetation	0	0%	0%
Piedmont Emergent Vegetation	0	0%	0%
Riverbank Shrublands	100	0%	0%
Floodplain Wet Shrublands	0	0%	0%
Open Water	1,500	1%	0%
Total Other	**1,800**	**1%**	**0%**
TOTAL	**202,000**	**100%**	

Note: Results have been rounded to the nearest 100 acres and whole percent (see Section 4.2). Differences were calculated prior to rounding. Results of "0%" represent changes less than half a percent and not absolute zero change in percentage. Totals may appear not to equal the sum of the parts because of rounding.

Table 10: 2030 RPA Land Use

Land Use	Total Area (acres)	% of Total Area	Difference in Percentage from 2030 No-Build
Total Residential	97,500	48%	<1%↓
Low Density Residential	*80,100*	*40%*	*<1%↓*
Medium Density Residential	*14,300*	*7%*	*<1%↑*
High Density Residential	*3,000*	*2%*	*0%*
Commercial	5,100	3%	<1%↑
Industrial/Office/Institutional	8,700	4%	<1%↑
Transportation	13,900	7%	<1%↑
Total Developed	**125,200**	**62%**	**<1%↑**
Agricultural Fields	14,500	7%	<1%↓↓
Agricultural Pasture/Hay and Natural Herbaceous	22,700	11%	<1%↓
Total Agricultural	**37,200**	**18%**	<1%↓
Coniferous Cultivated Plantation	600	0%	0%
Successional Deciduous Forest	3,000	1%	0%
Piedmont Xeric Pine Forests	600	0%	0%
Piedmont Dry-Mesic Pine Forests	3,100	2%	0%
Piedmont Xeric Woodlands	2,700	1%	0%
Piedmont Dry-Mesic Oak and Hardwood Forests	11,800	6%	<1%↓
Piedmont Deciduous Mesic Forest	4,500	2%	0%
Xeric Pine-Hardwood Woodlands and Forests	1,200	1%	0%
Dry Mesic Oak Pine Forests	7,000	3%	0%
Piedmont Mixed Bottomland Forests	1,600	1%	0%
Piedmont Oak Bottomland and Swamp Forests	1,500	1%	0%
Total Forested	**37,700**	**19%**	**<1%↓**
Barren (quarries, strip mines, and gravel pits)	0	0%	0%
Barren (bare rock and sand)	100	0%	0%
Piedmont Submerged Aquatic Vegetation	0	0%	0%
Piedmont Emergent Vegetation	0	0%	0%
Riverbank Shrublands	100	0%	0%
Floodplain Wet Shrublands	0	0%	0%
Open Water	1,500	1%	0%
Total Other	**1,800**	**1%**	**0%**
TOTAL	**202,000**	**100%**	

Note: Results have been rounded to the nearest 100 acres and whole percent (see Section 4.2). Differences were calculated prior to rounding. Results of "0%" represent changes less than half a percent and not absolute zero change in percentage. Totals may appear not to equal the sum of the parts because of rounding.

Table 11: 2030 RPA W/O 601 Interchange Land Use

Land Use	Total Area (acres)	% of Total Area	Difference in Percentage from 2030 No-Build
Total Residential	97,600	48%	<1%↓
Low Density Residential	*80,200*	*40%*	*<1%↓*
Medium Density Residential	*14,300*	*7%*	*<1%↑*
High Density Residential	*3,000*	*2%*	*0%*
Commercial	5,100	3%	<1%↑
Industrial/Office/Institutional	8,600	4%	<1%↑
Transportation	13,900	7%	<1%↑
Total Developed	**125,200**	**62%**	**<1%**↑
Agricultural Fields	14,500	7%	<1%↓
Agricultural Pasture/Hay and Natural Herbaceous	22,700	11%	<1%↓
Total Agricultural	**37,200**	**18%**	<1%↓
Coniferous Cultivated Plantation	600	0%	0%
Successional Deciduous Forest	3,000	1%	0%
Piedmont Xeric Pine Forests	600	0%	0%
Piedmont Dry-Mesic Pine Forests	3,100	2%	0%
Piedmont Xeric Woodlands	2,700	1%	0%
Piedmont Dry-Mesic Oak and Hardwood Forests	11,800	6%	<1%↓
Piedmont Deciduous Mesic Forest	4,500	2%	0%
Xeric Pine-Hardwood Woodlands and Forests	1,200	1%	0%
Dry Mesic Oak Pine Forests	7,000	3%	0%
Piedmont Mixed Bottomland Forests	1,600	1%	0%
Piedmont Oak Bottomland and Swamp Forests	1,500	1%	0%
Total Forested	**37,700**	**19%**	**<1%**↓
Barren (quarries, strip mines, and gravel pits)	0	0%	0%
Barren (bare rock and sand)	100	0%	0%
Piedmont Submerged Aquatic Vegetation	0	0%	0%
Piedmont Emergent Vegetation	0	0%	0%
Riverbank Shrublands	100	0%	0%
Floodplain Wet Shrublands	0	0%	0%
Open Water	1,500	1%	0%
Total Other	**1,800**	**1%**	**0%**
TOTAL	**202,000**	**100%**	

Note: Results have been rounded to the nearest 100 acres and whole percent (see Section 4.2). Differences were calculated prior to rounding. Results of "0%" represent changes less than half a percent and not absolute zero change in percentage. Totals may appear not to equal the sum of the parts because of rounding.

As shown in the far right columns of Table 10 and Table 11, all changes in land cover predicted for the Build scenarios are within one percent (i.e., between negative one percent and one percent) of the change that is predicted with the No-Build scenario in the year 2030. This difference represents the indirect plus direct impacts of the proposed project.

In order to determine the amount of impervious surface in the overall Study Area and by watershed under the Build and No-Build scenarios, each land use category was assigned an assumed level of impervious surface. This step of the analysis followed guidance in the Soil Conservation Service (SCS) TR-55 Manual (SCS, 1986). The SCS TR-55 Manual is widely used for drainage studies and runoff calculations. Land use categories with their associated percentage of impervious coverage applied in this quantitative ICE analysis are presented in Table 12.

Table 12: Percent Impervious Surface for Each Land Use Category

Land Use Category	% Impervious using SCS TR-55 Manual
Commercial	85%
Industrial/Office/Institutional	70%
High Density Residential	38%
Medium Density Residential	25%
Low Density Residential	20%
Transportation	100%
Agricultural and Natural	0%

Source: SCS, 1986

These percentages were applied to the land use acreages, and results are summarized in Table 13. Because the analysis revealed no measurable difference between the two Build scenarios, they are presented as one Build scenario in this summary. However, each alternative is presented separately for the discussions of indirect and cumulative effects in Section 5.0 and Section 6.0, respectively.

Table 13: Percent Impervious Surface by Watershed and Alternative

Watershed Name	Baseline Impervious Cover	2030 No-Build Impervious Cover	Change from Baseline to 2030 No-Build	2030 Build Impervious Cover[1]	Change from 2030 No-Build to 2030 Build[1]
Study Area	18%	22%	4%	22%	No Change
Beaverdam Creek	6%	7%	1%	7%	No Change
Richardson Creek (Upper)	14%	18%	4%	18%	No Change
Rays Fork	12%	16%	4%	17%	1%
Bearskin Creek	24%	31%	7%	31%	No Change
Richardson Creek (Middle)	23%	27%	4%	29%	2%
Gourdvine Creek	6%	8%	2%	8%	No Change
Salem Creek	9%	13%	4%	14%	1%
Sixmile Creek	25%	30%	5%	30%	No Change
Twelvemile Creek	22%	25%	3%	25%	No Change
Richardson Creek (Lower)	10%	15%	5%	16%	1%
Stewarts Creek	15%	20%	5%	22%	2%
Fourmile Creek	32%	34%	2%	34%	No Change
Crooked Creek	21%	25%	5%	27%	2%
Goose Creek	13%	17%	4%	17%	No Change
Irvins Creek	35%	37%	2%	37%	No Change
McAlpine Creek	36%	37%	1%	37%	No Change
Bakers Branch	6%	8%	2%	8%	No Change
Wide Mouth Branch	10%	12%	2%	12%	No Change

Notes: Shaded rows indicate watersheds crossed by the Monroe Connector/Bypass ROW. Percentages have been rounded to the nearest whole percent (see Section 4.2). Differences were calculated prior to rounding.
[1] Results were the same for both the 2030 RPA and the 2030 RPA W/O 601 Interchange scenarios.

Validation of the impervious surface estimation was completed by comparing impervious surface data (in the form of a GIS polygon layer) provided by Mecklenburg County to the existing land cover raster described above. The impervious surface data provided by the County was developed in order to bill property owners for the impervious surface on their property to raise revenue for the local storm water utility; this data is considered to be an accurate representation of the development context given that it was developed from analysis of aerial photography and is legally defensible for taxing purposes. The County's polygon layer was overlaid on the existing land use raster developed for this ICE quantitative

analysis. The result showed markedly lower levels of impervious surface[2] than the assumptions from the SCS TR-55 manual used in the analysis summarized in Table 13. Much of Mecklenburg County that is within the Study Area is typical suburban development and is similar to the type of development expected across the rest of the Study Area. The results suggest that actual impervious surface percentages would likely be lower than those calculated with the SCS TR-55 assumptions. When percent impervious changes were calculated based on these lower values, differences between the Build and No-Build Alternatives for the Study Area watersheds were still no more than two percent, indicating that the Monroe Connector/Bypass would have minimal effects on the percent impervious cover.

4.2 Estimation Accuracy

Based on a review of the original datasets and the type of analysis completed, it was determined that it was most appropriate to round results to whole percentages. This was based on two rationales:

1. Baker's analysis relies on averaging a percent impervious value for each of the land use types, and those values are only available as whole percentages.
2. In the average watershed, one percent of the area equals 500 raster cells, or 112 acres, whereas one-tenth of a percent would only equal about 11 acres, which is too precise to represent a result for this study given the parcel sizes. While the average parcel size in the Study Area is only two acres, the largest is over 600 acres, and the standard deviation of parcel sizes is ten acres.

4.3 Conclusion

As shown Table 13, the difference in impervious surfaces between the Build and No-Build scenarios reaches a maximum of two percent increase, and this increase occurs in three watersheds (Richardson Creek – Middle, Stewarts Creek, and Crooked Creek). A difference of one percent occurs in three additional watersheds (Rays Fork, Salem Creek, and Richardson Creek - Lower). For the remaining 12 watersheds, there is no measureable difference between the Build and No-Build scenarios. This result is the same for both Build Alternatives (the 2030 RPA and the 2030 RPA W/O 601 Interchange scenarios).

With respect to actual acreage of impervious surface in the Study Area, it is presumed that this analysis presents conservatively high results by using the SCS TR-55 Manual assumptions. If the analysis were to apply actual known percentages of impervious surface per land use layer as documented by a jurisdiction that covers a portion of the Study Area (Mecklenburg County), the analysis would have resulted in lower acreages and percentages of impervious surface. For the purposes of this environmental study, however, it is most suitable to apply conservatively high levels in order to assess potential adverse effects to the natural environment and prepare mitigation measures if appropriate.

5.0 POTENTIAL INDIRECT EFFECTS

Indirect effects are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air

[2] Commercial = 64%, Industrial/Office/Institutional = 32%, High Density Residential = 35%, Medium Density Residential = 16%, Low Density Residential = 10%, Transportation = 100%, and Agricultural and Natural = 0%.

and water and other natural systems, including ecosystems" (40 CFR 1508.8(b)). For the purposes of this report, indirect effects to land use and impervious surface are not separated from the direct effects resulting from the proposed project's footprint. This approach results in a more complete calculation of the differences between the No-Build and Build alternatives because the following results do not exclude the conversion of the proposed project right-of-way to transportation land use. The direct effect to land use is calculated to be 1,094 acres for the RPA and 1,063 acres for the RPA W/O 601 Interchange based on footprints provided by the NCTA in December 2009.

Each of the following sections compares the effects associated with the two Build Alternatives to those of the No-Build Alternative for the year 2030, including indirect and, in the case of the Build Alternatives, direct effect. This comparison yielded the incremental effects of each Build Alternative. The direct effect acreage is equal to the right of way for each Build Alternative, which was assumed to be entirely transportation use and impervious, even though some of the right of way will actually remain unpaved. Again, the most conservative assumption (i.e., an overestimation of impervious surface) was used.

Effects are broken down by land use category for the whole Study Area (Section 5.1) and by the amount of impervious surface in each Study Area watershed (Section 5.2). Additionally, Section 5.3 addresses the consistency of any induced land use changes with local plans.

5.1 Land Use

The following tables (Table 14 and Table 15) present the differences between the 2030 No-Build Alternative and each of the Build Alternatives, accounting for both direct conversion of land within right-of-ways and induced development.

Table 14: Indirect Plus Direct Effects to Land Use of 2030 RPA

Land Use Category	2030 No-Build		2030 RPA		
	Total Area (acres)	% of Total Area	Total Area (acres)	% of Total Area	Difference from 2030 No-Build
Total Residential	97,900	49%	97,500	48%	<1%↓
Low Density Residential	*81,300*	*40%*	*80,100*	*40%*	*<1%↓*
Medium Density Residential	*13,600*	*7%*	*14,300*	*7%*	*<1%↑*
High Density Residential	*3,100*	*2%*	*3,000*	*2%*	*<1%↓*
Commercial	4,800	2%	5,100	3%	<1%↑
Industrial/Office/Institutional	8,500	4%	8,700	4%	<1%↑
Transportation	12,800	6%	13,900	7%	1%↑
Total Developed	**124,200**	**61%**	**125,200**	**62%**	**1%↑**
Total Agricultural	**37,800**	**19%**	**37,200**	**18%**	**1%↓**
Total Forested	**38,200**	**19%**	**37,700**	**19%**	**<1%↓**
Total Other	**1,800**	**1%**	**1,800**	**1%**	**0%**
TOTAL	**202,000**		**202,000**		

Notes: Results have been rounded to the nearest 100 acres and whole percent (see Section 4.2). Differences were calculated prior to rounding. Totals may appear not to equal the sum of the parts because of rounding. For more detailed breakdown of acreages and percentages within the Study Area, see Table 9 and Table 10.

Differences in land use between the 2030 RPA and 2030 No-Build scenarios are small relative to the overall level of development in the Study Area. Total additional developed land is approximately 1,000 acres, less than one percent of all land in the Study Area. Agricultural and forested lands decrease by 600 and 400 acres, respectively, as a result of the additional developed land. These additional changes represent a one percent and less than one percent greater decrease, respectively, as compared to the 2030 No-Build condition (Table 8).

While the aggregate numbers describing the change in developed land indicate that transportation (i.e., the Build Alternative itself) accounts for the primary difference in land use from the No Build alternative, there are also important differences in the detailed developed land use categories. There is a decrease of over 1,200 acres in low-density residential land use, but an increase of 700 acres in medium-density residential, which is estimated to produce the net increase of 1,300 households in the Study Area with the RPA. Also, commercial and industrial land use categories increase by 300 and 200 acres, respectively. The decreases in projected low-density residential land use acres are a result of replacement by the direct effects of the Build scenarios, by commercial or industrial development near interchanges, or by medium-density residential development in the 2030 RPA land use scenario.

Table 15: Indirect Plus Direct Effects to Land Use of 2030 RPA W/O 601 Interchange

Land Use Category	2030 No-Build		2030 RPA W/O 601 Interchange		
	Total Area (acres)	% of Total Area	Total Area (acres)	% of Total Area	Difference from 2030 No-Build
Total Residential	97,900	49%	97,600	48%	<1%↓
Low Density Residential	*81,300*	*40%*	*80,200*	*40%*	*<1%↓*
Medium Density Residential	*13,600*	*7%*	*14,400*	*7%*	*<1%↑*
High Density Residential	*3,100*	*2%*	*3,100*	*2%*	*0%*
Commercial	4,800	2%	5,100	3%	<1%↑
Industrial/Office/Institutional	8,500	4%	8,600	4%	<1%↑
Transportation	12,800	6%	13,900	7%	<1%↑
Total Developed	**124,200**	**61%**	**125,200**	**62%**	**<1%↑**
Total Agricultural	**37,800**	**19%**	**37,200**	**18%**	**1%↓**
Total Forested	**38,200**	**19%**	**37,700**	**19%**	**<1%↓**
Total Other	**1,800**	**1%**	**1,800**	**1%**	**0%**
TOTAL	**202,000**		**202,000**		

Notes: Results have been rounded to the nearest 100 acres and whole percent (see Section 4.2). Differences were calculated prior to rounding. Totals may appear not to equal the sum of the parts because of rounding. For more detailed breakdown of acreages and percentages within the Study Area, see Table 9 and Table 11.

Differences in land use between the 2030 RPA W/O 601 Interchange and 2030 No-Build scenarios are also small relative to the overall level of development in the Study Area, and there is no difference between the 2030 RPA and 2030 RPA W/O 601 scenarios in terms of percent of land use cover. There are minor differences between the 2030 RPA and 2030 RPA W/O 601 in terms of detailed land use categories, in each case totaling no more than 100 acres in difference. Total additional developed land is approximately 1,000 acres, less than one percent of all land in the Study Area. Agricultural and forested lands decrease by 600 and 400 acres, respectively, as a result of the additional developed land. These additional changes represent a one percent and less than one percent greater decrease, respectively, as compared to the 2030 No-Build condition (Table 8).

5.2 Impervious Surface

As discussed in Section 4.1, impervious surface was calculated by applying assumptions of percent impervious surface for each land use category (based on the SCS-TR 55 Manual) to the land uses determined through the future land use mapping effort. Table 16 and Table 17 present the difference between the No-Build scenario and the 2030 RPA and the 2030 RPA W/O 601 Interchange scenarios, respectively. The total effect (including direct conversion of the project right of way to transportation land cover and induced development) is presented as a difference in the percentage of impervious surface by watershed.

Table 16: Indirect Plus Direct Effects to Percent Impervious Surface by Watershed of 2030 RPA

Watershed Name	2030 No-Build Percent Impervious Cover	2030 RPA Percent Impervious Cover	Difference in Percentages
Study Area	22%	22%	<1%↑
Beaverdam Creek	7%	7%	No Change
Richardson Creek (Upper)	18%	18%	No Change
Rays Fork	16%	17%	1%↑
Bearskin Creek	31%	31%	No Change
Richardson Creek (Middle)	27%	29%	2%↑
Gourdvine Creek	8%	8%	No Change
Salem Creek	13%	14%	1%↑
Sixmile Creek	30%	30%	No Change
Twelvemile Creek	25%	25%	No Change
Richardson Creek (Lower)	15%	16%	1%↑
Stewarts Creek	20%	22%	2%↑
Fourmile Creek	34%	34%	No Change
Crooked Creek	25%	27%	2%↑
Goose Creek	17%	17%	No Change
Irvins Creek	37%	37%	No Change
McAlpine Creek	37%	37%	No Change
Bakers Branch	8%	8%	No Change
Wide Mouth Branch	12%	12%	No Change

Note: Shaded rows indicate watersheds crossed by the Monroe Connector/Bypass ROW. The numbers in the far right column show the net differences in acres that are predicted for the RPA scenario as compared to the No-Build scenario in 2030 throughout the Study Area. Results have been rounded to the nearest whole percent (see Section 4.2). Differences were calculated prior to rounding. Calculations are based on percentages of impervious surface per land use category provided in the SCS TR-55 Manual (SCS, 1986).

Increases in impervious surface as a result of the 2030 RPA are relatively small. Increases are found in six of the watersheds in the Study Area (Rays Fork, Richardson Creek - Middle, Salem Creek, Richardson Creek - Lower, Stewarts Creek, and Crooked Creek). All six of these watersheds see an increase in impervious surface of one or two percent. The RPA has no measurable difference in effect on the amount of impervious surface in the remaining 12 watersheds, including the Goose Creek watershed.

Table 17: Indirect Effects to Percent Impervious Surface by Watershed of 2030 RPA W/O 601 Interchange

Watershed Name	2030 No-Build Percent Impervious Cover	2030 RPA W/O 601 Interchange Percent Impervious Cover	Difference in Percentages
Study Area	22%	22%	<1%↑
Beaverdam Creek	7%	7%	No Change
Richardson Creek (Upper)	18%	18%	No Change
Rays Fork	16%	17%	1%↑
Bearskin Creek	31%	31%	No Change
Richardson Creek (Middle)	27%	29%	2%↑
Gourdvine Creek	8%	8%	No Change
Salem Creek	13%	14%	1%↑
Sixmile Creek	30%	30%	No Change
Twelvemile Creek	25%	25%	No Change
Richardson Creek (Lower)	15%	16%	1%↑
Stewarts Creek	20%	22%	2%↑
Fourmile Creek	34%	34%	No Change
Crooked Creek	25%	27%	2%↑
Goose Creek	17%	17%	No Change
Irvins Creek	37%	37%	No Change
McAlpine Creek	37%	37%	No Change
Bakers Branch	8%	8%	No Change
Wide Mouth Branch	12%	12%	No Change

Note: Shaded rows indicate watersheds crossed by the Monroe Connector/Bypass ROW. The numbers in the far right column show the net differences in percent impervious cover that are predicted for RPA scenario compared to the No-Build scenario in 2030. Results have been rounded to the nearest whole percent (see Section 4.2). Differences were calculated prior to rounding. Calculations are based on percentages of impervious surface per land use category provided in the SCS TR-55 Manual (SCS, 1986).

Increases in impervious surface as a result of the 2030 RPA W/O 601 Interchange are relatively small and the same as those estimated for the 2030 RPA. Increases are found in six of the watersheds in the Study Area (Rays Fork, Richardson Creek - Middle, Salem Creek, Richardson Creek - Lower, Stewarts Creek, and Crooked Creek). All six of these watersheds see an increase in impervious surface of one or two percent. The RPA W/O 601 Interchange scenario has no measurable difference in effect on the amount of impervious surface in the remaining 12 watersheds, including the Goose Creek watershed.

5.3 Consistency with Local Plans

Many of the long-range planning documents for the Study Area did not include the Monroe Connector/Bypass, or were uncertain as to when it might be constructed. For example, the amended 2030 Long Range Transportation Plan (LRTP) developed by MUMPO revised the estimated design year for the

project from 2010 to 2020. The current draft of the 2035 LRTP estimates that the project will be constructed by 2015. During interviews with local planners, most indicated that their existing long-term land use plans did not include the project. This includes the communities of Unionville and Fairview, Charlotte-Mecklenburg Planning, the City of Monroe, as well as the Towns of Marshville, Mint Hill, Stallings and Wingate. It should be noted that the Wingate/Marshville Economic Development Plan does include the Monroe Connector/Bypass.

The Town of Matthews includes the Monroe Connector/Bypass in its long term land use plans, but they include a general project location without finalized designs. The Town of Indian Trail's Comprehensive Plan anticipates the project will be constructed (although it assumes an alignment different than the RPA) with the US 601 Interchange.

Several jurisdictions are in the process of updating their long range land use plans, and they anticipate that the Monroe Connector/Bypass will be included in these updated documents. These jurisdictions include the Town of Wingate, the City of Monroe, and the Union County Planning Department.

6.0 POTENTIAL CUMULATIVE EFFECTS

This Technical Report addresses cumulative effects to water quality, threatened and endangered species, land use, and wildlife habitat. The NEPA definition of cumulative effect is "the effect on the environment which results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

As detailed in the following sections, the incremental effects of the Build Alternatives are generally one percent greater than the effects associated with the No-Build Alternative. Greater differences can be found with examination of results for individual watersheds.

6.1 Water Quality

For the purposes of this report, cumulative effects to water quality are addressed through reporting on the percent of impervious surface. Impervious surface consists of artificial surfaces where water cannot soak through, such as roof tops, asphalt, or concrete. This variable is presumed to be the best indicator of potential adverse effect to water quality because increases in impervious surface have a direct effect on water storage and flow in a watershed. As the amount of impervious surface increases, runoff increases in velocity, quantity, temperature, and pollution load. In addition, impervious surfaces prevent natural pollutant filtering by preventing percolation. As part of the Final EIS, NCTA will conduct a detailed study of changes in sediment and nutrients using detailed water quality modeling.

Total effects to percent impervious surface are presented in Table 18. Because effects in one area can potentially have a water quality effect downstream, these effects have been broken out by watershed for each alternative. The difference in incremental effect by alternative and watershed is shown in Chart 1.

Water quality effects, as indicated by impervious surface covers, are the same under either Build Alternative for the overall Study Area and for each watershed. Overall, impervious surface is expected to increase by five percent for the entire Study Area between the Baseline and future 2030 condition, with or

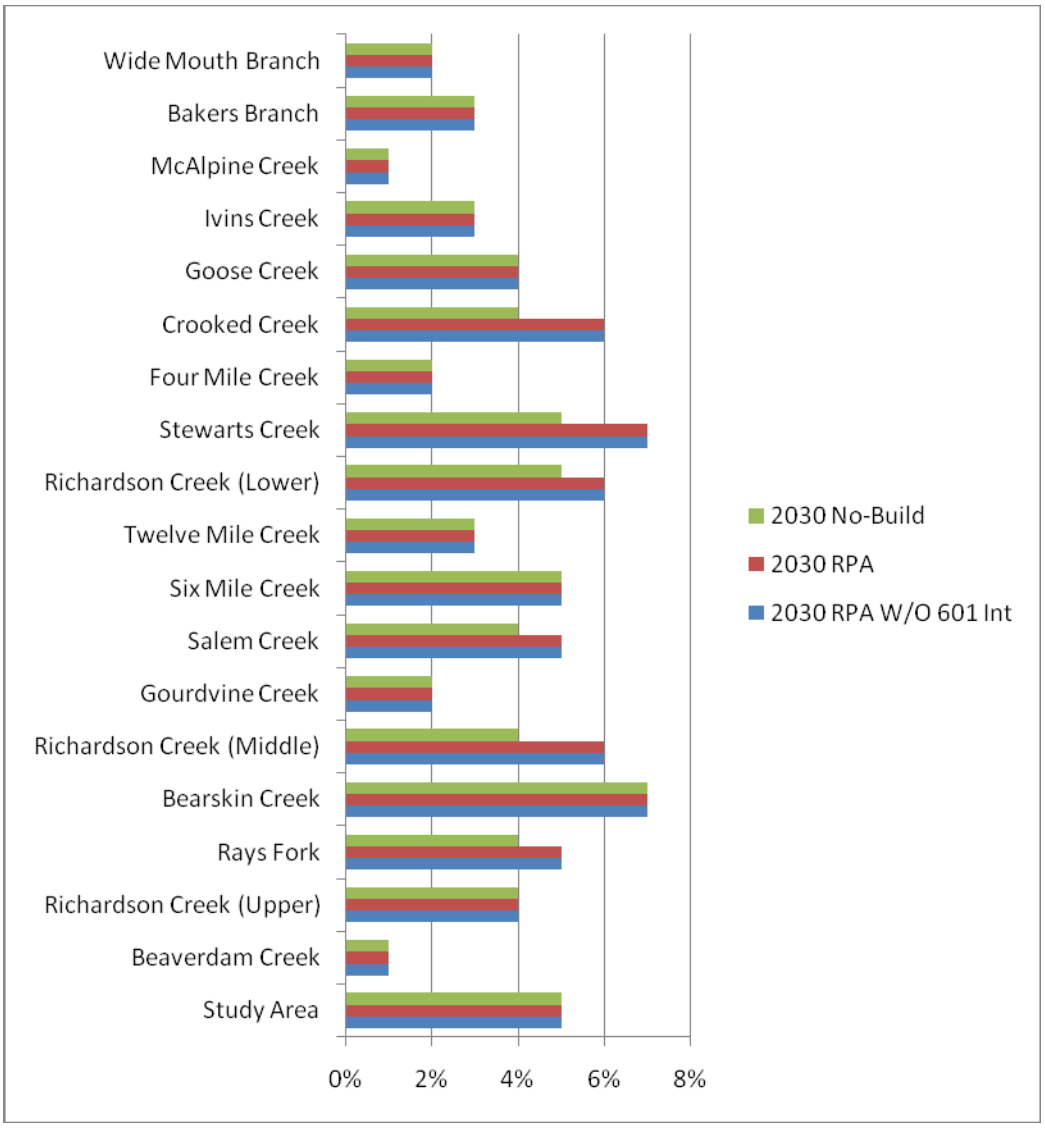
without the project. Every watershed is expected to see some increase in impervious surface with the No-Build or Build scenarios, with the highest increase being a seven percent increase in two watersheds (Stewarts Creek and Bearskin Creek). Watersheds with the highest impervious surface levels will likely see modest increases; although Irvins Creek and McAlpine Creek have baseline conditions of 34 percent and 36 percent impervious surface, these levels only increase by three percent and one percent, respectively, with any of the future conditions (No-Build or Build). With either Build scenario, no watershed would see a greater than two percent increase in impervious surface as compared to the No-Build scenario (Chart 1).

Table 18: Total Percent Impervious Surface

Area/Watershed	Baseline	2030 No-Build	2030 RPA	2030 RPA W/O 601 Interchange
Study Area	18%	22%	22%	22%
Beaverdam Creek	6%	7%	7%	7%
Richardson Creek (Upper)	14%	18%	18%	18%
Rays Fork	12%	16%	17%	17%
Bearskin Creek	24%	31%	31%	31%
Richardson Creek (Middle)	23%	27%	29%	29%
Gourdvine Creek	6%	8%	8%	8%
Salem Creek	9%	13%	14%	14%
Sixmile Creek	25%	30%	30%	30%
Twelvemile Creek	22%	25%	25%	25%
Richardson Creek (Lower)	10%	15%	16%	16%
Stewarts Creek	15%	20%	22%	22%
Fourmile Creek	32%	34%	34%	34%
Crooked Creek	21%	25%	27%	27%
Goose Creek	13%	17%	17%	17%
Irvins Creek	34%	37%	37%	37%
McAlpine Creek	36%	37%	37%	37%
Bakers Branch	5%	8%	8%	8%
Wide Mouth Branch	10%	12%	12%	12%

Note: Results have been rounded to the nearest whole percent (see Section 4.2).

Chart 1: Incremental Effect of Build Alternatives to Percent Impervious Surface



Note: This chart presents the differences in the results presented in Table 18. For each watershed and the Study Area as a whole, each grouping of bars shows the percent increase in impervious surface as compared to the Baseline condition for each alternative in the year 2030.

For individual watersheds with the 2030 RPA, findings show no difference for 12 of the 18 watersheds, including Goose Creek and Sixmile Creek (Chart 1). For the remaining six watersheds, a one to two percent difference between the 2030 Build Alternatives and the 2030 No-Build Alternative was found. It is possible that in the watersheds where there are differences from the No-Build, the Build Alternatives' incremental effect could also have a cumulative effect when considered in combination with the incremental effects of other reasonably foreseeable future projects.

6.2 Endangered Species

As stated in USFWS guidance for implementing Section 7 of the Endangered Species Act (ESA), cumulative effects "are those effects of future State or private activities, not involving Federal activities,

that are reasonably certain to occur within the action area of the Federal action subject to consultation. [50 CFR §402.02] This definition applies only to Section 7 analyses and should not be confused with the broader use of this term in the National Environmental Policy Act or other environmental laws" (USFWS & NMFS, 1998, p.xiii). However, because of the difficulty in quantifying the effects from future Federal actions, the cumulative effects on endangered species will be assessed based on the NEPA definition of "cumulative" (see the introduction to Section 3.5 for further explanation).

This study considers the species listed as Federally-endangered that occur in Mecklenburg and/or Union counties: Carolina heelsplitter, Michaux's sumac (*Rhus michauxii*), Schweinitz's sunflower (*Helianthus schwienitzii*), and smooth coneflower (*Echinacea laevigata*).

Carolina Heelsplitter

The Carolina heelsplitter is Federally-listed as endangered for both Mecklenburg and Union counties. The mussel lives in freshwater streams; therefore, effects to the mussel are presumed to be associated with effects on the quality of surface waters.

Critical habitat for the Carolina heelsplitter occurs in the Study Area. As designated in the Federal Register, critical habitat in the Study Area for the species includes approximately 7.2 km (4.5 mi) of the mainstem of Goose Creek in Union County and approximately 8.8 km (5.5 mi) of the mainstem of Duck Creek in Union County from the Mecklenburg/Union County line downstream to its confluence with Goose Creek (67 FR pp. 44501-44522). This critical habitat designation was taken into consideration at the beginning of the quantitative ICE analysis, as the Study Area was expanded to include all of the Goose Creek watershed (i.e., 14-digit Hydrologic Unit) (Figure 3). Analysis of the Goose Creek watershed includes analysis of the Duck Creek critical habitat because Duck Creek is a subwatershed of the Goose Creek watershed. In addition to the Critical Habitat and known occurrences of the mussel in the Goose Creek watershed, the Sixmile Creek watershed also has a known occurrence of the endangered species (USFWS, 2006).

As shown in Section 5.2 with the assessment of direct and indirect effects, no measureable differences in impervious surface were found between the 2030 No-Build and 2030 RPA within the Goose Creek or Sixmile Creek watersheds. Therefore, there would be no cumulative effect from changes to impervious surface associated with land use changes to the Carolina heelsplitter as a result of the 2030 RPA. However, more detailed water quality modeling is being prepared for the Goose Creek watershed for further evaluation of the potential impacts to the Carolina heelsplitter.

The draft biological assessment (Draft BA) for the endangered plant species in the expanded FLUSA (the Study Area for this ICE report) indicates there is no effect to Michaux's sumac or smooth coneflower. Only marginal habitat for these species exists in the Study Area. The Draft BA lists two populations of Schweinitz's sunflower that may be affected by future development and recommends that these populations be moved. No other known populations of the species are known to exist in areas where land use changes are anticipated within the Study Area, although there is suitable habitat in various parts of the Study Area. The species is known to exist in recently disturbed habitats of various types, including several NCGAP habitat types, as well as utility and road rights of way. The reader should refer to the Draft BA (or Final BA as it becomes available) for a more complete discussion of the Schweinitz's sunflower.

Other Endangered Species

Michaux's sumac, Schweinitz's sunflower, and the smooth coneflower are all plants that are Federally listed as endangered. The sumac and sunflower are listed for both Mecklenburg and Union counties, but the coneflower is listed only for Mecklenburg County (NC Natural Heritage Program Database, Updated January 9, 2009).

Cumulative effects to Schweinitz's sunflower are addressed through examining the conversion of land exhibiting habitat characteristics that would support the species. The NCGAP land cover categories included in the analysis were "Agricultural Pasture/Hay and Natural Herbaceous," "Barren (quarries, strip mines, and gravel pits)," and "Barren (bare rock and sand)" (see Table 8). Investigation of suitable habitat within forest gaps was beyond the scope of this analysis. In addition, the sunflower is an opportunistic species that can colonize even disturbed areas. Although this species could eventually inhabit some of the lands converted to developed land use, such land use categories were not included in the analysis to present a more conservative estimate of the amount of suitable habitat loss. Table 19 presents the results of this analysis.

Table 19: Total Conversion of Pasture/ Hay Natural Herbaceous and Barren Land Cover to Developed Land

	Baseline (acres)	2030 No-Build (acres)	2030 RPA (acres)	2030 RPA W/O 601 Interchange (acres)	Change in 2030 with No-Build (acres)	Change in 2030 with RPA (acres)	Change in 2030 with RPA W/O 601 Interchange (acres)
Acres	33,500	23,200	22,800	22,800	-10,300	-10,700	-10,700
% of Baseline	-	-	-	-	-31%	-32%	-32%

Notes: Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding.

With the 2030 No-Build, there is an estimated 31 percent decrease in land cover types presumed to provide suitable habitat for the Schweinitz's sunflower. The incremental effect with either the 2030 RPA or the 2030 RPA W/O 601 Interchange scenarios is approximately a one percent decrease in potential suitable habitat (32 percent versus 31 percent).

6.3 Land Use and Farmland Conversion

Table 20, Table 21 and Table 22 present the estimated total effects to land use broken out by watershed with each of the alternatives in conjunction with reasonably foreseeable future actions compared to the Baseline condition. Table 23 summarizes the incremental effects, i.e., the differences as compared to the changes anticipated with the No-Build scenario, for each of the Build scenarios. Comments on the Draft EIS included concern for potential sprawl effects of the Build Alternatives and reduction in farmland (i.e., agricultural lands), specifically. The following results can help address such concerns.

Indirect and direct land use effects combined were presented in Table 9, Table 10 and Table 11, and these tables also break out the land use categories in detail. For analysis of cumulative effects, the following tables present aggregations of categories for the agricultural and forested land uses. Agricultural land is comprised of two subcategories: Agricultural Fields and Agricultural Pasture/Hay and Natural Herbaceous. Forested land is comprised of the 11 different forested subcategories: Coniferous Cultivated Plantation, Successional Deciduous Forest, Piedmont Xeric Pine Forests, Piedmont Dry-Mesic Pine

Forests, Piedmont Xeric Woodlands, Piedmont Dry-Mesic Oak and Hardwood Forests, Piedmont Deciduous Mesic Forest, Xeric Pine-Hardwood Woodlands and Forests, Dry Mesic Oak Pine Forests, Piedmont Mixed Bottomland Forests, and Piedmont Oak Bottomland and Swamp Forests). The "Other" category includes seven subcategories: Barren (quarries, strip mines, and gravel pits), Barren (bare rock and sand), Piedmont Submerged Aquatic Vegetation, Piedmont Emergent Vegetation, Riverbank Shrublands, Floodplain Wet Shrublands, and Open Water.

Table 20: Total Changes in Land Use by Watershed with the 2030 No-Build Scenario Compared to the Baseline

Area/Watershed	Low Density Residential	Medium Density Residential	High Density Residential	Commercial	Industrial/Office/ Institutional	Transportation	Total Agricultural	Total Forested	Total Other
Study Area	26,900	900	100	1,200	2,300	100	-15,900	-15,400	-300
Beaverdam Creek	900	0	0	0	0	0	-600	-300	0
Richardson Creek (Upper)	1,200	0	0	0	0	0	-700	-600	0
Rays Fork	1,700	0	0	0	0	0	-1,000	-800	0
Bearskin Creek	1,600	100	0	0	500	0	-1,100	-1,100	0
Richardson Creek (Middle)	1,000	0	0	0	100	0	-500	-700	0
Gourdvine Creek	100	0	0	0	0	0	0	0	0
Salem Creek	2,100	100	0	100	100	0	-1,600	-600	0
Sixmile Creek	100	200	0	0	0	0	-100	-200	0
Twelvemile Creek	900	100	0	0	300	0	-500	-900	0
Richardson Creek (Lower)	3,400	0	0		0	0	-2,300	-1,100	0
Stewarts Creek	4,300	0	0	200	100	0	-2,900	-1,800	-100
Fourmile Creek	400	0	0	100	0	0	-100	-400	0
Crooked Creek	3,100	100	100	200	200	0	-2,100	-1,700	0
Goose Creek	3,700	0	0	200	0	0	-1,400	-2,500	0
Irvins Creek	400	0	0	100	200	0	-100	-600	0
McAlpine Creek	200	300	0	100	0	0	0	-400	0
Bakers Branch	300	0	0	0	0	0	-100	-200	0
Wide Mouth Branch	500	0	0	0	0	0	-400	-200	0

Note: These numbers represent the increase (positive numbers) or decrease (negative numbers) in acres that are predicted for the No-Build scenario in 2030 throughout the Study Area. Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding. Watershed totals may appear not to add to the Study Area total because of rounding.

Table 21: Total Changes in Land Use by Watershed with the 2030 RPA Scenario Compared to the Baseline

Area/Watershed	Low Density Residential	Medium Density Residential	High Density Residential	Commercial	Industrial/Office/ Institutional	Transportation	Total Agricultural	Total Forested	Total Other
Study Area	25,700	1,700	100	1,500	2,400	1,200	-16,500	-15,800	-300
Beaverdam Creek	900	0	0	0	0	0	-600	-300	0
Richardson Creek (Upper)	1,200	0	0	0	0	0	-700	-600	0
Rays Fork	1,600	0	0	0	0	100	-1,000	-800	0
Bearskin Creek	1,600	100	0	0	500	0	-1,100	-1,100	0
Richardson Creek (Middle)	1,000	0	0	0	100	100	-500	-700	0
Gourdvine Creek	100	0	0	0	0	0	0	0	0
Salem Creek	2,000	200	0	100	0	100	-1,700	-700	0
Sixmile Creek	100	200	0	0	0	0	-100	-200	0
Twelvemile Creek	900	100	0	0	300	0	-500	-900	0
Richardson Creek (Lower)	3,200	200	0	0	100	100	-2,400	-1,200	0
Stewarts Creek	4,000	100	0	400	100	300	-3,000	-1,900	-100
Fourmile Creek	400	0	0	100	0	0	-100	-400	0
Crooked Creek	2,800	300	100	300	300	400	-2,200	-1,800	0
Goose Creek	3,700	0	0	200	0	0	-1,400	-2,500	0
Irvins Creek	400	0	0	100	200	0	-100	-600	0
McAlpine Creek	200	300	0	100	0	0	0	-400	0
Bakers Branch	300	0	0	0	0	0	-100	-200	0
Wide Mouth Branch	500	0	0	0	0	0	-400	-200	0

Note: These numbers represent the increase (positive numbers) or decrease (negative numbers) in acres that are predicted for the RPA scenario in 2030 throughout the Study Area. Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding. Watershed totals may appear not to add to the Study Area total because of rounding.

Table 22: Total Changes in Land Use by Watershed with the 2030 RPA W/O 601 Interchange Scenario Compared to the Baseline

Area/Watershed	Low Density Residential	Medium Density Residential	High Density Residential	Commercial	Industrial/Office/ Institutional	Transportation	Total Agricultural	Total Forested	Total Other
Study Area	25,800	1,600	100	1,500	2,400	1,100	-16,400	-15,900	-300
Beaverdam Creek	900	0	0	0	0	0	-600	-300	0
Richardson Creek (Upper)	1,200	0	0	0	0	0	-700	-600	0
Rays Fork	1,600	0	0	0	0	100	-1,000	-800	0
Bearskin Creek	1,600	100	0	0	500	0	-1,100	-1,100	0
Richardson Creek (Middle)	1,000	0	0	0	100	100	-500	-700	0
Gourdvine Creek	100	0	0	0	0	0	0	0	0
Salem Creek	2,000	200	0	100	0	100	-1,700	-700	0
Sixmile Creek	100	200	0	0	0	0	-100	-200	0
Twelvemile Creek	900	100	0	0	300	0	-500	-900	0
Richardson Creek (Lower)	3,200	200	0	0	100	100	-2,400	-1,200	0
Stewarts Creek	4,000	100	0	400	100	300	-3,000	-1,900	-100
Fourmile Creek	400	0	0	100	0	0	-100	-400	0
Crooked Creek	2,800	300	100	300	300	400	-2,200	-1,800	0
Goose Creek	3,700	0	0	200	0	0	-1,400	-2,500	0
Irvins Creek	400	0	0	100	200	0	-100	-600	0
McAlpine Creek	200	300	0	100	0	0	0	-400	0
Bakers Branch	300	0	0	0	0	0	-100	-200	0
Wide Mouth Branch	500	0	0	0	0	0	-400	-200	0

Note: These numbers represent the increase (positive numbers) or decrease (negative numbers) in acres that are predicted for the RPA W/O 601 Interchange scenario in 2030 throughout the Study Area. Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding. Watershed totals may appear not to add to the Study Area total because of rounding.

Table 23: Incremental Effects to Land Use Changes by Watershed and Alternative

Area/Watershed	Difference From No-Build – Total Developed		Difference From No-Build – Total Agricultural		Difference From No-Build – Total Forested	
	RPA	RPA W/O 601 Int	RPA	RPA W/O 601 Int	RPA	RPA W/O 601 Int
Study Area	1,000	1,100	-600	-600	-400	-500
Beaverdam Creek	0	0	0	0	0	0
Richardson Creek (Upper)	0	0	0	0	0	0
Rays Fork	0	0	0	0	0	-100
Bearskin Creek	0	0	0	0	0	0
Richardson Creek (Middle)	100	100	0	0	0	-100
Gourdvine Creek	0	0	0	0	0	0
Salem Creek	200	200	-100	-100	-100	-100
Sixmile Creek	0	0	0	0	0	0
Twelvemile Creek	0	0	0	0	0	0
Richardson Creek (Lower)	200	200	-100	-100	-100	-100
Stewarts Creek	200	200	-100	-100	-100	-100
Fourmile Creek	0	0	0	0	0	0
Crooked Creek	300	300	-200	-200	-200	-200
Goose Creek	0	0	0	0	0	0
Irvins Creek	0	0	0	0	0	0
McAlpine Creek	0	0	0	0	0	0
Bakers Branch	0	0	0	0	0	0
Wide Mouth Branch	0	0	0	0	0	0

Note: These numbers represent the net differences in acres expected with each Build scenario as compared to the changes predicted with the No-Build scenario for 2030. Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding. Watershed totals may appear not to add to the Study Area total because of rounding.

2030 No-Build

The 2030 No-Build scenario is predicted to increase developed land by 31,500 acres throughout the Study Area as compared to the Baseline condition. This represents 16 percent of the total Study Area. Most of the estimated development (85 percent) is due to the increase in low density residential growth. For this conversion to development, the following reductions in undeveloped lands are predicted: 15,900 acres of agricultural land, 15,400 acres of forested land and 300 acres of other land uses.

From 1984 to 2003, a loss of over 48,000 acres in tree cover was recorded in Union County, although a large portion of those acres may have been cleared for agriculture, logging, or non-urban development (NCTA, 2009). The further reduction in forested acreage predicted with the 2030 No-Build in this Technical Report (15,300 acres) represents an additional loss; however, the reduction is at a substantially lower rate.

Farmland comprises 50 percent of the total converted undeveloped lands. The predicted acreage of farmland conversion (15,900 acres) represents 30 percent of the total amount of farmland in the Study Area's Baseline condition (53,700 acres; Table 8).

2030 RPA

The 2030 RPA scenario was predicted to increase developed land by 1,000 more acres throughout the Study Area as compared to the No-Build condition. This incremental effect is equivalent to less than one percent of the Study Area. Most of the estimated development with the RPA scenario (79 percent) is due to the increase in low density residential growth, but this number is smaller than with the 2030 No-Build scenario because a larger percentage of the development is predicted to be from medium density residential, commercial, and industrial/office/institutional growth in the Build scenarios, and also some of the low density residential acreages are replaced with the RPA's direct effects or with commercial or industrial development at interchanges. The incremental effect acreage is the same as the direct effect of the project, so the cumulative effects to land use are truly changes in type and density of development without a net increase in acreage beyond the project itself.

Farmland represents nearly the same amount of the converted undeveloped land as with the No-Build condition (51 percent versus 50 percent). As compared to the 2030 No-Build, the 2030 RPA is predicted to have 600 additional acres of converted farmland, which is equivalent to less than one percent increased loss as compared to the No-Build scenario (Table 8).

2030 RPA W/O 601 Interchange

The 2030 RPA W/O 601 Interchange scenario was predicted to increase developed land by 1,100 acres throughout the Study Area as compared to the No-Build condition. This incremental effect is equivalent to less than one percent of the Study Area. Most of the estimated development (79 percent) is due to the increase in low density residential growth, but this number is smaller than with the 2030 No-Build scenario because a larger percentage of the development is predicted to be from medium density residential, commercial, and industrial/office/institutional growth in the build scenarios. These results show no measurable difference as compared to the 2030 RPA.

Farmland represents nearly the same amount of the converted undeveloped land as with the No-Build condition (51 percent versus 50 percent). As compared to the 2030 No-Build, the 2030 RPA W/O 601 Interchange is predicted to have 600 additional acres of converted farmland, which is less than one percent greater change as compared to the No-Build effect. These are the same results as with the 2030 RPA. As with the RPA, the net difference is the same as the direct effect of the project, so the cumulative effects to land use are truly changes in type and density of development without a net increase in acreage beyond the project itself.

6.4 Wildlife Habitat

This section presents cumulative effects specific to wildlife habitat. Specifically, Table 24 presents the changes predicted for each alternative in the total amount of undeveloped vegetated land cover. The effect to potential aquatic habitat is inferred from the effect to water quality, detailed in Section 6.1. With regard to percent impervious cover as an indicator for effects to water quality and thus aquatic habitat, findings show no measurable difference in percent impervious cover between the 2030 RPA, 2030 RPA W/O 601 Interchange, and 2030 No-Build scenarios for the Study Area as a whole. Findings also show only as much as a one percent incremental effect with either Build scenario within any individual watershed, except for Stewarts Creek and Crooked Creek, which will have a two percent incremental effect with the Build scenarios (Chart 1).

With increased development in the midst of previously contiguous vegetated patches, fragmentation of habitat increases. This can affect some species that require large patches of habitat; and the increase in edge between different types of habitat, such as forested and residential areas, can cause an increase in encounters (such as vehicle crashes) that hurt wildlife populations.

In order to address fragmentation of forested habitat, a patch analysis was conducted by measuring the amount of edge between forested patches and developed patches in the Baseline and future conditions. Comparisons are presented in Table 25. The NCGAP categories used to define the forested lands were the same as those identified in Section 6.3 for the land use analysis. As discussed in Section 3.6, the methodology used to distribute land use effects in this ICE analysis by definition creates a greater fragmentation of developed parcels than would be expected to occur with a typical process of land development in the future; therefore, the fragmentation effects should be considered high and conservative to a large extent.

For presentation of cumulative effects in Table 24, aggregates of NCGAP categories introduced in Section 4.0 were used. From Table 8, the list of categories used to compile an “Undeveloped Vegetated Land” layer included all the categories below “Total Development,” except the “Agricultural Fields” (i.e., croplands), “Barren (quarries, strip mines, and gravel pits)” and “Open Water” categories, which were presumed not to provide substantial amounts of suitable wildlife habitat.

Table 24: Total Changes in Undeveloped Vegetated Land and Land Cover Likely to Encompass Wetlands Compared to the Baseline

Watershed Name	Total Vegetated (acres)		
	No-Build	RPA	RPA W/O 601 Interchange
Study Area	-25,500	-26,400	-26,400
Beaverdam Creek	-700	-700	-700
Richardson Creek (Upper)	-900	-900	-900
Rays Fork	-1,400	-1,500	-1,500
Bearskin Creek	-1,700	-1,700	-1,700
Richardson Creek (Middle)	-1,000	-1,000	-1,000
Gourdvine Creek	-100	-100	-100
Salem Creek	-1,600	-1,700	-1,700
Sixmile Creek	-300	-300	-300
Twelvemile Creek	-1,200	-1,200	-1,200
Richardson Creek (Lower)	-2,700	-2,900	-2,900
Stewarts Creek	-4,000	-4,200	-4,200
Fourmile Creek	-500	-500	-500
Crooked Creek	-3,100	-3,300	-3,300
Goose Creek	-3,200	-3,200	-3,200
Irvins Creek	-700	-700	-700
McAlpine Creek	-500	-500	-500
Bakers Branch	-200	-200	-200
Wide Mouth Branch	-400	-400	-400

Note: These numbers show the total changes in acres that are predicted for 2030 with each scenario, including changes attributable to other actions. The difference in changes to Undeveloped Vegetated Land throughout the Study Area is roughly equivalent to the footprint of the Build alternatives (1,100 acres).

Results have been rounded to the nearest 100 acres. Differences were calculated prior to rounding. Watershed totals may appear not to add to the Study Area total because of rounding.

Table 25: Total Changes to Length of Edge Between Forest and Development (miles)

Area/Watershed	Baseline	2030 No-Build	2030 RPA	2030 RPA W/O 601 Interchange	Change in 2030 with No-Build	Change in 2030 with RPA	Change in 2030 with RPA W/O 601 Interchange
Study Area	1,250.4	1,700.0	1,683.7	1,682.5	449.6	433.4	432.1
Beaverdam Creek	38.0	58.2	58.2	58.2	20.2	20.2	20.2
Richardson Creek (Upper)	43.6	66.7	66.7	66.7	23.1	23.1	23.1
Rays Fork	46.9	82.4	81.8	81.8	35.5	34.9	34.9
Bearskin Creek	62.7	93.0	93.0	93.0	30.3	30.3	30.3
Richardson Creek (Middle)	29.7	49.2	49.3	48.1	19.5	19.6	18.4
Gourdvine Creek	2.1	3.8	3.8	3.8	1.6	1.6	1.6
Salem Creek	42.6	74.1	71.5	71.5	31.5	28.8	28.8
Sixmile Creek	16.7	21.7	21.7	21.7	5.0	5.0	5.0
Twelvemile Creek	122.0	136.6	136.6	136.6	14.6	14.6	14.6
Richardson Creek (Lower)	71.4	123.4	119.3	119.3	52.1	47.9	47.9
Stewarts Creek	117.4	186.4	183.2	183.1	69.0	65.8	65.7
Fourmile Creek	63.8	69.5	69.5	69.5	5.7	5.7	5.7
Crooked Creek	176.9	234.3	228.4	228.5	57.4	51.5	51.6
Goose Creek	208.0	278.6	278.6	278.6	70.6	70.6	70.6
Irvins Creek	91.6	92.6	92.6	92.6	1.0	1.0	1.0
McAlpine Creek	90.8	86.5	86.5	86.5	-4.3	-4.3	-4.3
Bakers Branch	7.6	15.4	15.4	15.4	7.8	7.8	7.8
Wide Mouth Branch	18.3	27.2	27.2	27.2	9.0	9.0	9.0

Note: These numbers represent the total amount of edge between patches of forest and developed areas, as defined in this section with each scenario. The fragmentation effects should be considered high and conservative to a large extent (see discussion in Section 6.4). Results have been rounded to the nearest tenth of a mile. Differences were calculated prior to rounding. Watershed totals may appear not to add to the Study Area total because of rounding.

2030 No-Build

The 2030 No-Build scenario was predicted to decrease vegetated land cover by 25,500 acres from the Baseline condition. This effect represents 29 percent of the total Baseline condition vegetated land cover (87,000 acres; Table 8). With regard to forest edge, the overall amount of edge with the 2030 No-Build is increased by 449.6 mi as compared to the Baseline condition. This represents a 36 percent increase. As shown in Section 6.3 regarding land use changes, forest lands are predicted to be reduced by 15,300 acres with the 2030 No-Build scenario. These calculations show that some of the development likely to occur by 2030 with the No-Build will fragment forest patches. Cumulative effects from this fragmentation may include effects to wildlife populations.

With regard to effects within individual watersheds, some watersheds show little change in the length of forest-development edge (e.g., Irvins Creek with 1.0 mi difference), and one watershed shows a decrease in overall edge (McAlpine Creek with -4.3 mi). This decrease appears to be because most forested land lies within existing stream buffers which have high edge-to-area ratios, while the smaller areas of forested lands outside the stream buffers will mostly reach build-out by 2030, thus removing the forested areas from those parcels entirely. Therefore, edges in the McAlpine Creek watershed decline instead of increase.

2030 RPA

The incremental effect with the 2030 RPA is 1,000 acres of additional converted vegetated land as compared to the loss predicted with the 2030 No-Build condition. With respect to comparison of results between alternatives or individual watersheds, only differences of more than 100 acres are notable because of the lack of precision of the measurements (results were rounded to the nearest 100 acres). These results show small (i.e., approximately 100 acres) incremental effect within several watersheds and only a notable increased amount (approximately 200 acres) of vegetated habitat loss within the Richardson Creek – Lower and Crooked Creek watersheds specifically.

With regard to forest edge, the overall amount of edge with the 2030 RPA is predicted to increase by a similar amount from the Baseline as predicted for the No-Build; there will be roughly one percent less change in edge. The reason for this outcome is the "infill" of development in the Build Alternative analysis, particularly in the area of proposed interchanges. The 2030 RPA shows the following measurable differences from the 2030 No-Build: 0.6 mi less edge in the Rays Fork watershed, 2.6 mi less edge in the Salem Creek watershed, 4.1 mi less edge in the Richardson Creek – Lower watershed, 3.2 mi less edge in the Stewarts Creek watershed, 5.9 mi less edge in the Crooked Creek watershed, and 0.2 mi additional edge in the Richardson Creek – Middle watershed.

2030 RPA W/O 601 Interchange

The incremental effect with the 2030 RPA W/O 601 Interchange is 1,000 acres converted vegetated land as compared to the loss predicted with the 2030 No-Build condition. Results for the RPA W/O 601 Interchange are the same as for the RPA in the Study Area and in individual watersheds.

With regard to forest edge, the overall amount of edge with the 2030 RPA W/O 601 Interchange is predicted to increase by a similar amount from the Baseline as predicted for the No-Build; there will be roughly one percent less change in edge. The result is 1.3 mi less edge than with the 2030 RPA. With regard to individual watersheds, the 2030 RPA W/O 601 Interchange shows approximately (plus or minus one tenth) the same decreases in edge as compared to the 2030 No-Build as predicted for the 2030 RPA (detailed at the end of the previous section), except it will additionally have 1.2 mi less edge in the Richardson Creek – Middle watershed and 0.2 mi less edge in the Stewarts Creek watershed.

7.0 CONCLUSION

This Technical Report presents the methods and results of a quantitative ICE analysis performed for the proposed Monroe Connector/Bypass project in North Carolina's Mecklenburg and Union counties. Results are summarized in the sections that follow. The analysis was conducted for the same FLUSA area analyzed in the Draft EIS for the project (NCTA, 2009), with the exception that the Study Area for this analysis was expanded to include all of the Goose Creek watershed (14-digit Hydrologic Unit) as well

as the headwaters of some of the area streams. Goose Creek supports one of eleven known remaining populations of the Carolina heelsplitter (*Lasmigona decorata*), a Federally listed endangered freshwater mussel species, and is designated as critical habitat for this species. Special attention in the analysis was also given to Sixmile Creek, another watershed known to support a population of the protected mussel.

The resources in the Study Area considered in this quantitative ICE analysis include water quality, all Federally-listed species and their critical habitat, land use, and wildlife habitat. For the last two issues, analysis specifically included consideration to farmland conversion and increases in forest/development edge.

As with any attempt to forecast future growth or development, there are limitations to the accuracy and certainty of the results of these analyses. Most of these analyses rely on the land use forecasts developed using recommended methods as described in the NCDOT ICE Guidance (NCDOT & NCDENR, 2001a). Specifically, the land use forecasts rely on the Socioeconomic Forecasts developed by MUMPO, and therefore the results are only as accurate as those forecasts. The methods used to distribute land use effects are based on reasonable assumptions to produce a valid comparative analysis, but these methods also result in high, conservative estimates of effects.

Also, these results do not include assessment of mitigation and enhancement strategies (Step 8 of the NCDOT ICE Guidance). This final, more qualitative step is anticipated to be completed within the context of all effects assessed in the Final EIS and after further agency coordination.

7.1 Indirect Effects

Results of the indirect effects analysis are summarized below. These results summarize the comparisons of the two Build scenarios (2030 RPA and 2030 RPA W/O 601 Interchange) to each other and to the future No-Build scenario (2030 No-Build). Unless otherwise indicated, the results listed below include the direct conversion of right of way to transportation land use and impervious surface associated with both Build scenarios.

Land use

- Incremental effects to land use associated with the RPA are depicted in Figure 15, and differences between the RPA and RPA W/O 601 Interchange are depicted in Figure 16.
- For both the 2030 RPA and 2030 RPA W/O 601 Interchange, all changes in land use from the Baseline are within one percent (i.e., between negative one percent and one percent) of the change that is predicted for the 2030 No-Build.
- With both the 2030 RPA and 2030 RPA W/O 601 Interchange, increases in the overall level of development as compared to the 2030 No-Build are approximately the same (1,000 to 1,100 acres).
- With both the 2030 RPA and 2030 RPA W/O 601 Interchange, the net difference in land use is equivalent to the direct project effects; thus, the indirect land use effects are neutral in terms of total acres and involve changes from low density residential land use to medium density residential, commercial and industrial/office/institutional land uses.
- With both the 2030 RPA and 2030 RPA W/O 601 Interchange, incremental effects to agricultural and forested lands are 600 and 400 acres respectively as a result of the additional developed land.

For both these land uses, the decrease equals a less than one percent change as compared to the change predicted for the No-Build scenario.

Impervious Surface

- Findings show the incremental effect of both the 2030 RPA and the 2030 RPA W/O 601 Interchange will be a less than one percent greater change in impervious surface throughout the Study Area as compared to the change predicted for the 2030 No-Build scenario.
- With both the 2030 RPA and 2030 RPA W/O 601 Interchange, increases in percent impervious surface as compared to the change predicted for the 2030 No-Build are found in 6 of the 18 watersheds. These increases are between one and two percent.
- With respect to indirect effects alone, there is no difference in percent impervious surface throughout the Study Area as a whole between the 2030 No Build and either Build Alternative.
- 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.

7.2 Cumulative Effects

Results of the cumulative effects analysis are summarized below. These findings reflect the comparisons of the two Build Alternatives (2030 RPA and 2030 RPA W/O 601 Interchange) to each other and to the future No-Build condition (2030 No-Build). It should be noted that the NEPA definition of "cumulative effect" was used for all resources, including endangered species. Federal actions were included with the future changes that may affect protected species because this approach provides a conservative (i.e., high) estimate of changes to land use, and quantifying projected future Federal actions is particularly difficult.

Water Quality

- With regard to percent impervious cover as an indicator for water quality effects and effects to aquatic species, findings show no measurable difference in percent impervious cover between the 2030 RPA, 2030 RPA W/O 601 Interchange, and 2030 No-Build for the Study Area as a whole.
- With regard to individual watersheds, findings show no difference among the alternatives for 12 of the 18 watersheds, including Goose Creek and Sixmile Creek. For the remaining six watersheds, the Build scenarios will have a one to two percent greater change in impervious surfaces as compared to the change predicted for the No-Build scenario.
- As part of the Final EIS, a detailed study of changes in sediment and nutrients is being prepared using more detailed water quality modeling.

Endangered Species

- With regard to percent impervious cover as an indicator of potential effects that could affect habitat for the endangered mussel, findings show no direct or indirect effects within the Goose Creek or Sixmile Creek watersheds as a result of either the 2030 RPA or the 2030 RPA W/O 601 Interchange. Therefore, no cumulative effect to the Carolina heelsplitter is anticipated based on results of this study.
- For both the 2030 RPA and 2030 RPA W/O 601 Interchange, findings indicate a one percent greater decrease of land exhibiting habitat characteristics that would support the Schweinitz's sunflower as compared to the change predicted for the 2030 No-Build based on results of this study.

Land Use and Farmland Conversion

- The 2030 RPA and 2030 RPA W/O 601 Interchange are predicted to have less than 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 Alternatives and the No-Build scenarios. With both the 2030 RPA and 2030 RPA W/O 601 Interchange, there is more medium density residential, commercial, and industrial/office/institutional growth, such that the increase in low density residential development is six percent less than that with the 2030 No-Build (79 percent of the predicted development vs. 85 percent).
- Both the 2030 RPA and 2030 RPA W/O 601 Interchange are predicted to convert 600 additional acres of agricultural land to low-density residential or other developed uses. This represents less than one percent greater conversion than that predicted with the No-Build scenario for farmlands in the Study Area.

Wildlife Habitat

- Both the 2030 RPA and 2030 RPA W/O 601 Interchange are predicted to convert approximately one percent greater amount of undeveloped vegetated land in the Study Area as compared to the conversion predicted for the No-Build scenario. Measurable differences are anticipated in Richardson Creek – Lower and Crooked Creek, which showed a 200-acre greater decrease over the No-Build condition with both Build scenarios.
- With respect to forest fragmentation, all 2030 alternatives have nearly the same amount of increase in miles of edge between forested lands and developed lands in the Study Area; as compared to the Baseline condition, the No-Build scenario findings show a 36 percent increase, while the Build Alternative findings show a 35 percent increase. The Build Alternatives are estimated to have less edge than the 2030 No-Build. This is a result of greater contiguous build-out (resulting in less fragmentation) in interchange areas.

With conditions predicted for the year 2030, both the RPA and RPA W/O 601 Interchange are predicted to have very similar indirect and cumulative effects. Incremental effects relative to the No Build Alternative generally fall within a range of one percent difference. Greater differences can be found with examination of results for individual watersheds, but no measureable differences in development or impervious surface were found in the Goose Creek or Sixmile Creek watersheds.

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Figures

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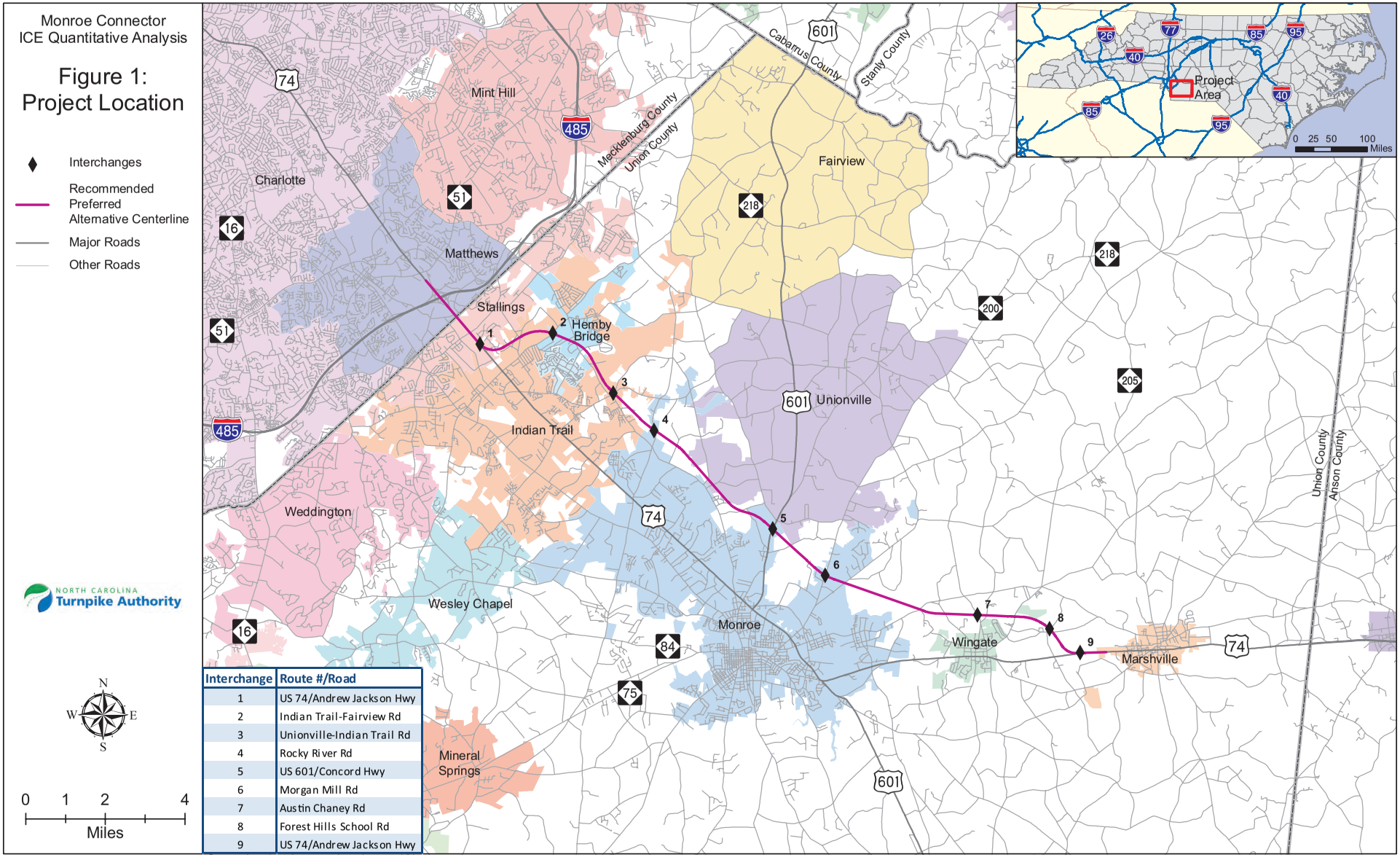
Monroe Connector
ICE Quantitative Analysis

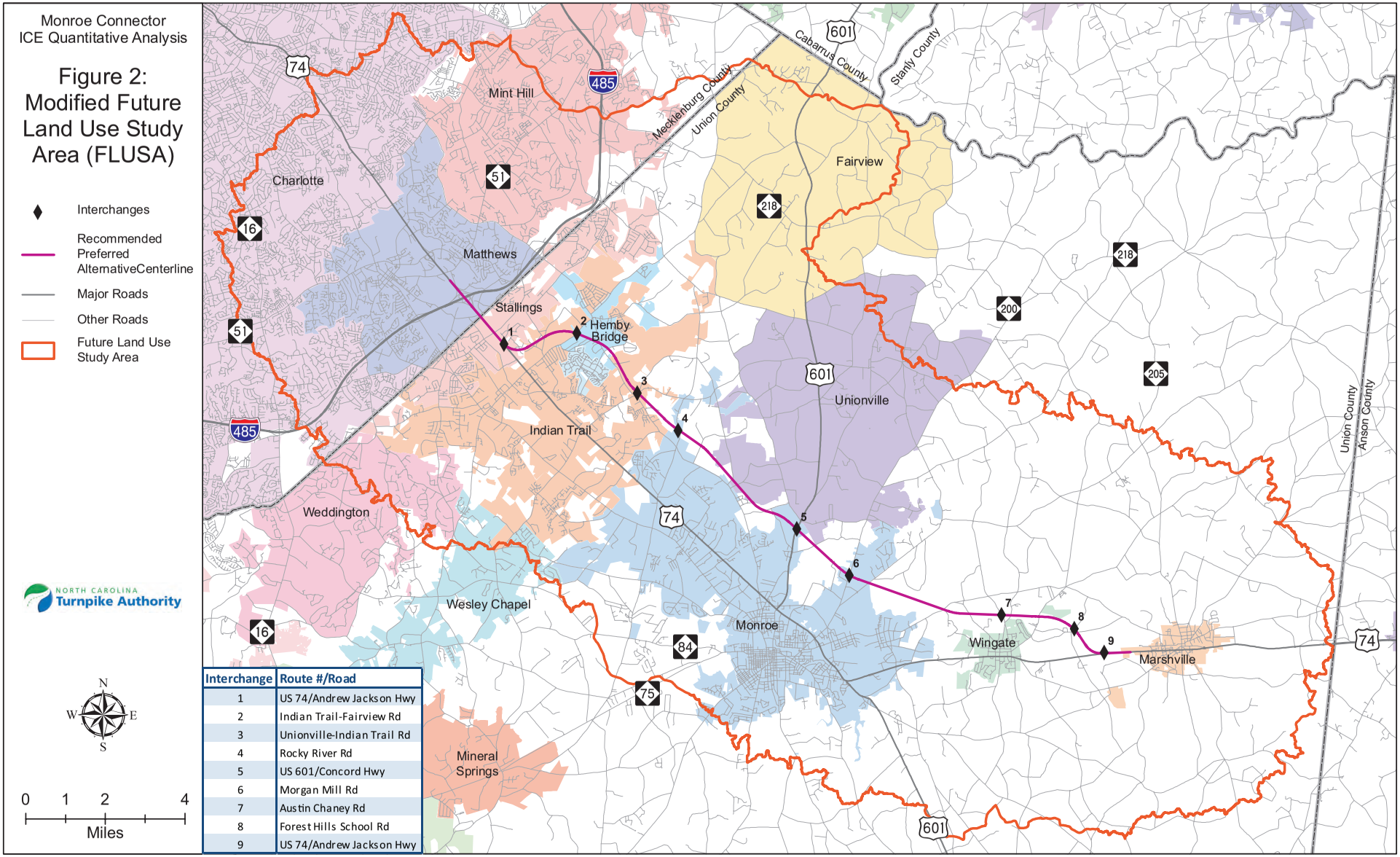
Figure 1: Project Location



Interchange	Route #/Road
1	US 74/Andrew Jackson Hwy
2	Indian Trail-Fairview Rd
3	Unionville-Indian Trail Rd
4	Rocky River Rd
5	US 601/Concord Hwy
6	Morgan Mill Rd
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Monroe Connector
ICE Quantitative Analysis

Figure 2: Modified Future Land Use Study Area (FLUSA)



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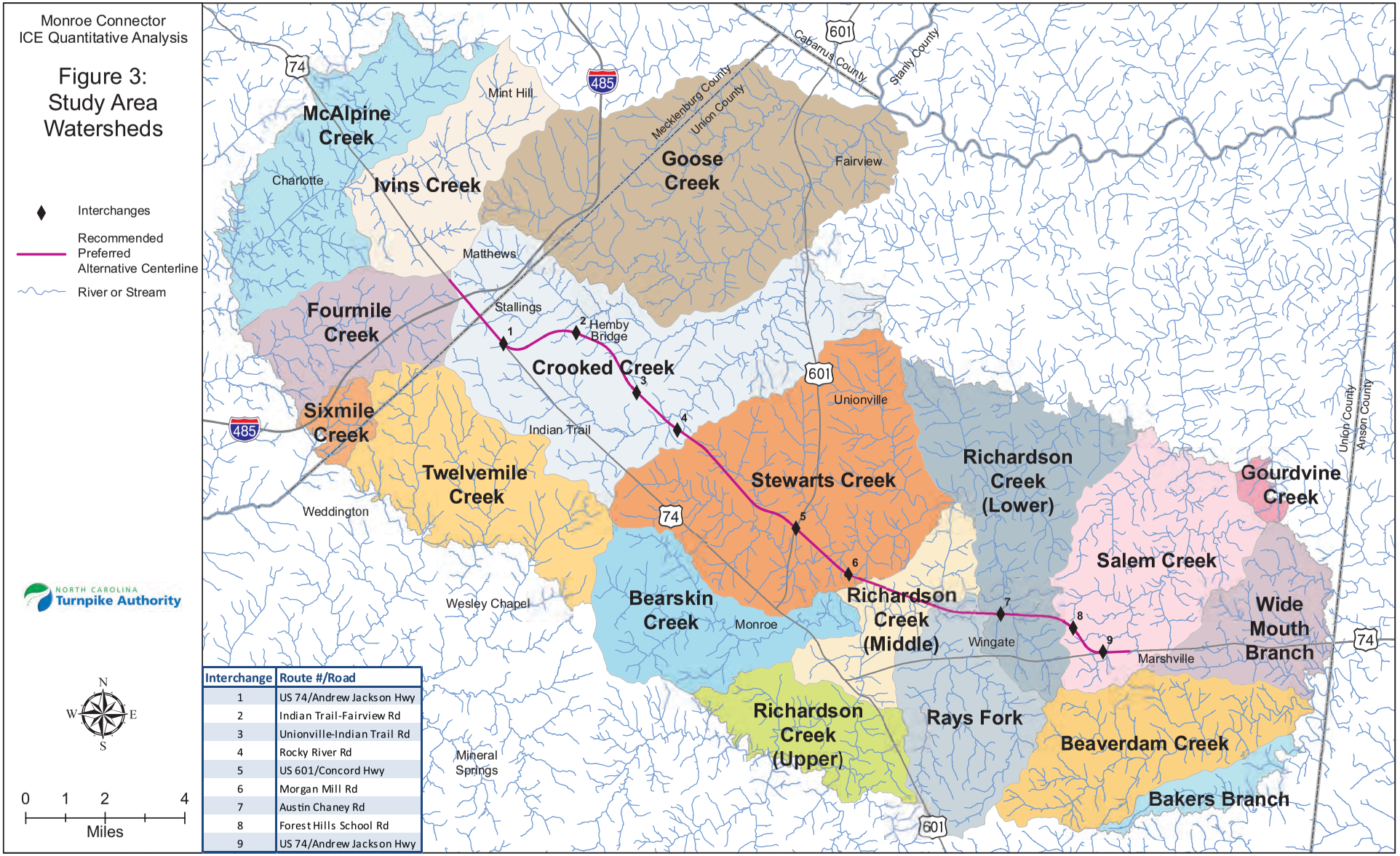
6	Morgan Mill Rd
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Monroe Connector
ICE Quantitative Analysis

Figure 3: Study Area Watersheds



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3	Unionville-Indian Trail Rd
4	Rocky River Rd
5	US 601/Concord Hwy
6	Morgan Mill Rd
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Monroe Connector
ICE Quantitative Analysis

Figure 4: Sanitary Sewer Availability

- Interchanges
- Recommended Preferred Alternative Centerline
- Existing Roads
- Future Land Use Study Area Boundary
- Current Sewer Service
- Future Sewer Service

NORTH CAROLINA Turnpike Authority

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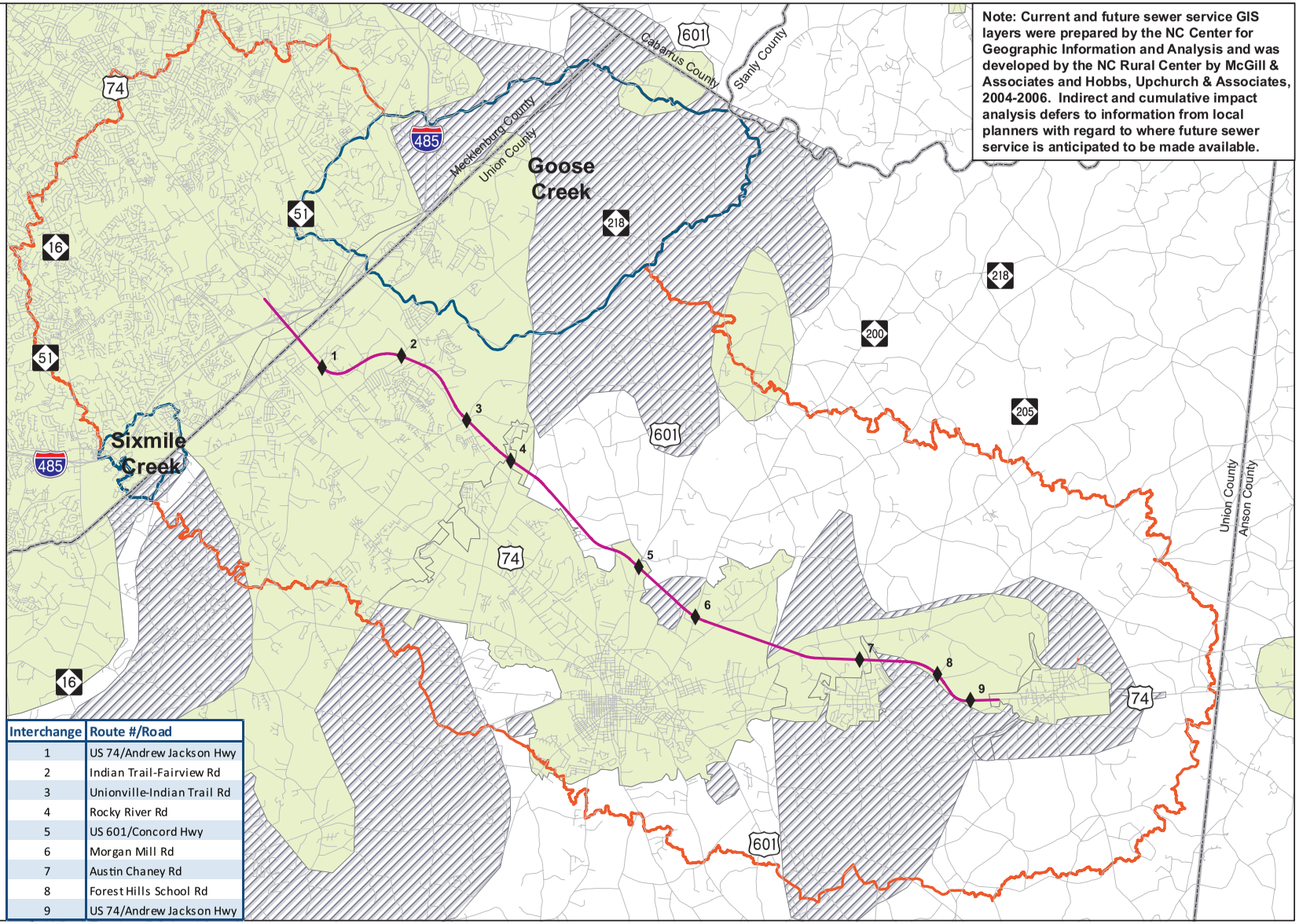

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8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

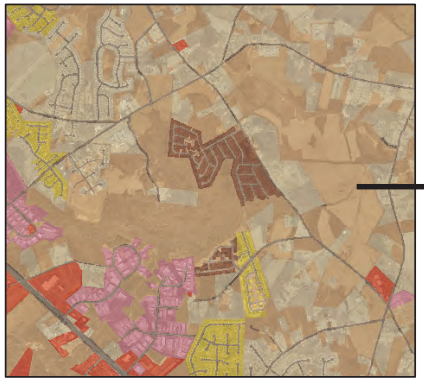
Note: Current and future sewer service GIS layers were prepared by the NC Center for Geographic Information and Analysis and was developed by the NC Rural Center by McGill & Associates and Hobbs, Upchurch & Associates, 2004-2006. Indirect and cumulative impact analysis defers to information from local planners with regard to where future sewer service is anticipated to be made available.

Monroe Connector
ICE Quantitative Analysis

Figure 5: Existing Land Use Categorization Process

Parcel Categorization

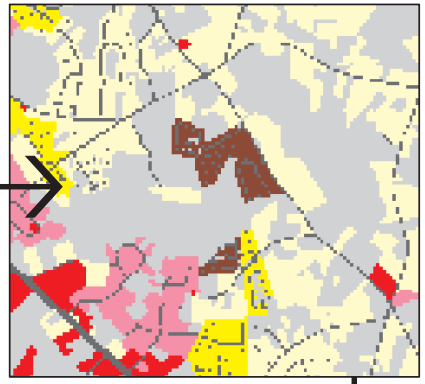
Parcels categorized based on zoning and land use attributes from assessment database. Aerial Photography used to spot check for accuracy.
5 Developed categories.



Land Use Category
- Undeveloped
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial/Office/Institutional

Parcel to Raster Conversion

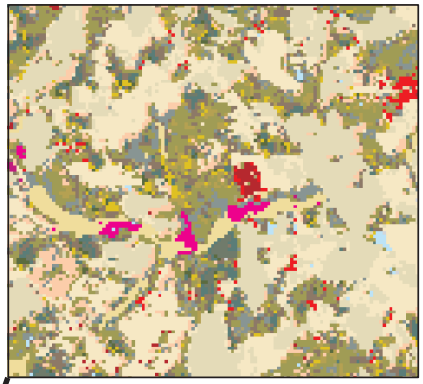
Parcels converted to raster layer and transportation use is added to the empty spaces between the parcels.
6 Developed categories.



Land Use Category
- Undeveloped
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial/Office/Institutional
- Transportation

Natural Background Land Cover Categories

NCGAP Landcover developed in 1992 serves as the "background" land cover for natural areas. The 3 developed categories (Residential Urban, Urban Low and Urban High) were removed prior to merging with the developed land cover.
20 Natural categories.

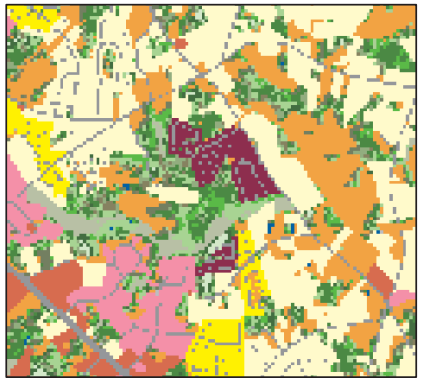


NCGAP Landcover
- Open Water
- Coniferous Cultivated Plantation
- Successional Deciduous Forest
- Agricultural Fields
- Residential Urban
- Urban Low
- Urban High
- Agricultural Pasture and Natural Herb.
- Barren (quarries, strip mines)
- Barren (bare rock and sand)
- Piedmont Xeric Pine Forests
- Piedmont Dry-Mesic Pine Forests
- Piedmont Xeric Woodlands
- Piedmont Dry-Mesic Oak and Hardwood Forests
- Piedmont Deciduous Mesic Forest
- Xeric Pine-Hardwood Woodlands and Forests
- Piedmont Submerged Aquatic Vegetation
- Piedmont Emergent Vegetation
- Riverbank Shrublands
- Floodplain Wet Shrublands
- Dry Mesic Oak Pine Forests
- Piedmont Mixed Bottomland Forests
- Piedmont Oak Bottomland and Swamp Forests

Merged Land Cover

26 Total Land Cover categories
6 Developed
20 Natural

Rasterized Parcel Land Cover and NCGAP Land Cover are merged to produce a complete land cover including developed and natural categories. Parcel Land Cover takes precedence. NCGAP is only included in the areas categorized as "Undeveloped" in the Parcel Land Cover.



Existing Land Use
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial/Office/Institutional
- Transportation
- Open Water
- Agricultural Fields
- Barren (bare rock and sand)
- Barren (quarries, strip mines, and gravel pits)
- Coniferous Cultivated Plantation
- Dry Mesic Oak Pine Forests
- Floodplain Wet Shrublands
- Piedmont Deciduous Mesic Forest
- Piedmont Dry-Mesic Oak and Hardwood Forests
- Piedmont Dry-Mesic Pine Forests
- Piedmont Emergent Vegetation
- Piedmont Mixed Bottomland Forests
- Piedmont Oak Bottomland and Swamp Forests
- Piedmont Submerged Aquatic Vegetation
- Piedmont Xeric Pine Forests
- Piedmont Xeric Woodlands
- Riverbank Shrublands
- Successional Deciduous Forest
- Xeric Pine-Hardwood Woodlands and Forests

NORTH CAROLINA Turnpike Authority

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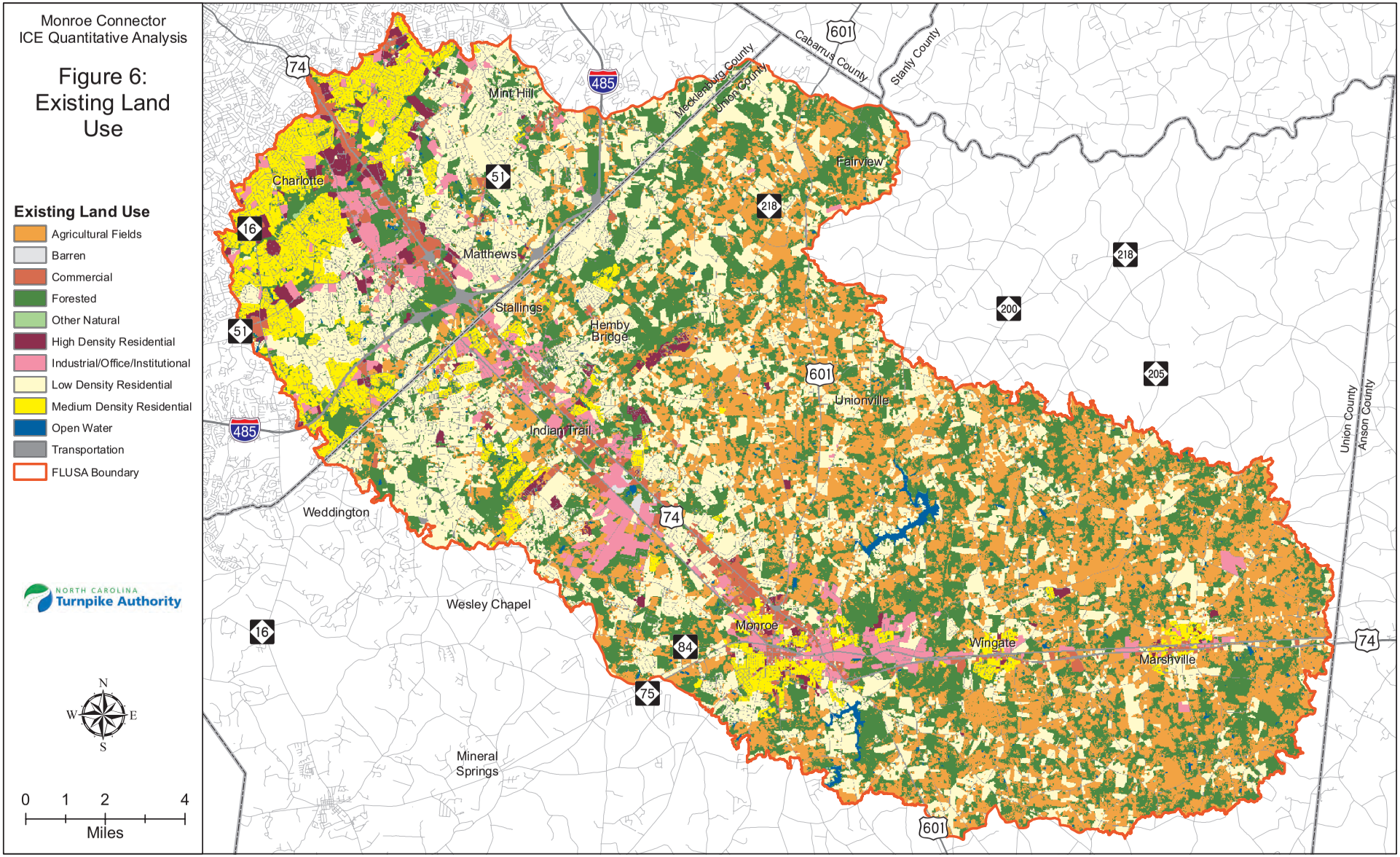
Monroe Connector
ICE Quantitative Analysis

Figure 6: Existing Land Use



Monroe Connector
ICE Quantitative Analysis

Figure 7: Household Growth by TAZ

Household Growth 2005 to 2030

- 0 - 100
- 101 - 250
- 251 - 750
- 751 - 1500
- > 1500

Traffic Analysis Zone Boundary

Future Land Use Study Area Boundary

NORTH CAROLINA Turnpike Authority

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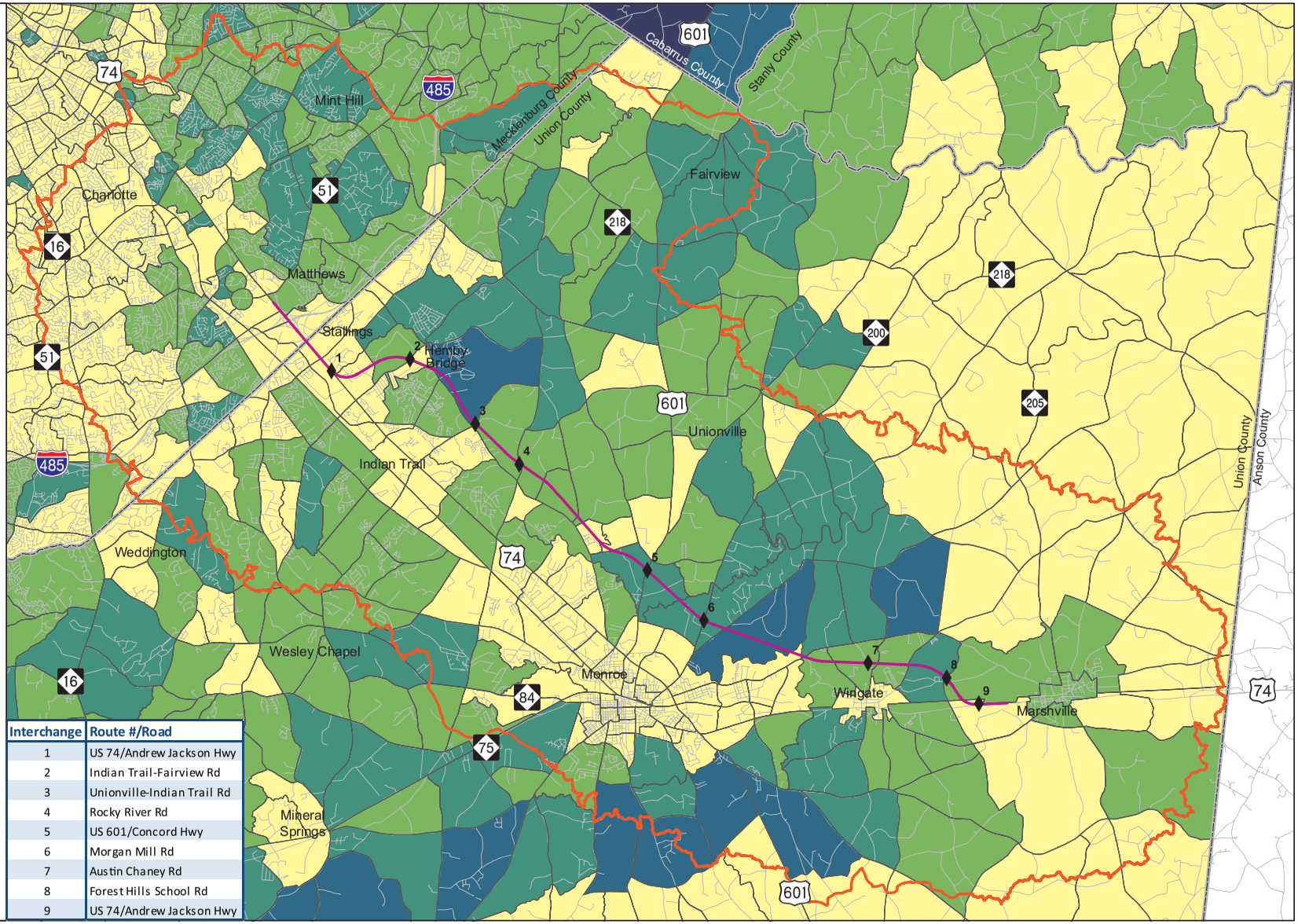

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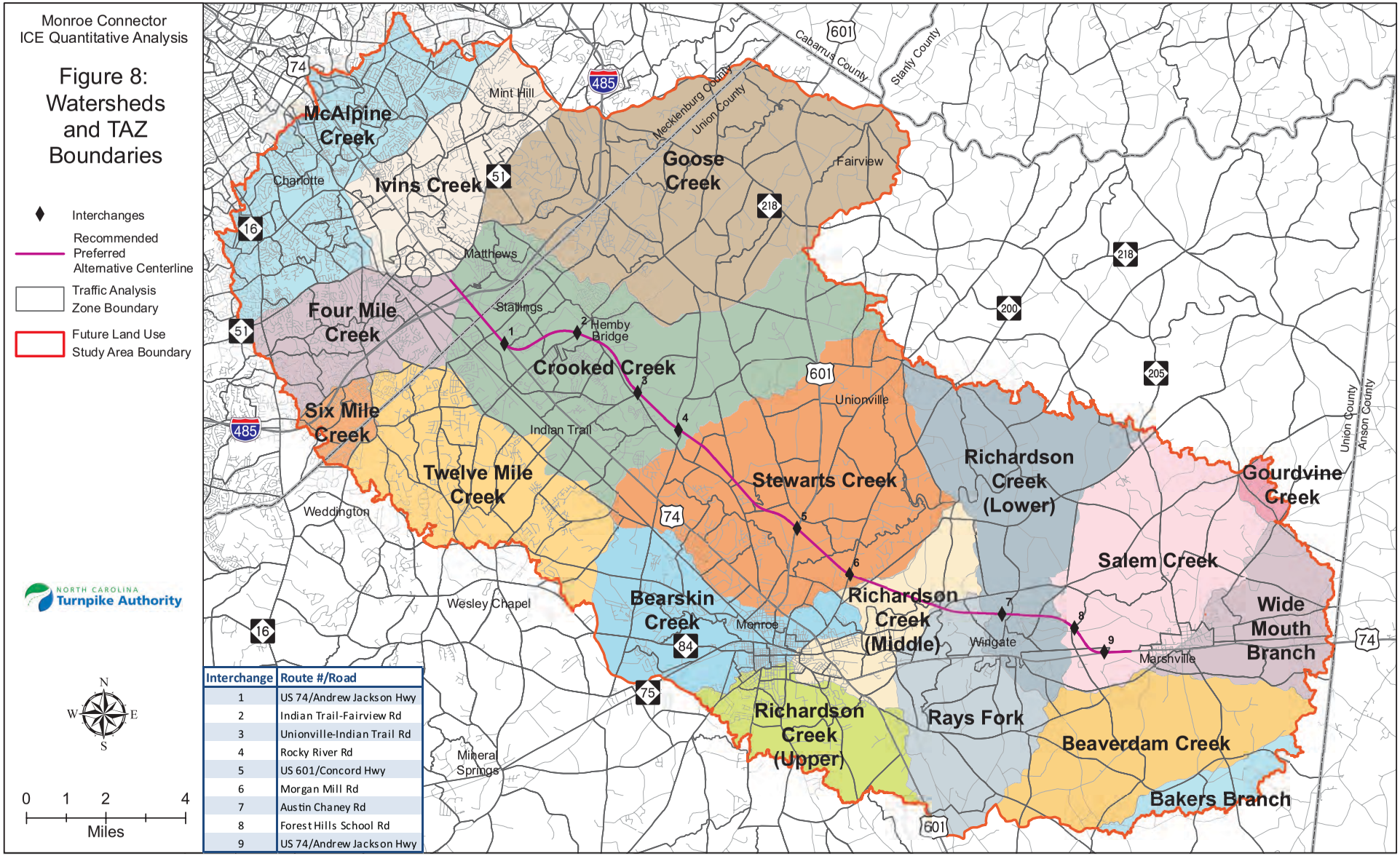
6	Morgan Mill Rd
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Monroe Connector
ICE Quantitative Analysis

Figure 8: Watersheds and TAZ Boundaries



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9	US 74/Andrew Jackson Hwy

NORTH CAROLINA Turnpike Authority

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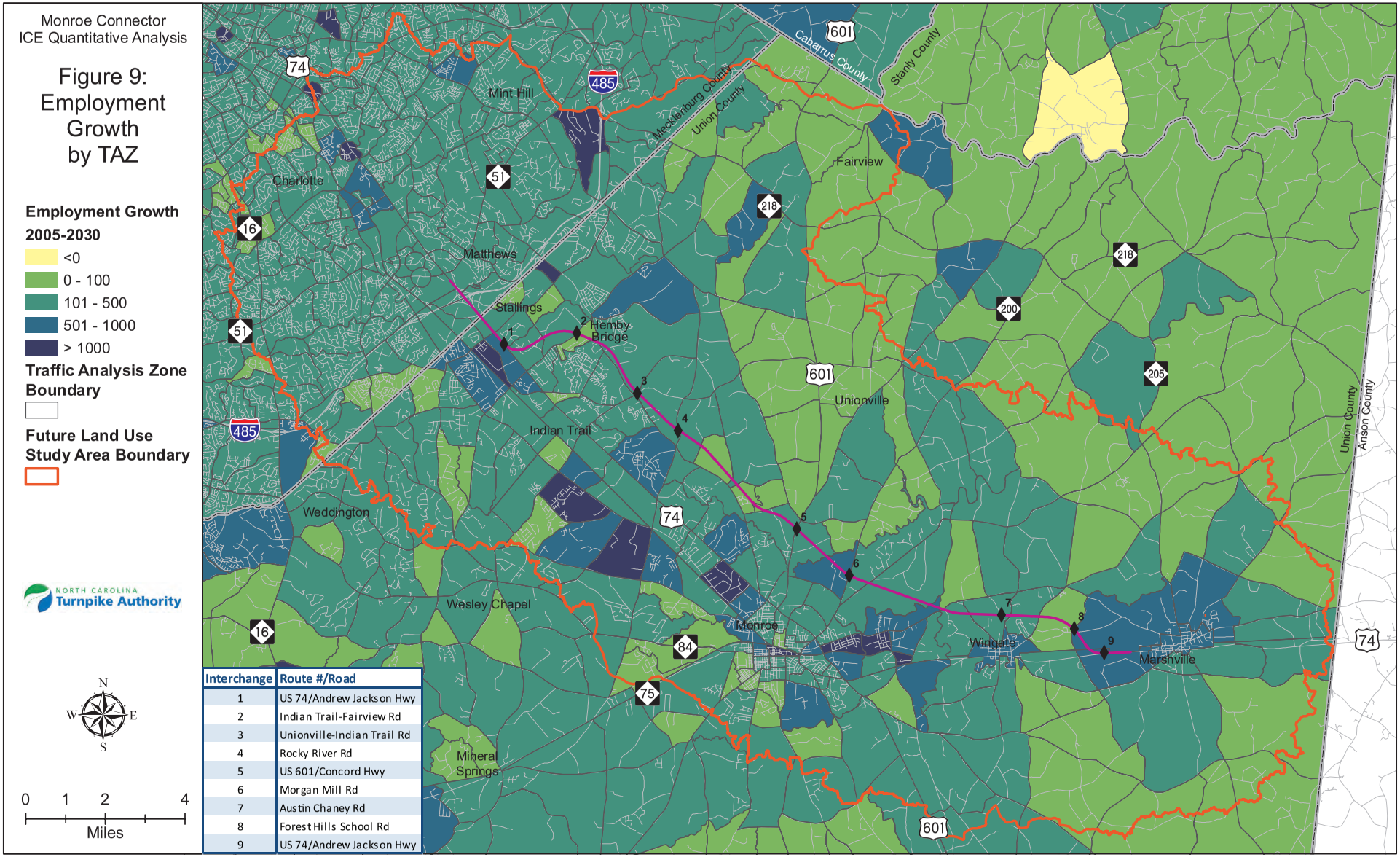
Monroe Connector
ICE Quantitative Analysis

Figure 9: Employment Growth by TAZ



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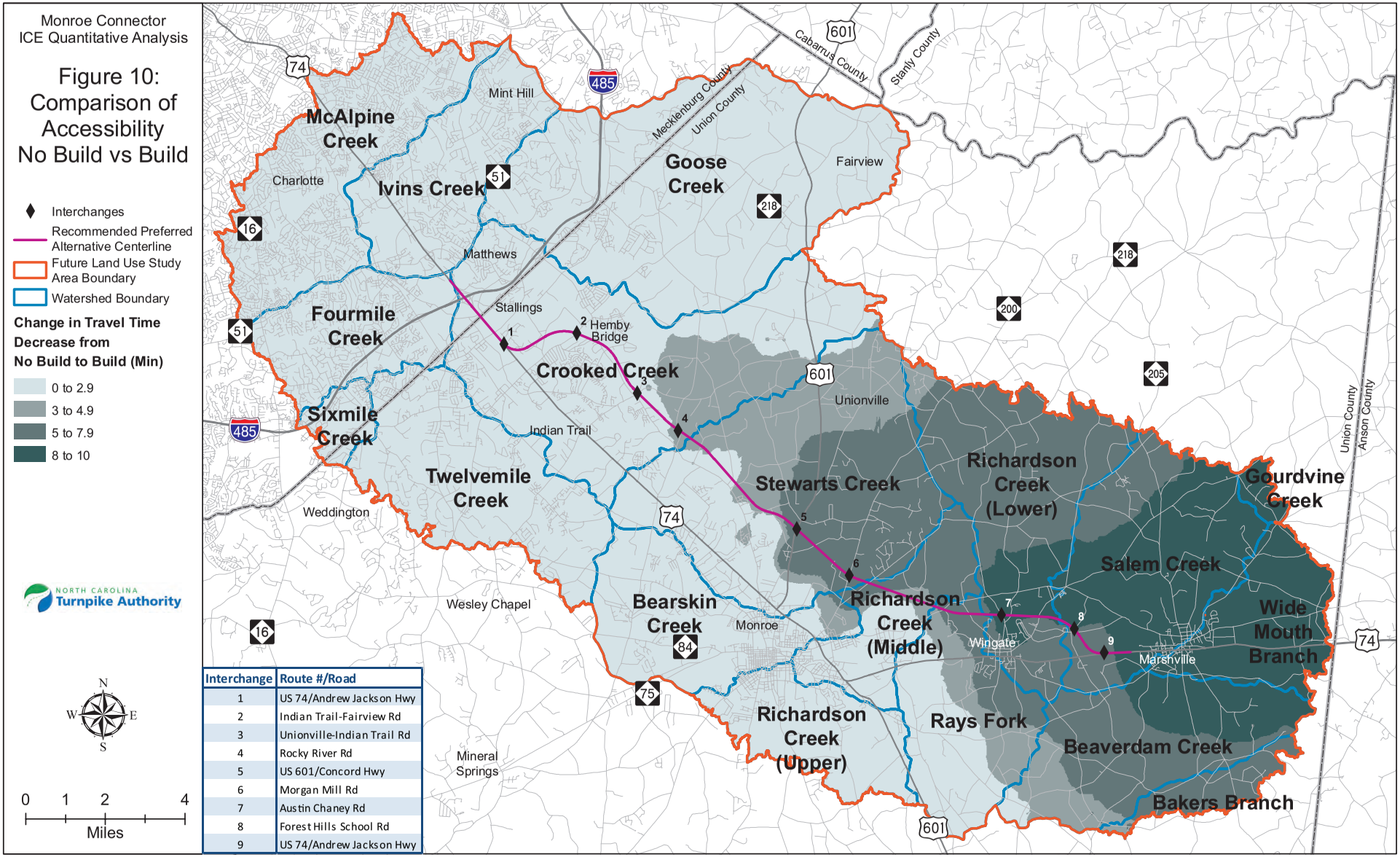
Monroe Connector
ICE Quantitative Analysis

Figure 10: Comparison of Accessibility No Build vs Build



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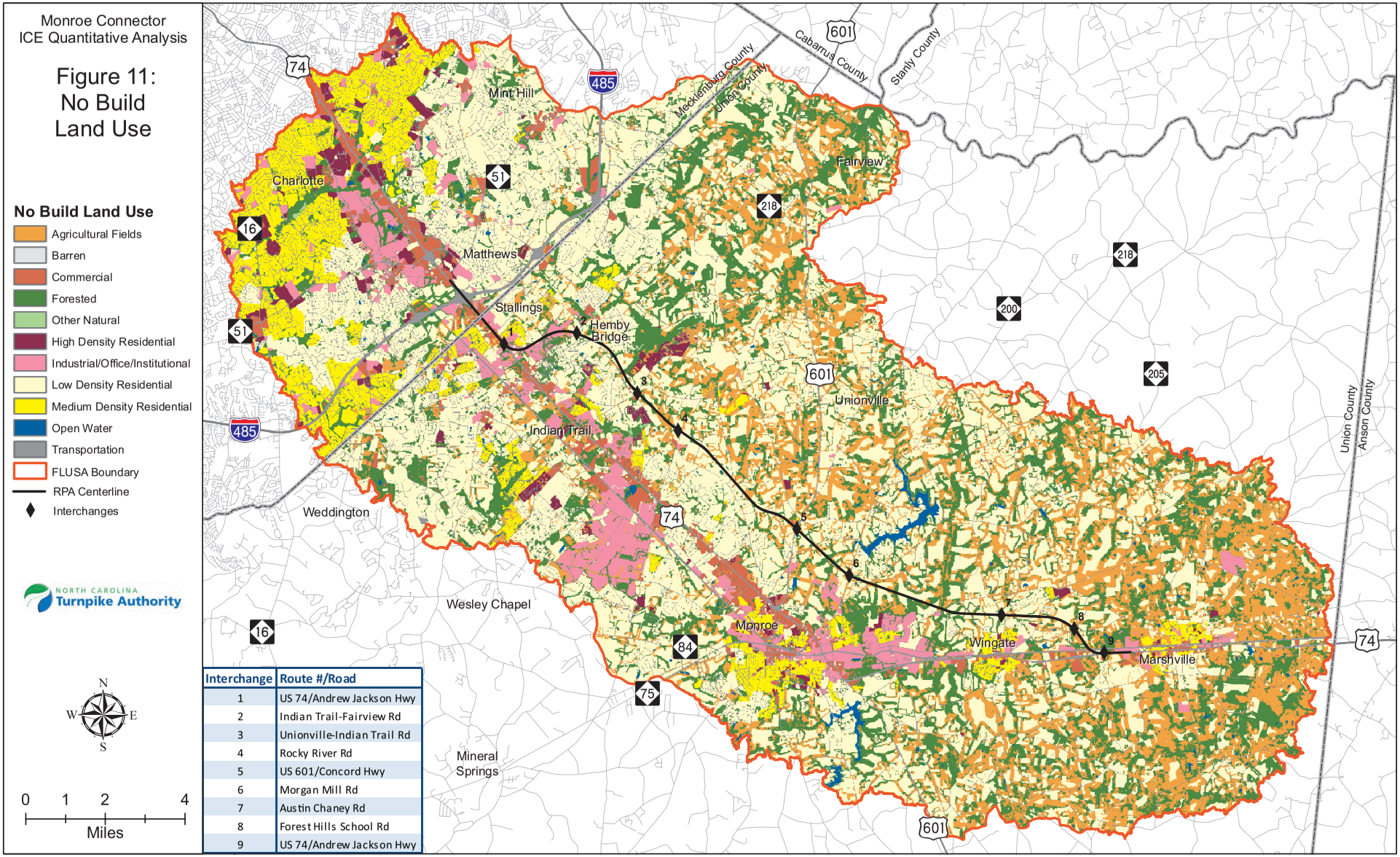
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Monroe Connector
ICE Quantitative Analysis

Figure 11: No Build Land Use



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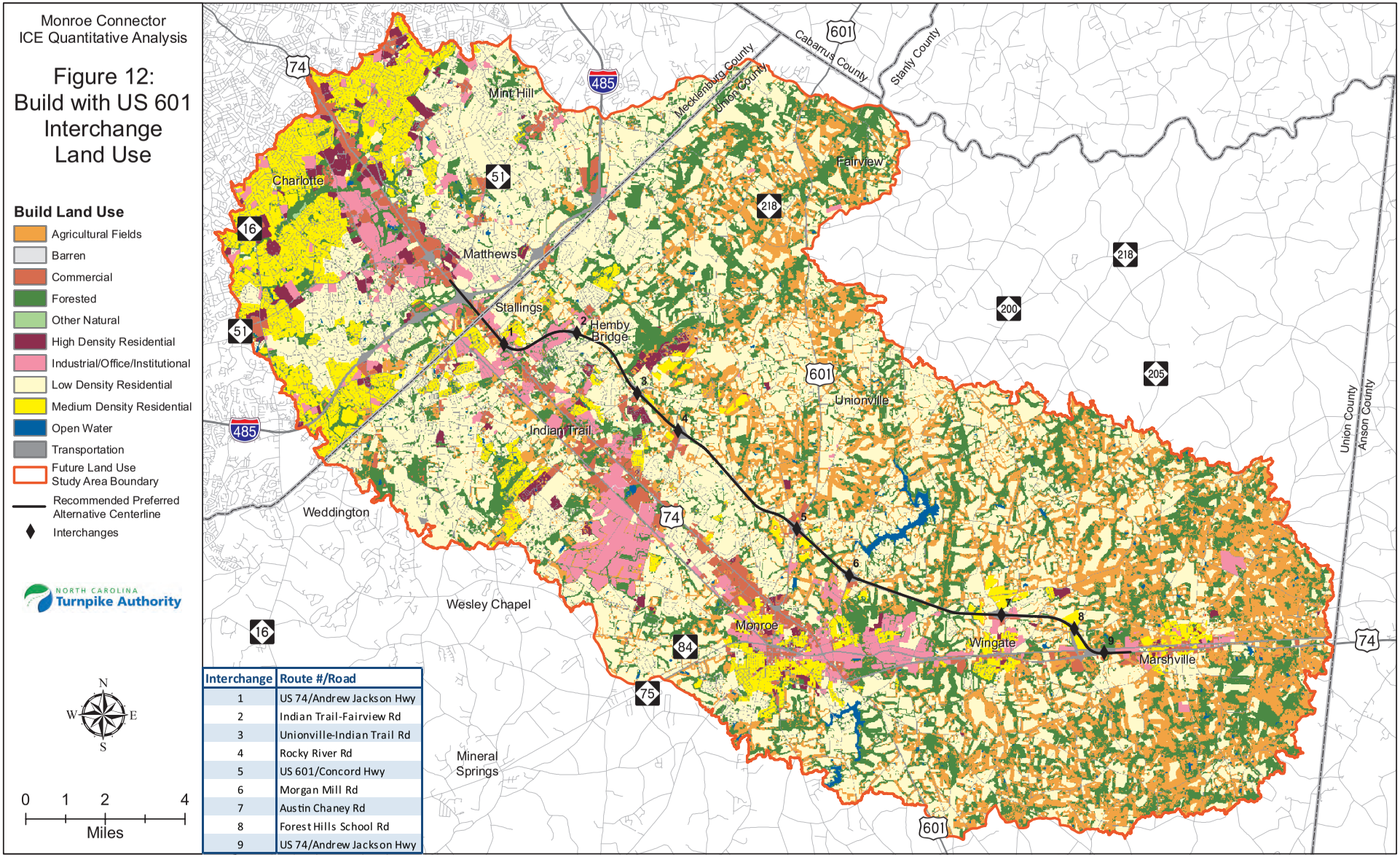
6	Morgan Mill Rd
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Monroe Connector
ICE Quantitative Analysis

Figure 12: Build with US 601 Interchange Land Use



Interchange	Route #/Road
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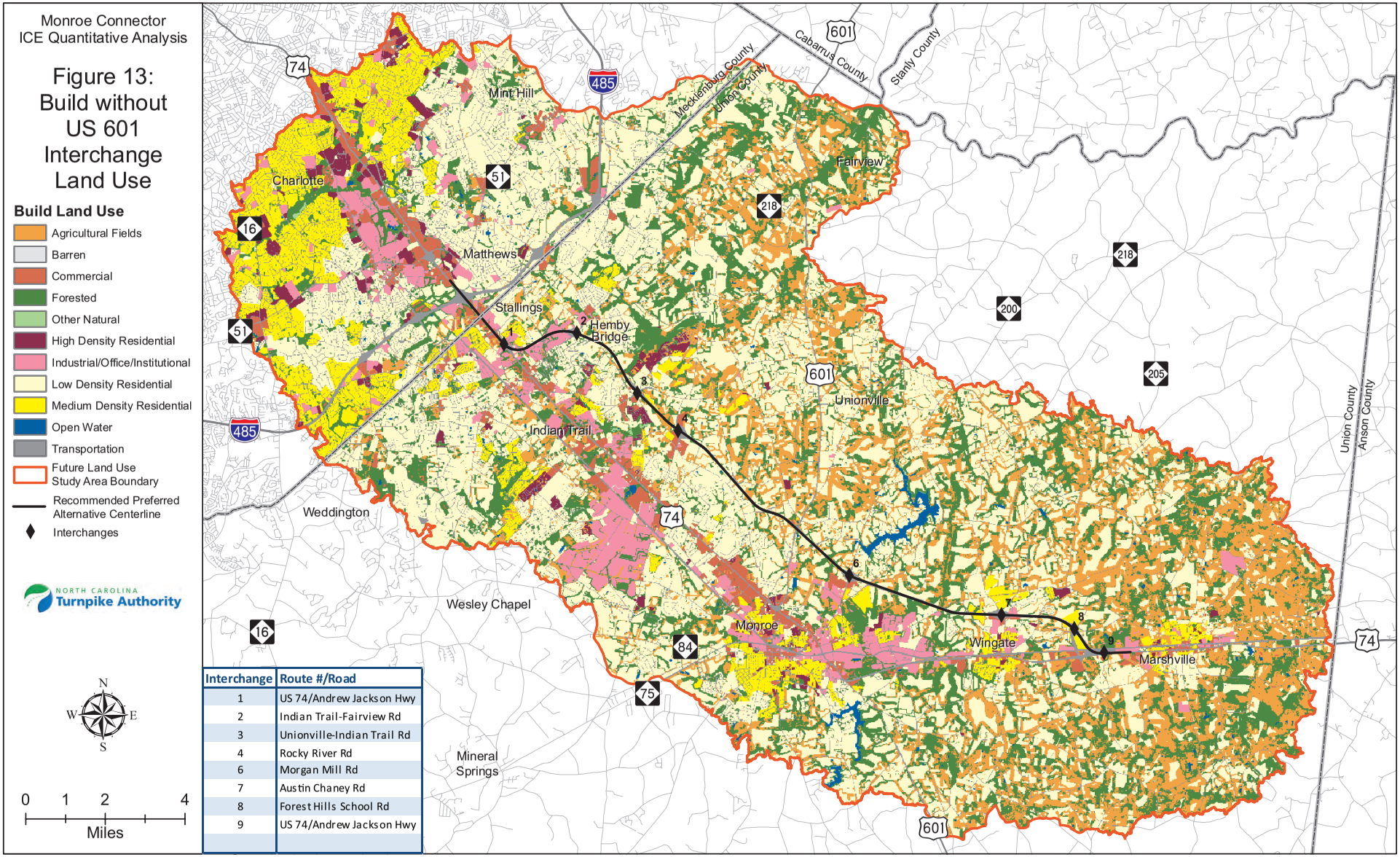
5	US 601/Concord Hwy
6	Morgan Mill Rd
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Monroe Connector
ICE Quantitative Analysis

Figure 13: Build without US 601 Interchange Land Use



Interchange	Route #/Road
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6	Morgan Mill Rd
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Monroe Connector
ICE Quantitative Analysis

Figure 14: Baseline to No Build Land Use

Baseline to No Build Comparison

- Undeveloped to Residential
- Undeveloped to Industrial/ Office
- Undeveloped to Commercial
- Residential to Industrial/ Office
- Residential to Commercial
- Lower to Higher Density Residential
- Industrial/Office to Residential
- Industrial/Office to Commercial
- Commercial to Industrial/ Office
- Commercial to Residential
- Future Land Use Study Area Boundary

Note: Limitations of comparisons between Baseline and No Build are detailed in Section 3.6.

NORTH CAROLINA Turnpike Authority

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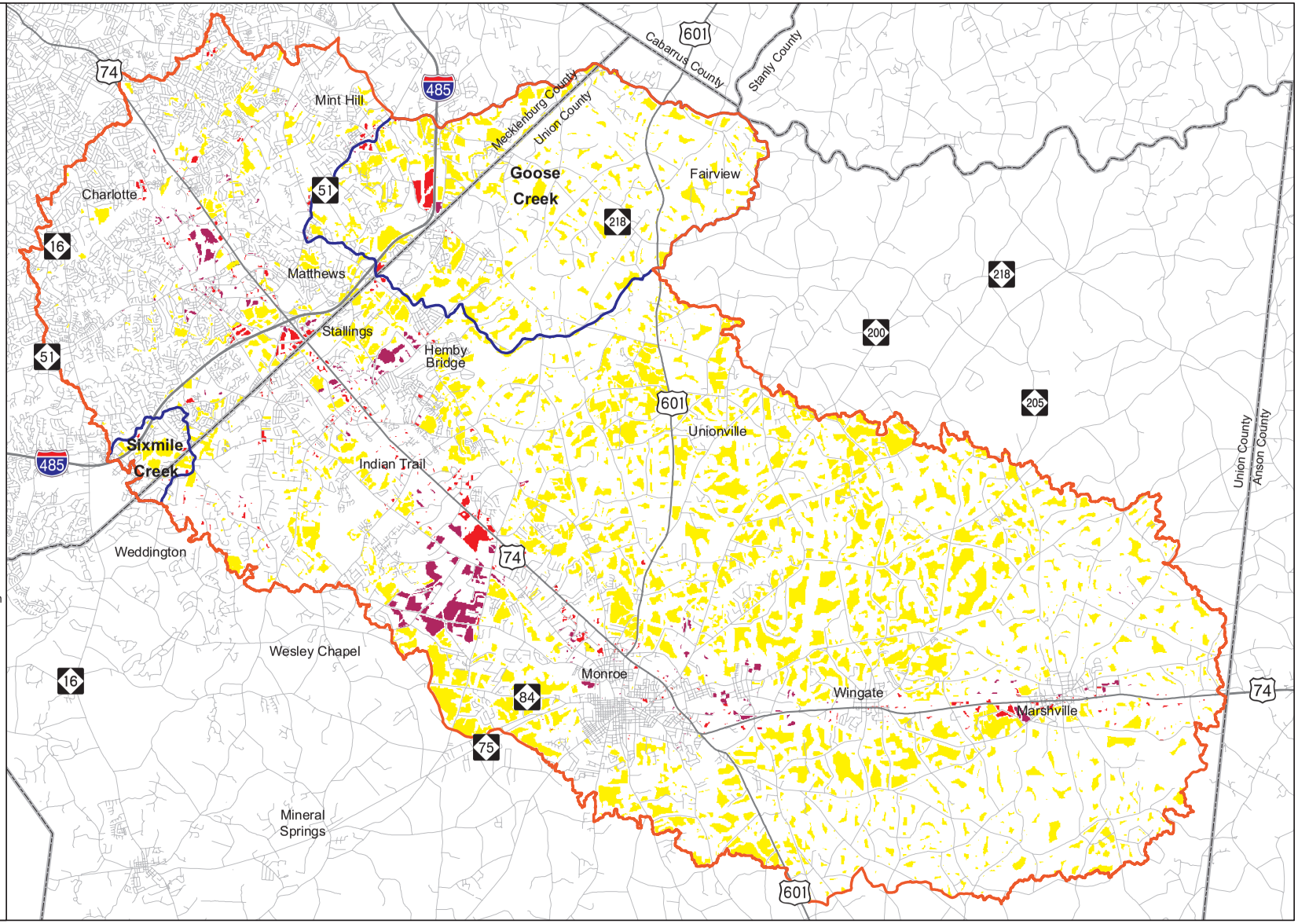
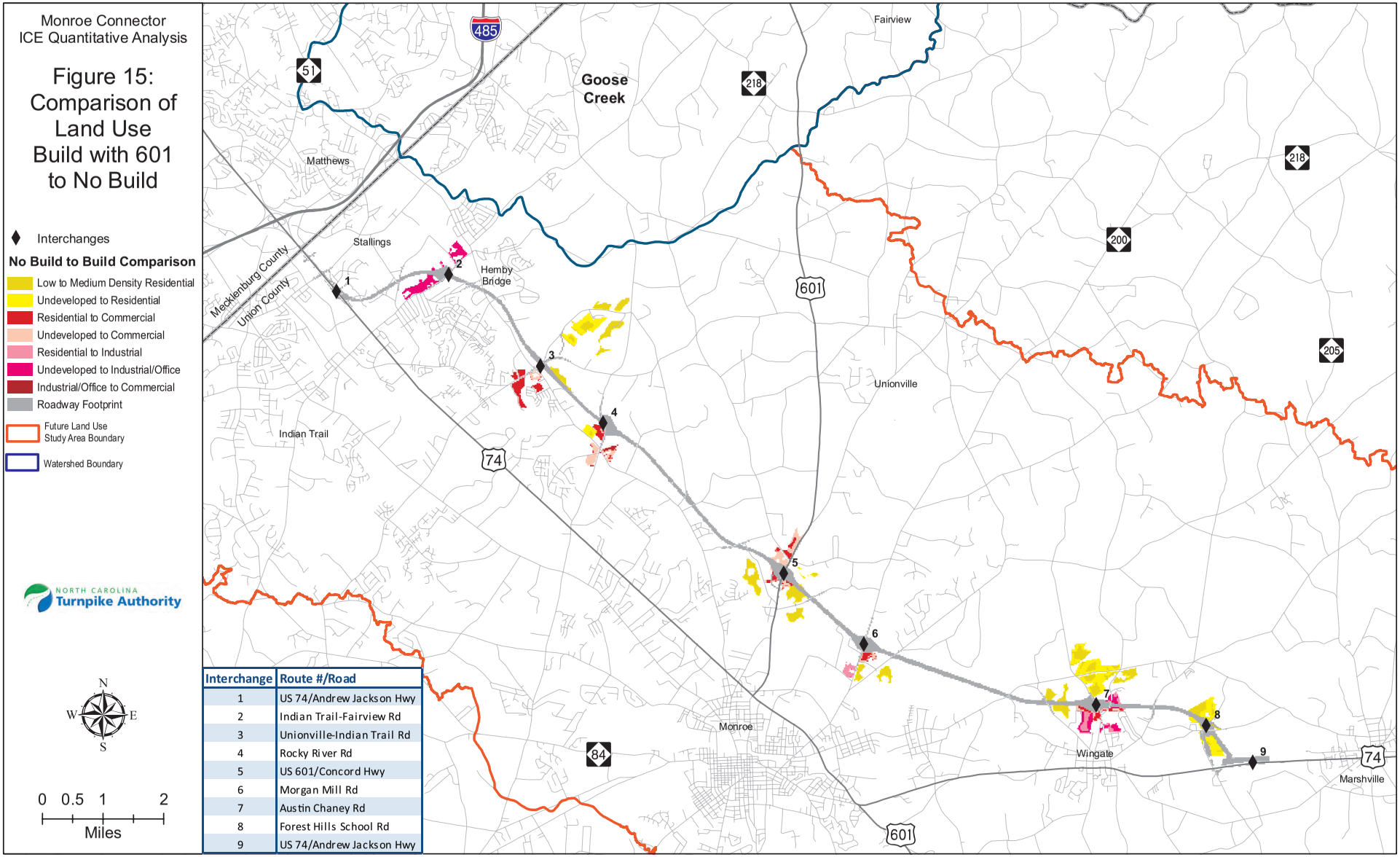


Monroe Connector
ICE Quantitative Analysis

Figure 15: Comparison of Land Use Build with 601 to No Build



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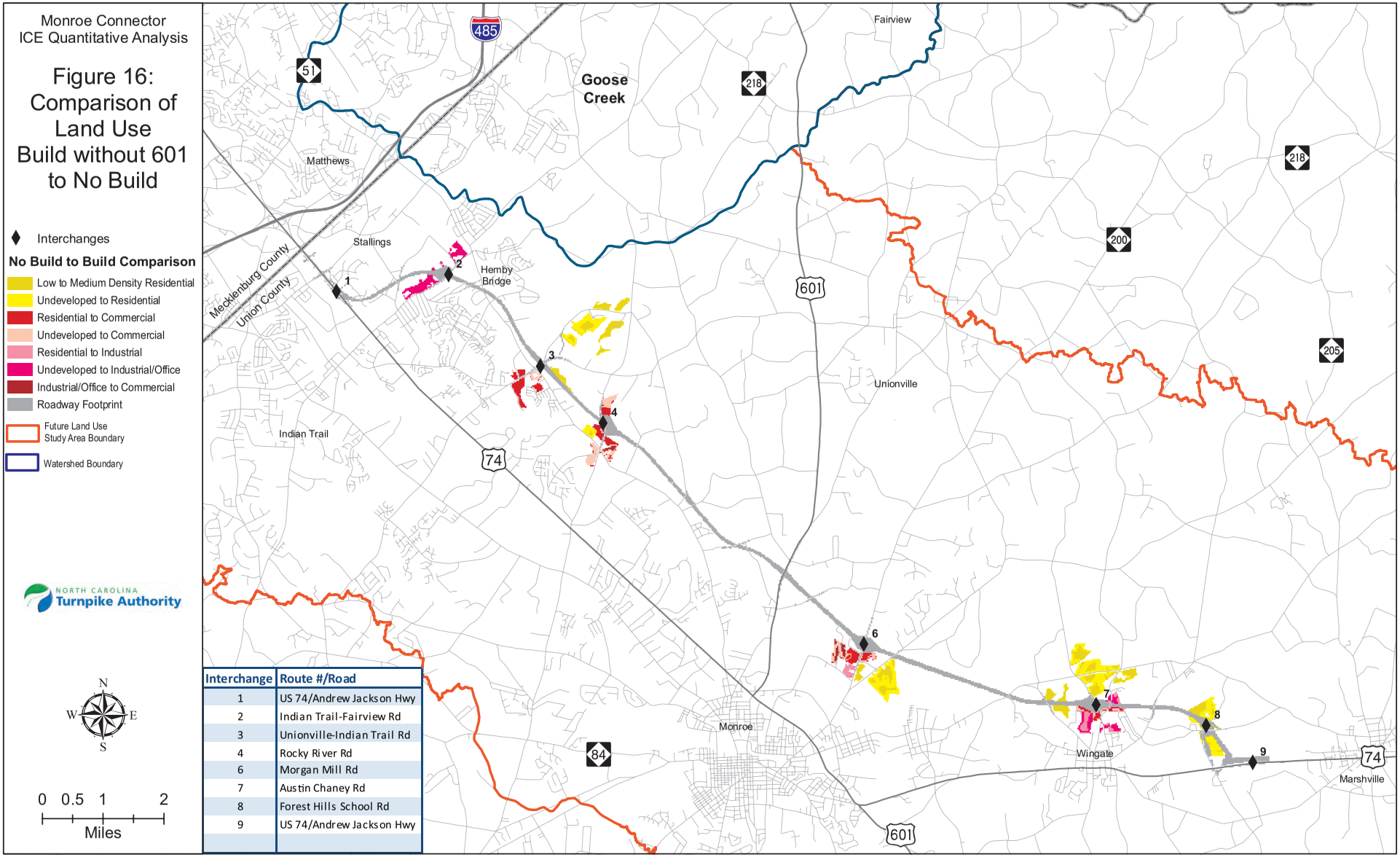
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Monroe Connector
ICE Quantitative Analysis

Figure 16: Comparison of Land Use Build without 601 to No Build



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4	Rocky River Rd
6	Morgan Mill Rd
7	Austin Chaney Rd
8	Forest Hills School Rd
9	US 74/Andrew Jackson Hwy

Appendix A

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TOWN OF WINGATE PLANNING DEPARTMENT LETTER

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/12/09
Meeting Location: Letter from Dryw Blanchard, Planning Director

Mr. Blanchard, Planning Director for the Town of Wingate, supplied a written response to the project interview questions, as he was going to be away from the office during our interview period and wished to provide a timely response. His responses are included below.

1. The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?
   No.

2. What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.
3. In May of 2008, the Town of Wingate amended its Land Use Ordinance to implement regulation in a new ETJ area. The new regulations did not include any significant changes from how Union County was already regulating the land around Wingate. We copied the approved land uses from Union County's land use ordinance almost verbatim. The largest change is that Wingate regulates the land use now, rather than Union County. The allowed uses can certainly change in the future, but none have occurred since the March, 2008 interview. A copy of the town's updated zoning map can be downloaded at:
   http://wingate.govoffice.com/vertical/Sites/%7B97E181A6-5F3F-4B46-B6D8-5965A146C00C%7D/uploads/%7B63EB26FD-56DB-4B2C-AEB6-A66DB0BE563E%7D.PDF

4. Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?
   No.

5. We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.
   The Town enforces its Land Use Ordinance. I can provide copies of zoning permits issued. Is this what you are asking? The Town has also adopted a Flood Hazard Prevention Ordinance to continue participation in the National Flood Insurance Program. It was adopted October 24, 2008. A copy of the ordinance can be downloaded at:

http://wingate.govoffice.com/vertical/Sites/%7B97E181A6-5F3F-4B46-B6D8-5965A146C00C%7D/uploads/%7BB0D07259-99AB-4E4F-8E38-87CB3AA7E3F6%7D.PDF

6. For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?
   Land use classifications are generally best represented by our zoning map. Union County GIS has not included a layer for Wingate's zoning map. Centralina COG has Wingate's shape files available that can be used.

7. What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?
   There are two developments approved and on hold (because of sewer availability). They total approximately 200 residential, single-family lots. Neither of the developments is mapped. I have preliminary drawings on paper that can be copied.

8. Have long-term growth expectations changed since the previous interview?
   No.

9. What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)
   Right now, the only information we have available is our zoning map and Land Use Ordinance. Wingate is about to start development of its first comprehensive plan, but it will not be complete for another 6-12 months. The RFQ to solicit bids went out the week of August 10th.

10. Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?
    Once developed, I assume it will study both alternatives.

11. We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?
    Availability of water and sewer will dictate where development occurs in the Wingate area.
    If Union County does not secure additional wastewater transmission and treatment capacity for eastern Union County, any growth will be severely limited and will only occur adjacent to existing utility lines.

12. What role will the provision of water and/or public sewer service have in determining future development patterns?

See question 10

13. For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?
    Shape files of Wingate's zoning map can be obtained from Centralina COG. Wingate's Land Use Ordinance can be downloaded at: http://wingate.govoffice.com/vertical/Sites/%7B97E181A6-5F3F-4B46-B6D8-5965A146C00C%7D/uploads/%7BF9B3EA05-E547-4E32-8788-FB58B69A8D2E%7D.PDF

Developed Land Use Classifications: (exact densities to be determined)

Low Density Residential	Low Intensity Mixed Use
Medium Density Residential	Medium Intensity Mixed Use
High Density Residential	High Density Residential

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis; Follow up interview
Meeting Date: 8/25/09, 10:00 am
Meeting Location: email request

Mr. Blanchard provided the following additional information during a follow up interview:
There have been no enforcement actions for buffer regulations.

As for rezonings, the Town took over zoning control (from Union County) in January of 2002. At that time, most of the residential property in town was zoned R-10 (residential with minimum lot sizes of 10,000 s.f.). In October of 2005 all R-10 properties were rezoned to R-20 (20,000 s.f. minimum) and the R-10 zoning district was eliminated.

In May of 2008 the Town once again had some pretty major changes with its Land Use Ordinance. The Town adopted an ETJ district. However, no changes were made to the zoning classifications that differed from the regulations the County had on them. To date, there have been no significant zoning changes since October, 2005.

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis; Follow up interview
Meeting Date: 9/15/09, 3:00 pm
Meeting Location: phone interview

On call:
Dryw Blanchard – Planning Director, Town of Wingate
Ken Gilland - Baker Engineering

Mr. Blanchard suggested that I review the Strategic Plan For Economic Development for the Town of Wingate and the Town of Marshville, October 2008, which is posted on the Town's website (summary follows). Mr. Blanchard said that the economic development plan is the driving force as the town develops its master plan, and it assumes the Monroe Connector will be built. He anticipates that zoning around the intersection north of Wingate will be commercial. He has spoken with NCTA and the city is

pursuing funds to extend water and sewer north of the interchange. Both the city and the university expect the connector exit to be their gateway. The university plans to build in the direction of the interchange and they've rezoned an area north of the current campus for a 70,000-square foot medical education complex. They expect the main traffic into town will go from the connector interchange down Austin-Chaney Road to North Main Street and "old" 74, where the Helms Center is located.

Summary of Future Land Use – Summary from the Strategic Plan For Economic Development for the Town of Wingate and the Town of Marshville, October 2008 and Interview with Dryw Blanchard pertaining to future land use in the Wingate and Marshville areas.

Under the build alternative, there would be two exits in the vicinity of Wingate and Marshville: Austin Chaney Road (north of Wingate) which is listed as SR 1758, and Forest Hills School Road (SR 1754), which lies between Wingate and Marshville.

Austin Chaney Road is currently bordered by farmland in the vicinity of the proposed connector. It merges with McIntyre Road to form Main Street. There are three roads that could act as an entry from Main Street to Wingate University. They are (from North to South): North Cannon Road, Cedar Street, and East Wilson Street. According the Dryw Blanchard and the economic development plan, both the university and the town are seeking to use the connector as a gateway centered on Austin Chaney Road and Main Street. Neither Mr. Blanchard nor the plan specifically mentions SR 1754.

The economic plan looks to develop towards and beyond the intersection. They hope to expand water and sewer north of the connector for commercial development. Specifically, the town is looking for an attraction, office park, or some other economic anchor to be located in this area. The cited examples would be an industrial park 500 acres or larger in size (given the examples cited in the plan) or an attraction. Examples for attractions include a water park, the Bob Graham Agricultural Center (Martin County), and Broadway on the Beach in Myrtle Beach.

South of the commercial section at the interchange, the town and university would like to redesign the entry to the town. They are looking at mixed use development that includes office and residential space, with the housing above street level stores. The listed examples are 5- to 50-acre developments. Such development could include a university/town partnership centered around Main Street (based on a review of the area map). The land is currently lower density residential or lands associated with the college. The redevelopment plan cites other projects that created new town centers in Davidson, NC and Huntersville, NC.

The development plan lists some developable parcels in Union County. They include:

- 34-acre greenfield site 1 mile from existing 74 in Wingate (zoned as a Highway Corridor)
- 62-acre greenfield site 1 mile from existing 74 in Marshville off Stegall Road (zoned Industrial)
- 70-acre greenfield site in Monroe (zoned General Industrial) on Corporate Center Drive 2 miles from existing 74
- 100-acre Old Hickory Industrial Park greenfield site in Indian Trail (zoned Light Industrial) off Fairview Road 1 mile from existing 74
- 200-acre greenfield site1 mile from existing 74 (zoned as General Business) in Monroe off M.L. King Jr. Blvd.

These will probably be pursued for development regardless of whether the project will be built or not.

CENTRALINA COG INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/17/09, 2:00 pm
Meeting Location: phone interview

On call:
Bill Duston - Director Centralina COG
Jana Finn - Marshville and Fairview Land Use Administrator
Nadine Bennett - Former Unionville Land Use Administrator
Ken Gilland - Baker Engineering
Scudder Wagg - Baker Engineering
Chris Roessler - Baker Engineering

Ken Gilland began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis as part of the NEPA process for the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: Centralina COG staff said they had reviewed the minutes from the previous meeting and thought that there were no new changes or new development projects. Wingate recently issued an RFP for a new comprehensive plan and that could change land use there.

No updated GIS since spring 2008.

Centralina mentioned that Weddington and Wesley Chapel have their own staff planners.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: No new changes in regulations have occurred in Marshville, Unionville, or Fairview since March of 2008.

There is a site-specific water quality plan for Goose Creek that only affects Fairview. DWQ is in charge of enforcement since they promulgated the regulation. Centralina recommended that Baker check with the towns that are directly affected. Centralina assisted with the Western Union County Local Area Regional Transportation Plan, and will see if they could send us the associated TAZ shapefiles for this document, as it includes Weddington and Wesley Chapel.

Beginning September 1, Fairview will have a new land use regulator as a town employee.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: No new changes in regulation of natural resources have occurred in Marshville, Unionville, or Fairview since March of 2008.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: Variances are handled by the Board of Adjustments. No examples were provided of zoning variances that do not comply with the current land use plan. The available zoning is a good representation of the future land use. The buffer rules tend to be upheld in a de facto manner by the flood ordinances. Developers must get a floodplain permit to build within these zones. Beyond this, DENR would be responsible for enforcement of other buffer areas. We could check with DENR about violations in this area but they don't keep specific enforcement data.

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: The Marshville future land use plan is more urban. It includes a rail line and industrial and commercial developments. Zoning in Marshville took place in the 1990s, but was little changed from the existing County zoning. They recently adopted their own ETJ and have more say in the development in their vicinity. Unionville and Fairview are satisfied with their land use plans, which have a high percentage of low density residential zoning. There is virtually no sewer and water service and the lots are mostly 40,000 square feet.

There is an ordinance (post development?) that has maximum impervious percentages. Centralina will send that information.

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: There is not much new development in the works except for a few subdivisions. Centralina will provide that information. Union County Public Works has to approve water supply to Fairview and Unionville. Approved developments have a time limit before they must obtain plat approval. If not, the original approval will expire.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: No changes to long-term growth expectations.

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)?*

RESPONSE: There are future land use GIS data and maps for each community. Centralina will provide these along with a document for interpreting the GIS.

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: The long-term land use plan for Fairview and Unionville is indicative of a future without the Monroe Connector (RPA). Centralina COG thought that they wouldn't change much if the Connector was approved and built. Marshville's plan does not refer to the Connector but it would react more quickly if the Connector were approved.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: The short answer is water and sewer service. Marshville will have more impetus to grow if these and the Connector are built. Fairview and Unionville seem content with how they are and are not looking to expand their tax base. Despite having one interchange near Unionville, there is no indication that they are looking at smaller lot sizes even if water and sewer were available.

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: Those areas would be more prone to development but it would not change the character or density of development.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: Centralina will provide all available GIS data to Scudder Wagg.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: Centralina has had some review of these forecasts but not for the communities within the Monroe Connector study area. They referred us to Anna Gallup from Charlotte DOT as the keeper of the MUMPO model, which covers the study area except for Marshville. The Rocky River MPO includes Marshville; call Dana Stoogenky at 980-581-6589 about that.

-CC Meeting Attendees

UNION COUNTY PLANNING INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/18/09, 10:00 am
Meeting Location: phone interview

On call:
Dick Black – Union Co. Planning Director
Lee Jenson – Union Co. Land Use Administrator
Cynthia Mabry – Union Co. GIS Specialist
Scudder Wagg - Baker Engineering
Chris Roessler - Baker Engineering

Chris Roessler began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis, which will be included in the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios that have occurred since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: Warren and Associates completed a long-range land use plan for Union County. In early 2008, Union County did not realize the extent of the economic downturn. Water and sewer service will probably be slower to expand than previously thought. However, by 2025 the projections should be the same.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: A new land use plan is being finalized. Union County expects it will be adopted by the end of 2009. For this study, the unapproved land use plan would seem to provide better information than the existing one but can we use an unapproved plan?

There are no digital data for the proposed land use plan, only text for the document.

In October 2008, new floodplain maps and language were adopted. The effect is the identification of new types of non-encroachment areas. It is more stringent for development but the CLOMR and LOMR (Federal Emergency Management Agency permitting) process is still the same. Amy Helms from Union County Public Works can provide more information about this.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: For buffer regulations, the NC Division of Water Quality has rules for Goose, Duck, Waxhaw and Sixmile Creeks. Lake Twitty is a water supply watershed in the study area. Otherwise, the post construction ordinance applies. This ordinance is available on the county website.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: There has been no approved rezoning in the last five years. Floodplain management is local and they have not had any ordinance violations. Talk to Amy Helms about this in interview with Public Works.

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: The zoning map is the most accurate reflection of what is on the ground now. The parcel data were used to create the zoning though they may be a little different. The zoning would fit pretty well with the low, medium, and high descriptions provided. In a water supply watershed the maximum impervious cover is 24%, but they weren't sure about the others.

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: Review the Warren and Associates Land Use Plan. It included an economic analysis using Land Matters to identify subdivisions that have been approved but not developed. The plan aggregated the total number of lots by planning area (4 or 5 planning areas). The interviewees thought the tax parcel IDs were not provided. It apparently does identify commercial developments that are proposed or under construction.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: No. The land use plan goes to 2025 and the projections for land use have not changed.

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)*

RESPONSE: Zoning is the best indicator of the present land use. The land use plan is the best indicator of the future land use.

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: The previous land use plan was updated with the footprint of the Connector but not the effect of the Connector on surrounding land use. The future plan definitely includes the Connector and its effects on surrounding land use.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: Most of the study area is within the towns' jurisdictions. In the parts where the County has a say (mostly eastern part of study area), water, sewer, and the bypass were all crucial to future growth. A large retail center is in the land use plan at the 601 interchange. This would go away and probably be replaced by smaller retail facilities if the interchange were not included.

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: Union County expects that by 2030, water and sewer will be available throughout the area so this is a non-issue. The soils are not very suitable for septic systems and, to some degree, well water is not plentiful so these utilities are crucial but expected.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: Marshville and Wingate have an ETJ so they control a larger area with their planning and zoning.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: Seek Amy Helms' (Public Works) input on this because she reviewed and commented on the model. In general, Dick Black was comfortable with the forecast. He thought maybe it overstated development south of Monroe (unclear if this is within study area, perhaps on border) and understated development north of Wingate.

-CC Meeting Attendees

We will want to follow up on the Warren and Associates economic development study. Also need to decide about using the proposed future land use (not yet approved).

Lee Jenson pointed out an incorrect parcel on Map 5 of the ICE.

TOWN OF MATTHEWS PLANNING DEPARTMENT INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/18/09, 2:00 pm
Meeting Location: phone interview

On call:
Kathi Ingrish – Matthews Planning Director
Scudder Wagg - Baker Engineering
Chris Roessler - Baker Engineering

Chris Roessler began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis, which will be included in the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios that have taken place since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: Matthews is in the process of updating its land use plan and downtown master plan but those will not be ready in time for this study. The City is also redoing its development regulations to fit into the new unified development ordinance (UDO), but that will not be ready either.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: There is nothing new at this time but changes are coming. Kathi had a significant list of projects that were approved but are not indicated in the current maps. She will try to provide these in a summary table by early September.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: View Matthews post construction ordinance on the town's website. This was completed in June 07 so it was probably captured in the previous interview.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: Buffer and floodplain enforcement is handled by the Mecklenburg County stormwater staff. Talk to Rusty Rozelle for the buffers and Bill Tingle for the flood ordinance.

The Erickson Continuing Care Retirement Community, which has been approved but not built, conforms to the land use plan but 'exceeds expectations for residential density.'

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: Matthews does not have an existing or future land use map at this time. The zoning map is tricky because zoning is not done in advance. R20 is used as a default and is changed as needed. When viewing the zoning map be careful of R20 because the zoning may not match actual development.

Matthews' land use policies are described in text only. The zoning conforms to what is built.

Both the Town's landscape chapter within the Zoning Ordinance and the Post Construction Ordinance require a certain amount of open space, tree canopy, and/or maximum impervious coverage.

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: This was covered in question 2.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: There is more acceptance now of the need to have urban, high density development along the transit corridor. Transportation issues, including the Monroe Connector and conversion of 74, are key to this.

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)*

RESPONSE: The land use plan update is in progress. The current plan is on the website in text only.

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: The draft plan talks about connecting to US 74 at the county line.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: The pockets of unbuilt acreage are closest to the county line (south of Independence Boulevard, Hendrick Motor Mall zoned but not built).

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: The north side of Independence Boulevard in the Crooked Creek basin has different post-construction regulations. This area has not developed because of lack of utilities. The road development situation will help to clarify how this area will develop. Ms. Ingrish expects all of Matthews to reach build out by 2030.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: The City doesn't have any.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: Ms. Ingrish assumes the information they provide is still adequate but has not looked at the forecasts in a while.

-CC Meeting Attendees

TOWN OF MARSHVILLE PLANNING DEPARTMENT INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/19/09, 10:00 am
Meeting Location: phone interview

On call:
John Munn – Interim Planning Director, Town of Marshville
Ken Gilland - Baker Engineering
Scudder Wagg - Baker Engineering

Ken Gilland began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis, which will be included in the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios that have taken place since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: Mr. Munn has been serving as the Interim Planning Director since May of 2009. He noted no changes since he began work. The only new federal funding is a Congestion Mitigation and Air Quality (CMAQ) grant for sidewalks that connect a residential area to a school, which shouldn't impact future development. A few Habitat for Humanity homes have been built and some small businesses have been lost due to the economic downturn.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: No new changes in regulations have occurred in Marshville.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: Federal Emergency Management Agency (FEMA) maps have been updated, but there have been no new regulations.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: Variances are rare. There have been few requests. The only rezoning request Mr. Munn remembered in the past year was a rezoning for a farmers' market in the ETJ.

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: Development is approximately a 60/40 mix of residential and non-residential. The average development pattern over the entire area is low density (1-acre lots) but areas in town and in poorer areas of the community are more densely developed. No maximum percent impervious.

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: There is not much new development in the works.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: No changes to long-term growth expectations. They expect little growth, as spillover from Charlotte generally is thought to end at Monroe.

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)?*

RESPONSE: Not sure, check with COG.

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: Rocky River RPO has just worked with NCDOT to develop a Comprehensive Transportation Plan for Marshville. While the connector isn't shown, a bypass of 74 to the south of Marshville is shown to alleviate downtown truck traffic. The build alternative may bring a small amount of development.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: Low growth is expected to continue. There is a lack of industry (other than poultry farms) and the Town cannot afford to expand water and sewer service.

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: The lack of water and sewer service is one reason substantial growth is not anticipated in the town. Water services are provided from Anson County. Sewer services are provided from Union and Anson Counties and were last expended in 2006. The City can't afford an expansion, and without expansion of water and sewer service, little development can occur. Only incremental increases to capacity are anticipated through 2030.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: The Public Works Department may have GIS or CAD information on existing sewer lines.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: The Rocky River RPO developed a feasibility study that may include this information. The Town cooperated in the development of the plan; check with them (Dana Stoogenke 980-581-6589 is the contact there).

-CC Meeting Attendees

TOWN OF INDIAN TRAIL PLANNING DEPARTMENT INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/19/09, 2:00 pm
Meeting Location: phone interview

On call:
Shelly DeHart – Planning Director, Town of Indian Trail
Ken Gilland - Baker Engineering
Scudder Wagg - Baker Engineering

Ken Gilland began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis, which will be included in the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios that have occurred since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: No.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: The town has developed a Unified Development Ordinance that renamed the district and brought the separate ordinances up to date with current zoning.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: Buffer regulations changed from 100 feet from top of bank to the floodplain, based on state regulations. The town views this as a less stringent criteria.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: Zoning was developed as part of the Comprehensive Plan. Each village has its own allotments of open space, development types, etc. The plan anticipated ultimate build out in 20 years. It is now thought buildout will not take place for 30 to 35 years. Rezoning is only allowed if it conforms with the comprehensive plan; otherwise it is not approved. Only exception is north of US 74, where an area of industrial parks that are zoned for regional business is currently in an industrial use.

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: The zoning (current and future land use) is the best representation of land use within the town. The connector is included in the comprehensive plan, but land use is consistent with zoning. There is no percent impervious limit in the unified development ordinance

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: There is a list of residential projects in the pipeline available which the Town will send. The list is updated each month. County still developing water allocation plan.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: The economic downturn has slowed the pace of development. Build out, originally anticipated to be reached by 2020; may not be reached until 2035.

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)?*

RESPONSE: The Comprehensive Plan is the best source of data.

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: The comprehensive plan anticipates the Monroe Connector will be built. The proposed 601 interchange might increase traffic in Unionville. If the connector was not built, it would impact business zoning at the anticipated interchanges. It would also impact the industrial park, whose tenants anticipated the access advantages the connector would supply. It would also make it harder to support the higher density development anticipated in the comprehensive plan. The growth is needed to sustain services.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: Water and sewer services are key. Growth is expected along thoroughfares. The Sardis and Poplin villages are expected to grow mainly because of the connector.

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: The comprehensive plan assumes that water and sewer issues will be resolved by 2030. It is possible that the Town will attempt to obtain water from Mecklenburg County, if capacity of the Union County facility is not increased.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: Look at the Union County Comprehensive Plan. The contact is Luke Fawcett, lff@planning.indiantrail.org.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: Since the slowdown in growth caused by the economic downturn, the Indian Trail TAZ forecast appears to match local development trends.

-CC Meeting Attendees

TOWN OF MINT HILL PLANNING DEPARTMENT INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/21/09, 10:00 am
Meeting Location: phone interview

On call:
Lee Bailey – Planning Director, Town of Mint Hill
Ken Gilland - Baker Engineering
Scudder Wagg - Baker Engineering

Ken Gilland began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis, which will be included in the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios that have occurred since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: Yes, there are two new documents under development: an update to the land use plan and a Lawyer's Road/485 Small Area plan, both of which will be developed by HNTB. The main new development is related to Highway 485. There is a plan to allow commercial/light industrial development at the Albermarle Road intersection, and to develop a mall/commercial development at Lawyers Road; otherwise the intersections of Highway 485 will be developed as residential. The Lawyers Mill mall is 1.2 million square feet, envisioned as an outdoor mall with 50 percent open space. They anticipate no impact to the Goose Creek watershed. Mall development has been hurt by recession and one of the partners in bankruptcy, so other funding options being explored. Hoping to restart in 2012.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: The post construction ordinance was finalized in 2008. Not sure if that was mentioned in previous interview.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: The only new environmental regulations are the Goose Creek Site Specific Water Quality Management Plan for the Goose Creek Watershed and the post construction ordinance. The town plans to ask NCDWQ for local delegation of the plan so the Charlotte/Mecklenburg could review development plans rather than the State.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: There have been no zoning changes. The average development in town consists of half-acre, single family lots; that's the type of development they want. The primary instance where zoning was changed was the rezoning of 215 acres for the mall. Buffer waiver requests are processed by Charlotte Storm Water Advisory Committee. No one has challenged this; however, the regulation came online as the economic downturn hit. Not sure how often requests will be made once the economy has improved.

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: The town's GIS contact, Dana Clukey, has developed GIS information that documents the current land use in the town. Mr. Bailey will give Baker the contact information; they have a lot of GIS data.

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: There is information about planned development in the county's GIS database; will provide Baker with the information. Lots are coded: developed, approved development, not approved, and vacant. There is a backlog of approved development. A consultant is developing a socioeconomic profile of the town that will be available in 3 to 6 months.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: No change.

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)?*

RESPONSE: The future land use plan is the best source of data and it's in the process of being updated (10 years old).

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: The plan does not include the bypass or Highway 485. The main impact on the town may be with regards to public transit; there are bus lines along 74 that might be impacted by the Connector. Would it be compatible with transit? Currently, Highway 218 is used by truckers and vacationers seeking to avoid US 74. That might change should the connector be built; having a small impact on the town.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: Hopefully, all of the environmental regulations are now in place. If that is the case, the primary limiting factor in development east of Highway 485 will be water/sewer hookups in the town and ETJ.

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: East of Highway 485, there is limited access to water/sewer. Interbasin transfers from the Catawba to Yadkin basin are currently limited by a lawsuit. Not sure how that will be resolved. Currently, a development moratorium is in place. West of Highway 485, water/sewer are already in place.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: The town will provide GIS data.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: The town does not think that the MPO's TAZ-level forecasts will match future development. It's seen somewhat as a coin flip guess that could be right of wrong.

-CC Meeting Attendees

CHARLOTTE-MECKLENBURG PLANNING INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/24/09, 9:00 am
Meeting Location: phone interview

On call:
Garet Johnson – Charlotte-Mecklenburg Planning Department, Assistant Director, Long Range Planning Services & Strategic Planning Services
Chris Roessler - Baker Engineering

Chris Roessler began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis as part of the NEPA process for the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: Ms. Johnson said that their post construction ordinance was passed in January 2008 and went into effect in July 2008. It is available online. Rusty Rozelle from Stormwater Services would be a good person to talk to about water quality regulations.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: The City Council holds monthly zoning meetings that may include text changes to the regulations, as well as specific rezonings of property. Although the rezoning process has been slower than normal, Council makes decisions on about 5-10 cases a month. All of the rezoning cases, including text amendments are listed on our website. Within the project area, there hasn't been much activity lately; more activity south of 51 than around 74.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: Again, contact Rusty Rozelle.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: Enforcement is handled through the zoning inspector, who is located in the Business and Neighborhood Services Department and in the Engineering Department. Ms. Johnson was not sure how this is documented.

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: The existing land use is created from tax parcel data for each area plan or other planning project. The tax data has some limitations, but the project team should be able to create an existing land use layer for the geographic area you are interested in. For more information on how to access this information contact Jan Whitesell at 704-336-4849 (jwhitesell@ci.charlotte.nc.us). C-M doesn't typically include maximum impervious cover percentages as part of our land use categories. The County is currently updating floodplain maps and is assigning impervious percentages to various land uses. Right now, they are not yet working on the area within the study boundary. However, the impervious percentages might be useful for the analysis.

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: There is probably not much new development in the works in the study area, unless there are some new residential subdivisions. All of the rezonings have been mapped, and the subdivision approvals are also mapped. Jan Whitesell will also be able to tell you if/where you would be able to get the GIS information for those.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: No changes to long-term growth expectations other than growth in the shorter term is expected to be slower than originally anticipated.

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)?*

RESPONSE: Adopted future land use GIS data are available. Talk to Jan Whitesell (see Q 5).

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: The long-term land use plan represents the future without the Monroe Connector (RPA). The Independence Blvd plan is aware of it but doesn't show it since this is outside of Charlotte's jurisdiction. See 2008 interview.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: See 2008 interview. The impact in Charlotte is difficult to predict but Ms. Johnson thinks it would not change land use significantly. Some impact would be expected but not in the realm of everything else that is expected.

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: Ms. Johnson thinks the whole area within Charlotte's jurisdication is currently serviced but suggests checking with the Charlotte-Mecklenburg Utility Department.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: We should contact the Charlotte-Mecklenburg Utilities Department. Jan Whitesell may have the layers but if not should have a contact.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: Ms. Johnson has been tangentially involved in the review process. The Planning Department has been taking over the land use and population data provision component of this. The Transportation Department runs the model. Ms. Johnson thinks that the model is better at the regional scale, less so for area plans.

-CC Meeting Attendees

UNION COUNTY PUBLIC WORKS INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/24/09, 3:00 pm
Meeting Location: phone interview

On call:
Ed Goscicki – Union Co. Public Works Director
Amy Helms – Union Co. Asst Director, Infrastructure and Environment
Scott Huneycutt – Union Co. Asst Director, Water
Mike Garbark - Union Co. Asst Director, Engineering
Scudder Wagg - Baker Engineering
Chris Roessler - Baker Engineering

Chris Roessler began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis, which will be included in the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios that have occurred since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: The draft EIS had some misconceptions about who does what. The post construction ordinance was implemented by NCDWQ in July 2007. DWQ also promulgated the site specific management plan for Goose Cr., Duck Cr., 6 Mile Cr., and Waxhaw Cr.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: This question is for the Planning Department.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: Union County has 2- and 25-year runoff detention regulations for cluster development only. A draft ordinance for buffer regulations (30' intermittent, 50' perennial) has been developed by county staff but it has not been presented to, let alone adopted by, the County Board.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: See Planning Dept. interview. Lee Jenson is in charge of enforcement. Does Amy Helms have a role in buffer enforcement?

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: N/A, see Planning Dept. interview.

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: The existing water and sewer policy is separate but not equal. There is a list of projects with allocations for water and/or sewer that have not yet been built. Union County has this information by tax parcel ID and will provide it.

The current policy of allocating water to new developments has been put on hold while a new policy is developed. No new water permits will be issued in the meantime.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: N/A, see Planning Dept. interview.

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)*

RESPONSE: N/A, see Planning Dept. interview.

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: N/A, see Planning Dept. interview.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: This is difficult to determine. The approach has been to expand utilities where growth is happening. If no water and sewer are provided, no commercial or industrial land use is likely unless the project is prepared to invest heavily.

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: Union County expects that by 2030, the current restrictions will be overcome. They have presented the plan to achieve this to the County Board but have yet to receive approval.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: The GIS data are being developed by the department's consultant. The sewer data are 90+% complete and the water data are 70-75% complete. Water is 3-4 months from completion. The department will provide what has been developed thus far. No future GIS data are available yet. The 2005 water and sewer master plan maps are available online in pdf format.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: Amy Helms provided the building permits by year to Anna Gallup with CDOT. The consultant used the TAZ forecast for the water service update but the department didn't hear any comment about it. The County Board's perspective is that the forecast numbers are probably now overstated.

CITY OF MONROE INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/25/09, 3:00 pm
Meeting Location: phone interview

On call:
Lisa Stiwinter – Monroe Interim Director of Planning
Doug Britt – Monroe Senior Planner
Scudder Wagg - Baker Engineering
Chris Roessler - Baker Engineering

Chris Roessler began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis as part of the NEPA process for the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: No change in natural resource protection. In terms of economic development, a few industries have expanded. The current land use plan is a 10-year plan that was adopted in 2000. They are working on a revised land use plan but it will not be ready for this study. Part of it includes a growth priority list (not yet approved by council?) because Monroe is the only jurisdiction in Union County with available water and sewer (<1 MGD remaining) capacity. The priority list favors industry and commercial property over residential and annexations.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: No changes other than plan for Rocky River Rd. corridor and priority list. The new land use plan will be for 2010 and beyond.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: Post construction ordinance is part of NPDES Phase 2 stormwater permit.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: The interviewees were not aware of any enforcement violations in zoning or natural resources. Lisa Stiwinter will follow up with Engineering and Stormwater departments.

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: Zoning district layer would reflect what has been built. Parcel data are somewhat reflective of land use. Monroe also has a future land use layer. Lisa Stiwinter will provide these data.

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: Monroe has a table of approved but not built residential developments. Parcel identifiers are not included but Lisa will provide an approximate location. There is a map for undeveloped commercial and high-density residential projects.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: The priority list limits annexations and residential developments while focusing on commercial and industrial properties. Residential will be limited to 2 units/acre until the WWTP capacity is expanded in 5-10 years.

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)*

RESPONSE: Land use plan and map that includes priority list.

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: Lisa Stiwinter does not believe it is in the 2000 Plan but it will be in the revised plan. The Rocky River Land Use Corridor assumes the Monroe Connector.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: Water and sewer utilities will be key determinants to growth. Growth with and without the Connector is expected to be similar with low-density residential along it and commercial property at the intersections. This is Lisa Stiwinter's vision, the Council's may differ.

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: See above.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: Lisa Stiwinter will get from the Water Resources Dept.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: The interviewees did not have a role in the TAZ forecasts. Lisa Stiwinter will ask Wayne Herron about his opinion.

TOWN OF STALLINGS TOWN MANAGER INTERVIEW

Project: R-3329/R2559 Monroe Connector
Subject: Indirect and Cumulative Impacts Quantitative Analysis
Meeting Date: 8/27/09, 10:00 am
Meeting Location: phone interview

On call:
Brian Matthews – Stallings Town Manager
Lynne Hair – Stallings Planning Director
Ken Gilland - Baker Engineering
Chris Roessler - Baker Engineering

Chris Roessler began by giving a brief overview of the project. Baker Engineering is conducting a Quantitative Indirect and Cumulative Effects Analysis, which will be included in the Final Environmental Impact Statement. A key component of this analysis is to forecast land use for four scenarios within the Future Land Use Study Area (FLUSA). The scenarios include Baseline (2007), 2030 No Build Alternative, 2030 Recommended Preferred Alternative (RPA), and 2030 RPA without the US 601 Interchange

The purpose of the interview is to identify changes to future land use scenarios that have taken place since the 2008 interviews for the qualitative ICE, gather additional information on the area added to the future land use study area (FLUSA), and gather any new or updated databases or GIS data that will be useful to the analysis. Data sources may include:

- Approved developments
- Updated zoning
- Information on current stream buffer or other environmental protection areas
- Water and sewer utility information
- Water and sewer priority areas
- Future land use forecasts and/or GIS data
- Approved population and employment forecasts and anticipated variations from forecasts with each land use scenario.

A map of the study area was provided to facilitate communication. Also, Baker provided a list of the questions to the interviewees prior to the discussion. The questions are listed below followed by the responses.

1. *The March 2008 interview covered land use and economic development trends, growth management and natural resource protection – in general, have any of these dynamics affecting future land use changed since the previous interview?*

RESPONSE: None.

2. *What, if any, changes in land use regulations have occurred since March of 2008? Please provide specific web links or documents.*

RESPONSE: The Town is redoing its development regulations to fit into the new unified development ordinance (UDO), but that will not be ready in time for this study. The current zoning does not follow the land use map.

3. *Has the local regulation of natural resources (including stream buffers) changed in this time period? If so, how?*

RESPONSE: Stallings has a post construction ordinance for its Phase II NPDES stormwater permit. It is still following the 100' and 200' buffers for Goose Cr.

4. *We are required at this stage to document the enforcement of land use/growth management and natural resource protection measures at the local level. What information is available to assess the enforcement history? We would like information for the last five years, or since the measures were enacted if less than five years ago.*

RESPONSE: The Town has no record of violations.

5. *For existing development, what data best represent the land use classifications (see below). For example, does the zoning GIS layer correspond to this information, parcel assessment data, or other available GIS or parcel-level data? Do any of your land use criteria include a maximum percent impervious?*

RESPONSE: The zoning map is the best representation of existing development. The land use plan is the best representation of future land use. Contact Shannon Martel (smartel@stallingsnc.org; 704-821-0309) for GIS data of both. PDF documents available on the Town website. There are no percent impervious requirements in the current zoning.

The Town is not revising its Land Use plan at this point; we are revising the codes to create a UDO. That may necessitate a change to the Land Use plan after the UDO is completed but they are not revising the land use plan at this time.

6. *What information is available about approved developments that are not built yet – is this information mapped? If not already mapped, how would you recommend it be mapped for this study?*

RESPONSE: They have not mapped these sites but there aren't many of them. There is one commercial development on Matthews-Weddington Rd that is approved but not built. Should follow up with Lynne Hair (lhair@stallingsnc.org; 704-821-0315)for tax parcel id and site plans.

7. *Have long-term growth expectations changed since the previous interview?*

RESPONSE: The economic slowdown will slow development for the next 5-10 years. They still think that Stallings will probably be built out by 2030. There is limited potential growth (probable final population at build out around 15,000).

8. *What documents and/or data best represent the long-term land use plan (ex: zoning, local and/or county future land use GIS layer, comprehensive plan, etc.)*

RESPONSE: See response to 5. Stallings has a land use plan. Pdf on website, GIS data from Shannon Martel.

9. *Does the long-term land use plan represent the future with or without the Monroe Connector (RPA)?*

RESPONSE: Without the Monroe Connector. They believe the Connector would negatively affect their land use plan as it could damage businesses along existing 74.

10. *We will have to predict the location of future growth to 2030 beyond what is already approved. What factors will influence the location of forecasted land use and how would that vary by the future scenarios?*

RESPONSE: Water and sewer availability is limited adjacent to Mecklenburg Co., south of 74 (Connector is north of 74). Stallings did a study of potential options and found service expansion to be feasible but expensive. The Town Council decided to wait indefinitely to expand.

11. *What role will the provision of water and/or public sewer service have in determining future development patterns?*

RESPONSE: See above, water and sewer service play a key role.

12. *For questions 8 and 9 above, what GIS or other data are available to support the land use forecasts we will prepare?*

RESPONSE: They do not have water and sewer GIS data; we should get that from the County.

13. *We are planning to use the MPO's TAZ-level population, households and employment forecasts as a benchmark in our land use forecasting for this project. We'd like to assume this is a good baseline forecast at the sub-jurisdiction level, giving us a more detailed distribution of growth to start with. Do you consider this a good representation of the level and distribution of future land use? Do you mind telling us a little about how these detailed forecasts are developed, for example, does each jurisdiction contribute the detailed TAZ-level forecasts or does the MPO prepare them and send them around for review?*

RESPONSE: Brian Matthews has looked at the TAZ-level forecasts and thinks that they are good on overall but off in specific areas. The southwest part of Stallings in Zone 4 of the study area has little potential for development and is probably accurate. The same is true for the portion of the Town in the Goose Creek watershed. The Zone 2 forecast is probably overly conservative in some areas; but in the area of Idlewild road they are forecasting growth where it appears none is likely.

-CC Meeting Attendees

Buffer Regulations in the Monroe Connector Study Area

Jurisdiction	Document	Page	Year	Description
Goose Creek Watershed	Goose Creek Site Specific Watershed Plan	5	2009	undisturbed riparian buffers are required within 200 feet of waterbodies within the 100-Year Floodplain and within 100 feet of waterbodies that are not within the 100-Year Floodplain
Town of Indian Trail	Post Construction Ordinance	18-22	2007	Twelvemile and Crooked Creek District: All built-upon area shall be at a minimum of 30 feet landward of all perennial and intermittent surface waters in the Twelve Mile Creek and Crook Creek Watersheds
				Goose Creek District: Perennial streams shall have a 200 foot undisturbed buffer and intermittent streams shall have a 100-foot undisturbed buffer in the Goose Creek Watershed or such other lesser standard, not less than 30 feet, that complies with the decisions of the Environmental Management Commission.
Town of Marshville	Land Use Ordinance	227	2007	A minimum thirty (30) foot vegetative buffer for development activities is required along all perennial waters indicated on the most recent versions of U.S.G.S. 1:24,000 (7.5 minute) scale topographic maps as determined by local government studies.
Town of Mint Hill	Zoning Ordinance	9.203.1	2005	Drainage area >50 acres, <300 acres - 35-ft buffer
				Drainage area >300 acres, < 640 acres, 50-ft buffer
				Drainage area >640 acres - Floodway plus 100% of flood fringe, but not less than 100 feet
County of Mecklenburg and Towns of Mathews and Mint Hill	NPDES Permit	14	1995	200-ft undisturbed buffers on perennial streams; one undisturbed buffers on perennial streams; one hundred foot undisturbed buffers on intermittent streams; and a ten percent impervious surface threshold for engineered stormwater management until a comprehensive plan for the Carolina heelsplitter in the Goose Creek watershed is adopted

Appendix B

Metrolina Regional model Socio-economic data file format

1	TAZ	Transportation Analysis Zone
4	HH	Households
5	POP	Population
10	RTL	Employment - Retail
11	HWY	Employment - Highway Retail
12	LOSVC	Low-traffic service employment
13	HISVC	High-traffic service employment
14	OFFGOV	Employment - office & government
15	BANK	Employment - bank
16	EDUC	Employment - Education

	2005									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
269	653	1777	20	10	11	44	0	0	139	224
270	393	978	21	4	9	31	0	0	0	65
7002	584	1515	3	3	10	18	3	0	0	37
7003	144	376	0	0	15	44	0	0	0	59
8091	76	182	0	0	0	0	0	0	0	0
8092	51	128	49	3	1	4	0	0	0	57
8096	244	610	12	1	1	2	0	0	16	32
8097	203	500	0	0	19	0	0	0	0	19
8098	63	164	12	0	4	0	8	0	0	24
8099	148	373	0	0	0	0	0	0	0	0
8100	103	264	0	0	0	78	0	0	0	78
8101	73	205	0	0	0	0	0	0	0	0
8105	252	677	3	0	0	0	0	0	0	3
8106	201	638	1	0	3	0	0	0	0	4
8107	368	949	8	8	3	8	34	0	62	123
8108	213	564	0	0	0	0	0	0	22	22
8109	97	256	16	0	2	0	0	0	0	18
8110	207	544	0	0	1	0	0	0	0	1
8111	84	205	0	0	0	0	11	0	0	11
9001	43	110	0	0	1	1	0	0	0	2
9002	38	107	0	0	0	0	0	0	0	0
9003	82	208	0	0	1	1	2	0	0	4
9004	61	171	0	2	0	0	0	0	0	2
9005	83	208	0	0	2	0	0	0	0	2
9006	89	218	0	0	0	0	0	0	0	0
9007	83	243	0	0	0	0	0	0	0	0
9008	48	132	0	0	0	0	0	0	0	0
9009	49	132	0	0	1	1	0	0	0	2
9010	118	352	2	0	3	7	0	0	0	12
9011	207	575	0	0	0	0	0	0	0	0
9012	92	241	0	0	0	0	0	0	0	0
9013	141	375	1	0	16	3	0	0	0	20
9014	122	341	1	1	2	2	0	0	0	6
9015	79	218	0	0	0	0	0	0	0	0
9016	64	160	0	0	6	0	0	0	0	6
9017	146	391	0	0	1	0	0	0	0	1
9018	81	220	1	0	1	1	0	0	0	3
9019	125	346	0	0	1	0	0	0	0	1
9020	19	50	4	0	4	1	0	0	0	9
9021	62	171	6	0	14	1	0	0	0	21
9022	68	215	1	0	1	1	0	0	0	3
9023	187	502	0	0	8	1	0	0	0	9
9024	234	693	0	0	1	4	0	0	97	102
9025	94	256	0	0	1	2	0	0	0	3
9026	144	430	59	1	63	27	17	4	0	171

	2005									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9027	54	188	0	0	3	29	0	0	0	32
9028	133	347	2	1	3	2	1	0	0	9
9029	138	346	0	0	3	2	0	0	367	372
9030	95	233	2	1	1	1	0	0	0	5
9031	31	86	1	1	2	2	1	0	0	7
9032	127	366	0	0	1	1	23	0	79	104
9033	58	157	0	0	1	1	0	0	0	2
9034	49	145	0	0	1	1	0	0	0	2
9035	137	438	4	0	1	1	0	0	0	6
9036	28	72	0	0	1	1	0	0	0	2
9037	65	171	0	0	1	1	0	0	0	2
9038	85	258	1	40	4	2	1	0	0	48
9039	582	1527	1	1	8	1	6	0	0	17
9040	806	2400	95	32	23	6	3	0	0	159
9041	444	1370	23	1	13	7	2	0	0	46
9042	894	2465	3	6	12	7	1	0	0	29
9043	110	271	0	0	6	1	0	0	0	7
9044	44	111	1	0	1	1	0	0	0	3
9045	33	87	21	55	1	16	0	9	0	102
9046	111	287	26	2	17	12	4	0	0	61
9047	717	1889	226	56	34	76	31	31	101	555
9048	751	2228	0	0	1	1	3	0	0	5
9049	296	798	6	1	3	5	4	0	0	19
9050	322	913	1	14	3	2	0	0	0	20
9051	121	335	1	0	12	2	0	0	0	15
9052	214	534	44	1	7	17	0	0	0	69
9053	123	297	0	0	1	1	0	0	0	2
9054	459	1262	1	1	20	2	1	0	0	25
9055	1113	3113	2	5	32	16	12	0	21	88
9056	312	828	118	4	96	41	23	0	112	394
9057	633	1604	9	1	2	2	1	0	0	15
9058	771	2054	12	1	3	9	9	0	0	34
9059	146	410	0	2	5	1	0	0	0	8
9060	712	1914	155	15	12	25	9	0	0	216
9061	3	5	1	0	1	3	6	0	0	11
9062	364	896	9	1	6	4	17	0	0	37
9063	8	14	1	1	112	6	21	0	0	141
9064	556	1475	1	2	9	2	0	0	0	14
9065	224	626	1	0	7	1	0	0	0	9
9066	156	468	1	0	3	1	0	0	0	5
9067	186	523	4	0	4	3	0	0	0	11
9068	433	1174	0	0	6	1	0	0	0	7
9069	27	60	0	0	1	1	0	0	0	2
9070	363	947	7	1	28	22	54	0	0	112
9071	202	486	14	4	19	19	0	0	0	56

	2005									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9072	118	336	53	0	4	2	48	0	0	107
9073	175	477	1	1	2	27	0	0	0	31
9074	73	190	0	0	2	1	3	0	0	6
9075	307	747	6	100	56	11	124	10	0	307
9076	293	770	247	1	5	6	15	0	0	274
9077	71	196	0	0	3	1	0	0	0	4
9078	8	18	54	251	7	45	36	8	0	401
9079	511	1117	857	364	265	160	67	55	0	1768
9080	84	174	176	121	56	63	73	7	0	496
9081	250	810	5	20	14	12	4	0	0	55
9082	333	1006	77	56	82	50	3	8	0	276
9083	37	110	119	0	54	52	54	0	0	279
9084	254	863	30	80	11	82	11	1	4	219
9085	45	143	40	4	1	31	0	0	0	76
9086	46	154	1	70	1	57	3	0	0	132
9087	30	92	2	1	17	2	0	0	0	22
9088	57	132	1	0	3	2	10	0	0	16
9089	12	77	53	28	100	182	285	24	0	672
9090	108	321	22	1	2	6	204	29	0	264
9091	216	511	0	0	1	1	3	0	0	5
9092	212	541	0	0	6	1	24	0	0	31
9093	231	739	7	0	31	17	17	0	0	72
9094	139	408	30	26	46	89	32	15	0	238
9095	224	676	1	0	19	29	7	0	11	67
9096	116	247	0	0	1	1	0	0	0	2
9097	44	101	1	0	8	2	1	0	0	12
9098	407	1053	9	14	13	15	1	0	89	141
9099	145	348	7	9	1	3	3	0	0	23
9100	249	682	78	1	3	14	0	4	6	106
9101	113	295	11	0	1	1	0	0	0	13
9102	379	989	7	1	19	24	13	0	0	64
9103	118	309	0	0	6	4	0	0	0	10
9104	164	448	4	0	3	1	0	0	0	8
9105	80	209	4	41	11	9	13	0	0	78
9106	117	301	3	0	4	2	0	0	0	9
9107	52	143	0	0	1	1	0	0	0	2
9108	211	906	7	1	12	91	6	0	103	220
9109	256	755	23	14	11	29	24	0	0	101
9110	388	822	8	1	9	37	1	0	0	56
9111	29	102	6	0	1	231	0	0	95	333
9112	192	588	8	0	58	29	1	0	100	196
9113	9	140	58	100	9	743	29	9	0	948
9114	27	77	46	47	39	48	15	0	0	195
9115	149	422	18	60	23	22	8	10	0	141
9116	229	895	9	28	34	44	26	1	0	142

	2005									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9117	55	383	62	1	13	91	586	0	0	753
9118	161	470	62	25	31	202	44	15	0	379
9119	160	441	15	1	2	12	0	0	0	30
9120	59	152	0	1	3	1	0	0	0	5
9121	34	163	3	50	1	66	0	1	0	121
9122	1	4	1	0	2	1	0	0	0	4
9123	101	404	9	0	5	2	115	0	0	131
9124	170	604	1	1	4	14	0	0	0	20
9125	210	540	1	1	17	7	1	0	0	27
9126	45	117	0	0	1	0	0	0	0	1
9127	338	1474	6	1	7	2	7	0	0	23
9128	28	102	9	0	26	1	0	0	22	58
9129	3	8	1	0	1	2	0	0	101	105
9130	0	0	0	2	1	1	0	0	0	4
9131	24	56	2	4	3	5	274	7	0	295
9132	76	184	39	1	28	11	66	0	0	145
9133	191	673	1	1	2	1	4	1	0	10
9134	233	702	1	1	9	1	0	0	0	12
9135	44	112	0	0	3	1	0	0	0	4
9136	76	201	1	0	1	2	3	0	0	7
9137	104	282	1	0	5	1	0	0	0	7
9138	144	392	1	0	1	2	0	0	0	4
9139	364	1089	1	15	7	3	0	0	0	26
9140	189	626	0	0	1	1	0	0	0	2
9141	151	395	17	56	3	6	6	3	0	91
9142	59	148	2	0	1	6	9	0	116	134
9143	41	101	0	0	1	0	0	0	0	1
9144	64	176	0	0	1	0	0	0	0	1
9145	142	389	0	0	4	0	0	0	0	4
9146	103	292	0	0	8	1	0	0	0	9
9147	173	480	1	0	3	1	0	0	0	5
9148	139	367	0	0	4	2	0	0	0	6
9150	108	332	0	0	1	1	1	0	53	56
9151	89	263	0	0	1	1	0	0	0	2
9152	118	285	1	1	4	2	1	0	0	9
9153	74	219	7	25	3	10	1	0	105	151
9154	161	425	0	0	1	1	1	0	71	74
9155	38	104	1	0	0	0	0	0	0	1
9156	57	142	0	0	0	1	0	0	0	1
9157	63	184	0	0	0	0	0	0	0	0
9158	185	452	38	28	17	9	9	0	0	101
9159	42	99	0	0	0	0	0	0	0	0
9160	34	75	12	1	2	1	0	6	0	22
9161	96	287	0	0	0	1	0	0	0	1
9162	124	335	0	0	2	0	0	0	0	2

	2005									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9166	131	360	0	0	0	0	0	0	0	0
9170	123	347	0	0	0	0	0	0	0	0
9171	114	353	3	0	2	1	3	0	0	9
9173	125	322	1	0	1	0	0	0	0	2
9176	330	958	1	0	3	1	0	0	0	5
9187	131	362	1	1	4	1	0	0	0	7
9189	205	582	2	0	1	1	0	0	0	4
9190	258	710	1	1	2	5	0	0	0	9
9191	173	472	1	1	17	2	1	0	0	22
9192	291	819	1	1	15	6	0	0	84	107
9193	104	300	1	0	6	1	0	0	0	8
9194	777	2199	78	14	78	50	59	0	0	279
9195	252	778	1	0	1	1	0	0	0	3
9196	120	363	1	0	3	1	0	0	0	5
9197	237	611	10	1	4	5	0	0	0	20
9198	311	853	0	0	10	1	0	0	0	11
9199	161	490	0	0	1	1	0	0	0	2
9200	114	383	1	0	3	1	0	0	0	5
9201	460	1360	0	0	7	5	0	0	0	12
9202	274	867	8	3	8	7	2	0	0	28
9204	165	464	0	0	1	1	2	0	0	4
9205	264	767	1	14	4	1	2	0	0	22
9206	38	125	0	0	1	1	0	0	0	2
9207	408	1314	2	1	13	2	39	0	0	57
9208	337	1044	3	1	9	24	4	0	0	41
9209	268	920	4	1	2	6	9	0	0	22
9210	245	759	1	1	2	1	0	0	0	5
9211	1349	4708	21	16	39	18	18	0	5	117
9212	141	363	59	71	48	39	12	4	0	233
9213	221	557	14	0	7	21	13	0	0	55
9214	11	27	2	2	5	12	0	0	0	21
9215	77	222	0	0	1	1	0	0	0	2
9216	13	30	0	0	3	1	0	0	0	4
9217	21	68	0	0	1	1	0	0	0	2
9218	48	129	1	0	1	10	0	0	0	12
9219	44	123	0	0	1	1	0	0	0	2
9220	11	25	0	0	1	1	0	0	0	2
9221	80	257	1	0	1	1	0	0	0	3
9222	39	100	0	0	1	1	0	0	0	2
9223	82	218	1	1	2	2	0	0	0	6
9224	116	316	0	0	3	2	0	0	0	5
9225	75	208	1	1	7	1	0	0	0	10
9226	92	256	0	0	6	1	0	0	0	7
9227	45	124	0	0	1	1	0	0	0	2
9228	173	534	2	0	1	1	3	0	0	7

	2005									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9229	55	136	0	0	7	1	3	1	0	12
9230	186	543	0	0	24	1	0	0	0	25
9231	84	253	31	0	7	1	6	0	0	45
9232	66	169	1	1	1	2	0	0	0	5
9233	46	146	1	4	2	2	0	0	0	9
9234	175	489	5	0	18	13	3	0	0	39
9235	74	221	0	0	12	1	0	0	0	13
9236	4	10	1	0	21	6	0	0	0	28
9237	158	469	6	62	4	73	24	0	0	169
9238	21	55	0	0	1	0	0	0	0	1
9239	355	781	19	0	11	3	0	0	12	45
9240	254	709	9	1	5	7	6	0	0	28
9241	122	365	1	0	1	1	0	0	0	3
9242	45	125	0	0	3	1	0	0	0	4
9243	330	968	1	1	2	21	0	0	106	131
9244	118	363	102	14	41	368	50	0	0	575
9245	87	232	103	87	41	44	2	0	80	357
9246	160	414	2	0	3	2	0	0	0	7
9247	104	287	14	0	1	1	0	0	0	16
9248	17	40	44	1	31	15	0	0	0	91
9249	37	82	16	3	9	5	0	0	0	33
9250	10	18	67	1	2	4	1	0	0	75
9251	40	112	0	29	1	9	0	0	148	187
9252	72	189	2	0	10	1	0	0	0	13
9253	23	67	37	1	22	29	5	0	2	96
9254	3	13	0	0	1	10	0	0	0	11
9255	34	74	1	0	3	1	0	0	0	5
9256	143	398	0	0	4	1	0	0	0	5
9257	73	188	12	1	18	32	12	0	0	75
9258	429	1148	64	12	14	16	47	0	0	153
9259	157	425	3	0	1	1	0	0	0	5
9260	273	801	0	0	2	1	0	0	93	96
9261	363	974	204	2	12	14	1	0	0	233
9262	60	167	0	0	8	7	0	0	0	15
9263	369	952	4	0	1	7	0	0	0	12
9264	751	2263	3	1	14	6	7	0	0	31
9265	1030	3271	3	1	12	2	1	0	0	19
9266	58	147	51	29	3	7	3	0	0	93
9267	850	2637	4	0	6	1	0	0	0	11
9268	596	1781	12	13	35	16	0	0	267	343
9269	306	905	2	0	1	1	0	0	0	4
9270	62	164	1	1	1	1	0	0	0	4
9271	23	88	0	0	1	1	0	0	0	2
9272	416	1098	1	0	1	2	0	0	123	127
9273	166	499	2	0	3	7	9	0	0	21

	2005									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9274	41	155	0	0	1	2	20	0	522	545
9275	260	846	1	1	7	1	8	0	0	18
9276	61	185	1	1	10	2	8	0	0	22
9277	107	342	0	0	1	1	0	0	0	2
9278	113	372	1	0	2	3	3	0	0	9
9279	101	269	112	28	15	13	8	3	0	179
9280	386	1148	1	0	1	1	0	0	0	3
9281	550	1801	1	1	5	1	4	0	119	131
9282	384	988	0	0	6	1	3	0	0	10
9283	56	129	0	0	1	1	0	0	0	2
9284	18	49	0	0	1	1	0	0	0	2
9285	268	772	1	0	3	17	0	4	0	25
9286	382	1133	52	49	75	40	59	7	10	292
9287	104	314	0	0	10	1	0	0	0	11
9288	221	523	0	0	23	1	3	0	0	27
9289	409	1188	4	1	1	1	0	0	0	7
9290	174	508	1	0	1	1	0	0	0	3
9291	51	143	2	0	1	1	0	0	0	4
9292	419	1128	4	0	1	2	3	0	146	156
9293	80	198	4	1	3	3	2	0	0	13
9294	119	314	0	0	3	1	0	0	0	4
9295	70	207	17	2	14	15	10	0	79	137
9296	109	292	0	0	1	2	0	0	0	3
9301	162	477	1	0	8	1	3	0	0	13
9302	112	317	2	0	1	5	0	0	0	8
9304	187	521	1	1	2	1	0	0	0	5
9305	96	235	1	0	3	2	3	0	0	9
9306	71	194	1	1	2	2	0	0	0	6
9307	39	107	0	0	1	13	0	0	106	120
9308	116	284	1	1	2	2	0	0	2	8
9309	201	674	2	0	1	23	2	0	0	28
9310	211	644	40	37	32	46	9	3	86	253
9311	31	99	3	0	12	17	3	0	0	35
9312	158	462	1	1	12	4	31	0	0	49
9313	37	107	0	0	1	5	0	0	0	6
9314	176	448	5	0	1	1	0	0	0	7
9315	184	540	17	1	8	3	0	0	0	29
9316	62	144	0	0	1	1	0	0	214	216
9317	68	182	5	0	1	1	3	0	0	10
9318	189	485	15	0	1	0	0	0	0	16
9319	51	127	0	0	0	1	0	0	0	1
9320	49	146	0	1	1	1	0	0	0	3
9321	18	48	1	5	1	0	0	0	0	7
9322	69	190	27	0	1	0	0	0	0	28
9323	51	132	0	0	1	0	0	0	0	1

TAZ	2005									
	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9324	21	56	0	0	0	0	0	0	0	0
9325	94	253	0	0	0	0	0	0	0	0
9326	21	49	0	0	0	0	0	0	0	0
9327	53	128	0	19	1	0	0	0	45	65
9328	103	244	0	0	6	0	0	0	0	6
9329	67	168	0	0	0	0	0	0	0	0
9330	50	139	1	0	3	0	0	0	0	4
9331	92	246	0	0	0	0	0	0	0	0
9332	27	74	0	0	0	0	0	0	0	0
9333	476	1380	61	15	24	94	143	27	0	364
9334	158	458	0	0	1	5	0	0	0	6
9335	49	137	44	46	2	9	0	4	0	105
9336	26	64	0	0	1	0	0	0	0	1
9337	277	1294	108	23	13	23	15	0	470	652
9338	30	67	0	0	1	0	0	0	0	1
9339	103	293	10	2	0	0	0	0	0	12
9341	118	318	1	0	1	0	0	0	0	2
9342	327	895	1	0	4	0	0	0	0	5
9351	64	191	0	0	0	0	0	0	0	0
10077	575	1387	19	1	26	21	14	1	7	89
10084	549	894	5	2	17	5	11	2	0	42
10086	512	1031	15	2	26	19	15	2	1	80
10087	114	244	176	47	156	167	195	11	0	752
10088	907	2347	8	2	22	21	67	2	0	122
10089	258	832	7	2	7	5	3	2	0	26
10090	200	407	25	18	18	27	3	2	25	118
10091	243	505	553	114	180	122	34	5	0	1008
10092	103	260	2	1	7	5	3	2	0	20
10093	189	406	32	99	41	36	6	19	135	368
10094	179	367	12	40	12	8	27	3	0	102
10095	96	204	3	2	9	26	3	2	0	45
10096	174	417	60	41	174	268	22	5	0	570
10097	209	407	90	20	79	196	11	7	0	403
10098	255	555	88	15	49	26	16	3	30	227
10099	533	1024	31	22	190	225	106	9	0	583
10100	147	303	237	153	20	20	9	2	0	441
10101	542	984	5	2	69	52	24	2	0	154
10102	260	511	210	43	130	65	18	3	98	567
10126	370	983	27	31	18	115	3	2	0	196
10127	106	378	1	1	5	518	1310	1	51	1887
10128	709	1987	335	83	250	234	315	5	0	1222
10129	359	642	3	3	11	17	3	2	0	39
10130	446	891	9	7	51	61	11	5	0	144
10131	497	1018	1	1	20	221	2	1	0	246
10132	430	914	36	141	199	239	415	27	134	1191

	2005									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10133	721	1411	12	18	42	610	70	2	0	754
10134	578	981	528	173	188	389	160	35	0	1473
10294	1249	2750	27	15	134	137	13	4	173	503
10349	629	1441	5	22	120	10	16	3	0	176
10351	172	425	1	1	6	3	1	1	0	13
10352	243	609	10	4	14	37	7	3	111	186
10353	501	1122	41	23	29	31	14	4	100	242
10354	195	411	36	15	74	142	106	2	0	375
10360	611	1776	18	89	12	81	45	2	0	247
10363	571	1318	86	49	17	20	31	11	0	214
10367	375	719	364	269	177	197	66	46	0	1119
10368	614	1610	49	90	43	76	31	3	0	292
10369	136	290	103	97	136	84	133	11	0	564
10372	187	718	751	183	45	126	13	5	0	1123
10373	729	1747	27	6	40	118	20	5	0	216
10374	721	1803	8	4	4	51	19	1	0	87
10376	996	2114	6	1	39	8	35	1	0	90
10377	1474	3328	153	221	586	116	36	20	100	1232
10378	944	1940	18	6	39	71	66	5	0	205
10379	383	870	124	6	123	61	42	5	406	767
10380	853	2228	24	4	139	58	5	3	123	356
10381	1370	3174	58	67	39	67	20	8	0	259
10382	800	2239	251	17	27	52	17	4	0	368
10383	531	1450	230	100	57	67	24	13	0	491
10384	498	1427	8	1	11	3	1	1	0	25
10385	351	993	324	4	30	47	4	3	0	412
10386	431	971	4	4	11	9	9	1	0	38
10387	485	1380	77	7	18	61	2	2	117	284
10388	252	751	1	1	22	85	3	1	17	130
10389	1299	3641	2	4	23	158	7	1	0	195
10390	712	1920	2	1	15	3	2	1	0	24
10391	1356	3252	111	8	556	82	341	9	218	1325
10392	434	1407	19	31	33	88	9	4	0	184
10393	1042	2724	16	23	53	31	15	5	0	143
10394	572	1222	1	1	13	43	2	1	0	61
10395	1304	3431	27	6	48	10	79	1	114	285
10396	193	417	98	16	47	70	29	9	0	269
10397	37	86	40	7	12	12	6	3	0	80
10398	60	185	4	3	11	8	3	3	0	32
10399	209	638	107	2	54	45	28	2	115	353
10400	126	406	208	15	176	197	61	10	0	667
10401	371	957	16	1	11	15	2	2	282	329
10402	677	2034	361	25	132	59	29	11	0	617
10403	200	525	69	17	286	142	51	1	122	688
10404	590	1581	293	57	32	28	10	3	0	423

TAZ	2005									
	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10405	1092	2123	52	40	456	77	106	8	0	739
10406	89	207	22	16	130	24	31	4	0	227
10407	949	2250	41	4	509	475	311	7	0	1347
10408	262	686	1	1	14	27	6	1	0	50
10409	597	1254	83	40	21	5	19	2	0	170
10410	898	1638	141	12	160	56	73	3	17	462
10411	862	1714	18	5	26	42	41	3	131	266
10412	346	895	251	60	37	132	22	17	0	519
10413	1285	2708	14	1	126	96	27	2	119	385
10414	84	241	176	126	33	117	8	7	0	467
10415	532	871	270	101	41	20	9	4	0	445
10416	0	0	48	19	253	104	43	11	0	478
10417	7	12	51	27	50	30	23	5	0	186
10418	0	0	233	113	267	139	136	2	0	890
10419	52	69	71	56	93	112	18	2	0	352
10420	365	875	1	3	12	3	2	1	104	126
10421	669	1329	88	32	102	28	15	6	0	271
10422	257	624	9	1	15	4	2	1	0	32
10423	524	1139	8	2	81	207	98	3	0	399
10424	286	803	58	1	227	214	54	2	0	556
10425	450	928	1	1	12	3	11	1	35	64
10426	74	176	1	1	5	4	2	1	0	14
10427	140	395	2	1	30	8	17	1	0	59
10429	210	451	1	1	6	5	11	1	0	25
10431	190	414	1	1	15	28	9	1	0	55
10432	250	398	1	1	34	23	2	1	250	312
10433	654	1554	6	1	56	9	26	2	55	155
10437	74	190	1	1	14	59	14	1	0	90
10438	193	501	1	1	11	29	9	1	0	52
10439	456	854	12	24	42	25	385	7	0	495
10440	43	89	1	6	4	3	1	1	0	16
10441	139	353	1	1	13	4	1	1	0	21
10442	235	471	1	1	16	19	3	1	16	57
10443	940	2181	28	47	8	45	15	1	0	144
10444	68	201	1	1	4	3	14	1	140	164
10445	257	476	1	1	82	141	2	1	19	247
10446	347	868	6	1	23	87	15	2	250	384
10447	462	1154	3	1	30	43	21	1	102	201
10448	307	861	1	1	45	4	2	1	0	54
10449	270	681	4	3	29	11	4	3	38	92
10450	643	1416	5	3	72	13	166	237	0	496
10451	531	1451	8	6	58	64	9	5	0	150
10452	518	1327	5	1	45	6	7	1	0	65
10453	437	1184	6	4	33	244	6	4	7	304
10454	131	293	86	182	279	480	49	22	0	1098

TAZ	2005									
	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10455	869	2186	20	35	32	38	7	5	0	137
10456	349	918	1	1	16	4	11	1	0	34
10457	437	1126	13	66	48	78	27	1	0	233
10458	269	827	6	1	15	8	1	1	0	32
10459	534	1142	18	11	15	25	11	3	0	83
10460	0	0	86	16	64	21	16	3	0	206
10461	21	55	183	27	203	98	21	3	0	535
10462	619	1529	10	18	93	14	13	1	0	149
10463	607	1753	13	1	56	35	28	2	28	163
10464	479	1414	1	1	55	8	6	1	45	117
10465	519	1200	152	17	33	35	9	1	0	247
10466	1197	2803	14	9	82	50	49	7	277	488
10467	263	634	4	3	70	9	4	16	0	106
10468	752	2159	6	3	103	57	2	1	0	172
10469	467	1288	7	4	20	28	7	1	0	67
10470	853	1921	201	39	143	178	28	20	0	609
10472	981	2462	6	1	38	34	45	1	100	225
10475	514	1430	1	1	19	4	2	1	147	175
10476	628	1998	68	2	207	162	53	3	0	495
10480	317	914	3	1	54	48	2	2	0	110
10809	243	595	6	4	19	27	5	4	0	65
10813	396	1063	5	21	13	29	4	3	0	75
10814	10	29	1	1	4	3	2	1	0	12
10815	348	944	21	2	37	15	3	2	0	80
10816	59	168	1	1	3	2	1	1	0	9
10817	20	56	7	4	15	16	6	4	0	52
10818	29	77	10	1	11	2	1	1	0	26
10819	136	361	2	1	6	4	2	1	0	16
10820	10	20	1	1	5	4	1	1	0	13
10821	64	175	1	1	4	2	1	1	0	10
10822	57	163	2	2	6	5	2	2	0	19
10823	45	116	22	2	13	8	2	16	0	63
10824	137	414	1	0	2	2	1	1	0	7
10825	86	269	3	1	24	3	11	1	0	43
10826	98	246	1	1	15	2	1	1	0	21
10827	264	768	7	5	30	14	5	4	0	65
10828	162	456	2	2	16	5	2	2	0	29
10829	200	542	1	1	6	3	1	1	0	13
10830	48	132	1	1	3	2	1	1	0	9
10831	22	59	1	0	2	2	1	1	0	7
10832	24	63	1	0	2	2	1	1	0	7
10833	24	64	1	1	3	2	1	1	0	9
10834	34	90	1	1	14	3	2	1	0	22
10835	234	703	8	5	47	15	5	4	0	84
10836	1159	3001	5	5	35	10	3	1	0	59

TAZ	2005									
	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10837	185	463	2	1	3	7	1	1	0	15
10838	70	161	10	2	42	36	31	8	0	129
10839	159	425	81	1	21	4	2	2	109	220
10840	201	628	1	1	7	2	1	1	0	13
10841	394	1045	58	2	13	11	5	2	0	91
10842	199	496	71	3	165	33	28	3	0	303
10843	109	276	98	114	53	190	68	27	115	665
10844	154	353	11	8	43	37	9	4	0	112
10845	116	319	1	1	3	2	4	1	0	12
10846	149	410	3	1	7	17	1	1	0	30
10847	88	237	1	0	2	2	1	1	0	7
10848	5	12	4	3	13	10	4	3	0	37
10849	200	580	20	4	28	20	8	3	0	83
10850	514	1385	45	64	242	62	28	10	50	501
10851	234	602	1	1	9	3	1	1	0	16
10852	244	728	12	1	31	4	2	1	0	51
10853	155	299	3	4	9	3	1	1	0	21
10854	507	1398	4	1	15	4	7	1	0	32
10855	210	605	1	1	31	3	5	1	0	42
10856	340	983	5	1	24	14	6	1	0	51
10857	824	2217	73	32	55	73	33	3	159	428
10858	770	1914	967	412	47	157	29	23	92	1727
10859	181	236	73	47	10	29	2	6	0	167
10860	200	605	9	1	8	3	1	1	0	23
10861	217	658	2	1	5	7	1	1	0	17
10862	210	588	1	1	9	3	4	1	0	19
10863	583	1680	58	41	7	29	13	7	257	412
10864	105	290	8	6	71	40	7	5	0	137
10865	90	177	296	222	20	25	5	2	0	570
10866	233	446	154	115	41	291	79	8	134	822
10867	146	428	64	120	44	52	48	15	0	343
10868	1	4	2	2	7	5	6	5	0	27
10869	35	88	11	2	7	5	2	2	0	29
10870	18	43	1	1	5	4	2	1	0	14
10871	247	478	262	53	38	117	10	4	0	484
10872	56	119	191	38	67	220	14	6	0	536
10873	539	1552	14	7	37	44	13	4	124	243
10874	55	110	32	31	593	39	13	4	0	712
10875	859	2755	7	4	32	27	16	4	0	90
10876	496	1656	3	1	3	7	8	1	0	23
10877	653	1849	2	1	10	10	1	1	0	25
10878	586	1051	114	59	475	643	944	19	104	2358
10879	1466	3895	22	1	23	31	7	1	118	203
10880	878	2634	228	169	165	209	146	43	36	996
10881	642	2189	6	1	86	8	23	1	0	125

TAZ	2005									
	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10882	56	141	1	1	14	3	1	1	0	21
10883	668	2186	208	7	163	74	54	6	0	512
10884	154	485	1	1	8	32	1	1	0	44
10885	476	1206	1	1	51	3	1	1	0	58
10886	278	770	1	1	4	3	7	1	106	123
10887	618	1831	10	5	78	26	64	4	93	280
10888	373	1080	14	1	93	9	11	1	0	129
10889	274	405	18	7	190	227	105	33	0	580
10890	204	648	1	1	5	2	4	1	0	14
10891	631	1548	1	1	44	5	2	1	0	54
10892	499	1469	211	65	59	30	125	11	112	613
10893	252	266	383	127	79	52	3	2	125	771
10894	988	2729	13	2	230	75	7	2	0	329
10897	357	707	1	1	24	20	6	1	0	53
10898	165	436	3	1	31	11	2	1	165	214
10899	335	702	517	310	82	54	193	3	0	1159
10900	761	1978	49	8	39	191	11	5	121	424
10902	162	486	112	11	14	27	12	10	0	186
10903	755	2475	13	21	62	98	4	3	0	201
10904	710	2285	5	19	56	18	4	2	0	104
10905	376	844	482	544	159	196	75	24	7	1487
10906	2426	4981	31	1	97	13	11	1	0	154
11059	57	127	39	9	192	88	62	4	0	394
11060	72	150	45	30	170	32	41	5	0	323
11061	343	1050	576	89	118	133	49	11	0	976
11062	601	1116	776	96	93	34	41	3	0	1043
11063	217	266	179	35	333	106	89	16	0	758
11064	235	408	151	114	22	73	19	4	0	383
11065	19	52	46	14	100	348	36	9	0	553
11066	188	379	16	14	92	928	255	21	0	1326
11067	3	8	8	3	13	48	42	8	106	228

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
269	2575	7005	48	29	50	151	0	0	228	1243
270	1556	3859	47	20	87	103	0	0	0	528
7002	2534	6317	42	16	43	39	7	0	0	322
7003	162	408	6	0	52	44	0	0	0	209
8091	135	320	0	0	4	1	0	0	0	22
8092	161	396	49	3	10	11	0	0	0	81
8096	338	830	11	3	17	11	0	0	44	130
8097	377	910	1	0	27	2	0	0	0	78
8098	124	312	12	0	17	9	9	0	0	198
8099	234	577	0	0	12	7	0	0	0	40
8100	208	511	0	0	4	85	0	0	0	99
8101	155	397	0	0	3	1	0	0	0	8
8105	381	987	3	0	6	9	0	0	0	44
8106	345	980	1	0	10	7	0	0	0	59
8107	531	1342	36	10	13	42	48	0	81	369
8108	295	758	0	0	4	2	0	0	0	27
8109	243	565	16	0	4	1	0	0	0	225
8110	369	927	1	0	6	6	0	0	168	218
8111	266	599	0	0	4	1	12	0	0	17
9001	103	270	13	0	13	5	4	0	0	54
9002	53	147	8	0	7	0	2	0	0	18
9003	113	291	11	0	12	22	9	0	0	83
9004	82	224	8	5	4	0	2	0	0	19
9005	164	422	9	0	11	3	2	0	0	35
9006	182	464	8	1	6	7	3	0	0	29
9007	106	302	9	14	9	9	4	0	0	50
9008	64	175	10	0	9	18	2	0	0	44
9009	69	185	10	0	12	5	4	0	0	58
9010	181	519	18	0	22	48	4	0	0	128
9011	291	797	9	17	6	0	3	0	0	39
9012	152	400	12	17	8	20	4	0	0	67
9013	796	2110	31	35	89	63	16	5	0	287
9014	263	736	20	20	27	35	16	6	0	161
9015	101	277	12	25	10	23	2	27	0	102
9016	80	202	12	0	17	0	2	0	0	35
9017	273	726	12	0	10	26	4	0	0	75
9018	117	314	20	14	26	44	9	0	0	1687
9019	456	1292	12	0	1	0	0	0	0	13
9020	263	746	19	0	14	4	0	0	0	38
9021	450	1278	24	0	42	6	3	0	0	104
9022	187	553	18	0	8	9	3	0	0	160
9023	334	914	9	0	14	1	0	0	0	42
9024	389	1127	9	0	3	6	0	0	145	167
9025	206	567	8	0	1	2	0	0	0	11
9026	342	982	91	11	113	54	44	9	0	566

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9027	242	732	10	0	5	49	0	0	0	66
9028	326	881	23	19	30	37	19	7	0	173
9029	395	1061	20	0	24	14	12	3	555	684
9030	458	1271	18	1	7	84	3	0	0	153
9031	182	515	46	101	138	149	53	18	0	542
9032	339	972	14	0	5	7	60	0	113	244
9033	220	620	12	0	1	1	0	0	0	14
9034	131	381	12	0	1	3	3	0	0	25
9035	227	696	19	0	3	4	0	0	0	53
9036	245	647	21	0	6	3	2	0	0	32
9037	261	729	12	0	1	2	0	0	0	19
9038	528	1430	40	129	90	114	28	9	0	469
9039	709	1880	70	32	65	45	29	4	0	269
9040	846	2509	188	32	56	14	8	0	0	331
9041	528	1605	106	66	75	56	16	4	0	394
9042	1357	3827	38	79	120	107	32	9	0	437
9043	125	312	71	5	28	19	4	0	0	222
9044	232	665	23	5	17	18	5	79	0	301
9045	72	202	45	59	15	33	8	13	0	373
9046	117	304	162	47	106	92	29	5	0	1771
9047	881	2373	266	56	101	141	74	39	357	1871
9048	845	2494	75	0	1	1	8	0	0	103
9049	410	1134	33	32	46	180	23	4	0	388
9050	383	1107	25	14	11	6	3	0	0	107
9051	305	869	17	11	57	27	8	3	0	211
9052	320	843	85	13	39	40	7	3	25	298
9053	191	500	18	0	4	4	0	0	0	243
9054	462	1270	25	25	89	38	14	3	0	872
9055	1314	3775	44	40	107	70	37	19	21	426
9056	641	1792	166	32	332	139	73	7	352	1707
9057	1537	4263	37	134	58	61	19	6	0	345
9058	992	2710	39	39	56	61	36	4	0	271
9059	305	854	98	3	22	7	6	0	0	188
9060	830	2242	193	61	77	73	40	5	0	1764
9061	39	112	24	1	15	18	20	0	78	454
9062	510	1303	40	67	121	74	64	5	0	966
9063	41	106	30	2	338	35	70	82	0	2474
9064	949	2569	23	32	61	42	13	5	0	241
9065	484	1379	16	17	45	29	8	3	58	194
9066	350	982	27	20	33	33	8	4	0	143
9067	259	726	17	0	13	5	0	0	0	48
9068	463	1257	13	0	20	1	0	0	0	77
9069	101	266	14	3	6	7	2	0	0	38
9070	412	1082	27	18	101	51	126	3	0	944
9071	273	682	32	20	72	42	8	3	0	273

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9072	170	482	71	0	15	5	105	0	0	223
9073	310	851	25	41	53	99	18	5	0	306
9074	85	223	8	0	4	1	6	0	0	22
9075	399	999	34	172	221	84	288	19	0	864
9076	439	1178	300	61	88	88	58	8	0	661
9077	379	1052	13	98	10	3	2	0	0	131
9078	68	186	79	272	27	84	84	11	0	626
9079	527	1161	980	410	737	289	158	115	9	3739
9080	119	270	239	144	166	119	163	10	12	1297
9081	284	903	35	64	71	48	20	4	0	1788
9082	346	1041	105	75	226	87	7	9	0	648
9083	41	126	151	3	152	93	117	0	0	639
9084	314	1029	53	99	30	140	25	1	10	415
9085	68	205	66	18	23	74	9	3	0	252
9086	89	291	27	92	12	109	15	0	0	319
9087	292	828	72	28	98	52	25	5	0	851
9088	444	1213	20	0	21	13	31	1	0	379
9089	12	122	85	53	299	494	612	91	0	1852
9090	121	356	53	34	40	47	449	38	0	1648
9091	222	528	18	1	3	1	8	0	0	315
9092	228	585	18	1	19	1	52	0	0	110
9093	244	774	25	1	89	19	37	0	0	614
9094	146	428	50	27	127	153	71	18	0	511
9095	248	741	19	1	54	51	16	0	104	251
9096	116	247	18	1	1	1	0	0	0	21
9097	68	168	21	13	38	19	6	3	0	113
9098	789	2118	38	65	100	87	26	8	135	531
9099	167	414	25	10	1	3	8	0	0	74
9100	280	788	101	2	10	17	0	4	22	169
9101	268	727	29	1	1	1	0	0	0	35
9102	569	1518	31	41	102	78	45	5	0	346
9103	249	674	13	0	20	6	0	0	0	54
9104	604	1616	33	25	39	41	12	4	0	186
9105	866	2276	38	99	79	90	49	5	0	404
9106	1232	3250	33	34	54	60	14	5	0	241
9107	545	1516	13	0	2	2	1	0	0	32
9108	635	2240	46	76	126	255	46	11	271	890
9109	272	806	43	15	30	52	53	0	0	350
9110	389	825	40	45	74	117	17	5	0	319
9111	32	109	24	1	4	396	0	0	283	713
9112	202	622	31	1	161	52	2	0	247	631
9113	9	224	83	102	25	895	62	10	0	1231
9114	32	91	76	79	124	334	38	3	0	1017
9115	173	487	43	85	73	36	21	12	0	316
9116	250	953	36	62	117	100	64	4	3	2499

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9117	73	519	96	23	65	187	1256	3	0	1667
9118	196	638	87	26	89	305	99	18	0	686
9119	1171	3253	46	67	83	99	26	8	0	365
9120	327	899	18	2	10	1	0	0	0	34
9121	42	260	32	67	29	139	13	4	0	314
9122	31	86	28	9	22	20	11	3	0	672
9123	109	427	34	1	20	7	249	0	36	2152
9124	931	2724	28	46	72	79	22	7	0	298
9125	646	1754	31	54	118	84	31	8	0	545
9126	501	1322	21	0	6	0	2	0	0	29
9127	403	1655	37	31	58	45	31	5	0	1094
9128	39	133	32	3	84	11	7	0	33	1024
9129	84	234	22	3	20	18	13	2	242	609
9130	0	0	19	3	0	0	0	0	0	5025
9131	264	723	27	11	35	32	601	11	0	811
9132	589	1545	91	18	111	62	173	4	0	548
9133	465	1615	27	23	47	44	30	6	0	778
9134	409	1168	27	24	53	37	10	4	0	169
9135	336	887	27	24	40	40	11	4	0	160
9136	475	1262	26	12	21	24	14	2	0	113
9137	970	2590	29	25	45	39	11	4	0	170
9138	285	767	60	11	18	24	7	4	0	166
9139	495	1436	30	136	62	67	15	5	0	343
9140	486	1415	21	0	6	3	2	0	0	43
9141	331	873	54	102	37	50	26	13	0	389
9142	210	551	32	12	27	40	30	2	304	565
9143	277	723	21	0	6	0	2	0	0	34
9144	177	473	9	30	12	7	3	0	0	63
9145	269	723	9	17	17	3	2	0	0	50
9146	697	1872	25	17	50	31	8	4	0	158
9147	1220	3264	29	36	50	57	15	5	0	214
9148	215	569	15	14	29	9	6	0	0	207
9150	186	541	12	0	16	5	5	0	138	192
9151	124	356	15	12	22	14	8	0	0	103
9152	197	503	54	34	33	59	12	4	0	453
9153	172	490	90	122	38	77	33	26	153	1890
9154	308	830	75	102	22	80	31	1	104	580
9155	109	291	13	48	24	23	10	0	0	201
9156	119	306	10	14	15	11	8	0	0	60
9157	142	394	15	30	18	29	16	0	0	133
9158	305	785	149	98	61	74	37	18	0	1179
9159	127	333	37	78	29	47	30	0	0	226
9160	99	247	51	70	44	50	31	22	0	416
9161	207	579	14	14	17	33	3	11	0	96
9162	215	575	9	0	10	9	5	0	0	37

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9166	217	590	8	0	8	0	3	0	0	23
9170	189	521	9	0	13	3	5	0	0	41
9171	171	504	16	0	22	7	10	0	0	103
9173	187	484	10	0	10	0	2	0	0	27
9176	416	1186	12	0	15	5	2	0	0	46
9187	1445	4201	46	130	46	164	19	31	0	455
9189	788	2203	22	35	39	41	17	5	0	175
9190	1405	3752	36	63	68	107	23	8	0	349
9191	602	1665	33	34	105	61	30	6	0	672
9192	623	1792	70	77	55	122	14	19	341	712
9193	692	2015	45	47	27	69	9	17	418	644
9194	1590	4582	634	85	657	301	476	17	0	2390
9195	492	1476	36	76	23	88	11	16	0	256
9196	325	933	18	23	33	28	11	3	0	126
9197	851	2234	45	30	48	61	14	4	0	263
9198	586	1582	24	14	48	25	7	4	0	131
9199	292	870	11	9	14	16	4	2	0	61
9200	247	771	17	11	30	23	6	3	47	185
9201	750	2208	5	5	16	10	5	2	0	45
9202	520	1583	16	9	19	16	11	3	0	77
9204	462	1418	42	0	2	3	5	0	0	52
9205	648	2003	31	42	51	35	18	4	0	209
9206	204	607	11	9	12	13	4	2	0	55
9207	644	2065	33	30	78	37	102	4	0	315
9208	592	1860	36	34	74	72	25	4	0	292
9209	425	1421	33	29	42	38	32	4	0	205
9210	336	1050	27	24	33	24	9	3	0	150
9211	1589	5476	99	105	178	287	64	68	8	895
9212	152	395	162	77	147	94	31	9	0	1157
9213	235	597	89	11	37	53	35	3	0	501
9214	18	48	339	75	12	790	2	72	0	1305
9215	321	958	34	14	60	48	6	6	0	177
9216	365	1081	56	0	10	1	0	0	0	67
9217	166	453	21	0	6	3	2	0	0	32
9218	766	2230	21	0	7	18	2	0	73	151
9219	183	522	12	0	3	3	0	0	19	43
9220	99	276	12	0	1	1	0	0	0	14
9221	219	654	19	0	8	11	3	0	0	283
9222	408	1154	12	0	1	2	0	0	0	19
9223	545	1542	50	116	154	166	57	17	0	601
9224	388	1093	12	0	9	5	0	0	0	30
9225	245	686	16	1	16	6	2	0	0	184
9226	216	603	10	0	11	2	0	0	0	53
9227	218	605	13	0	1	1	0	0	0	17
9228	231	699	14	0	3	4	8	0	0	132

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9229	149	401	9	0	13	1	4	1	0	34
9230	362	1035	9	0	37	1	0	0	0	48
9231	255	728	54	0	34	13	26	3	0	301
9232	157	424	16	11	15	20	9	2	0	103
9233	304	878	21	21	25	33	16	5	0	137
9234	534	1491	21	1	54	17	10	0	0	124
9235	195	556	16	8	45	14	6	2	0	112
9236	28	77	25	1	73	20	11	2	0	487
9237	172	507	24	81	14	128	53	0	0	361
9238	49	131	8	0	1	0	0	0	0	9
9239	424	971	35	0	31	6	2	0	27	212
9240	405	1177	32	36	54	52	27	5	0	250
9241	163	477	19	19	27	25	7	3	0	110
9242	235	656	13	0	10	1	0	0	0	31
9243	398	1166	26	30	42	65	12	4	399	623
9244	118	363	130	35	127	515	117	0	0	1159
9245	172	484	132	99	132	97	11	3	166	790
9246	205	529	7	27	12	9	4	0	0	64
9247	112	312	31	0	1	1	0	0	0	106
9248	31	81	91	1	95	26	3	0	0	836
9249	37	82	40	4	37	19	3	2	0	419
9250	193	526	96	9	29	29	17	2	0	582
9251	139	401	21	49	12	23	4	0	589	712
9252	89	239	86	6	37	15	3	0	0	363
9253	26	73	173	40	73	204	17	3	252	1137
9254	7	24	124	0	5	24	2	0	0	352
9255	46	109	110	6	23	22	4	1	0	307
9256	153	426	57	0	13	3	0	0	0	75
9257	82	214	45	13	66	251	33	3	76	914
9258	485	1305	167	57	40	108	108	0	0	593
9259	230	630	70	24	34	36	9	3	0	192
9260	356	1042	19	5	15	10	3	0	193	251
9261	507	1401	247	79	85	204	19	4	0	720
9262	123	333	21	0	30	22	2	0	0	92
9263	669	1834	26	17	27	33	9	3	0	184
9264	889	2670	27	32	76	47	30	4	0	234
9265	1239	3888	35	61	102	82	26	9	0	362
9266	113	308	74	48	18	19	12	0	0	185
9267	1026	3155	21	0	18	1	0	0	0	45
9268	766	2283	41	64	148	73	16	5	977	1626
9269	427	1254	18	17	26	27	10	3	0	132
9270	223	610	24	34	45	47	16	5	0	199
9271	70	224	11	3	8	9	3	0	0	51
9272	555	1499	15	9	16	99	5	3	252	404
9273	271	805	16	10	24	27	29	3	0	132

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9274	55	200	27	0	8	11	49	1	907	1007
9275	321	1040	27	21	46	21	27	3	0	166
9276	159	468	17	79	44	20	26	2	0	233
9277	169	540	22	0	1	2	0	0	0	29
9278	160	526	25	9	15	102	11	2	0	172
9279	171	492	165	62	52	84	23	10	0	433
9280	520	1543	8	9	10	11	8	4	0	55
9281	784	2489	8	21	15	13	18	3	795	878
9282	829	2281	6	6	15	9	13	2	0	110
9283	172	467	715	0	323	108	6	4	0	1161
9284	136	361	22	7	14	12	4	2	0	66
9285	497	1440	34	24	13	57	5	15	0	151
9286	544	1611	99	232	146	162	108	21	109	1118
9287	947	2779	34	0	17	4	0	0	0	66
9288	423	1112	9	0	69	4	9	0	0	91
9289	579	1683	23	27	38	38	12	4	0	156
9290	275	790	18	17	21	22	9	3	0	112
9291	135	375	14	0	1	1	0	0	0	20
9292	1050	2962	12	13	13	19	20	5	355	449
9293	775	2234	581	72	216	198	116	1	0	1185
9294	1101	2938	27	25	40	42	12	5	0	174
9295	156	447	40	15	55	38	32	3	309	586
9296	188	512	11	0	1	2	0	0	0	17
9301	510	1416	25	14	44	26	16	4	0	143
9302	1087	3171	37	41	14	58	7	10	0	214
9304	1432	3840	33	53	62	80	20	6	0	292
9305	762	2000	29	27	43	50	20	4	0	190
9306	249	692	22	15	25	25	9	3	0	334
9307	79	218	18	3	14	26	9	0	159	258
9308	279	737	25	46	56	61	18	5	2	241
9309	376	1235	18	0	6	28	7	0	3	102
9310	215	654	72	85	122	118	31	8	227	729
9311	41	128	26	3	36	22	9	0	0	144
9312	212	612	30	33	67	45	79	5	0	273
9313	324	908	13	0	4	8	1	0	0	36
9314	707	1861	32	16	24	29	8	4	0	124
9315	253	734	38	13	30	25	11	4	0	151
9316	587	1544	23	0	11	7	4	0	559	610
9317	492	1314	28	0	6	5	10	0	0	53
9318	260	672	32	0	11	0	4	0	0	53
9319	72	181	10	14	10	46	3	0	0	86
9320	65	190	12	15	16	5	5	0	0	120
9321	31	83	13	8	12	3	4	0	0	44
9322	127	343	52	0	12	9	4	0	0	82
9323	68	176	14	0	13	18	3	0	0	70

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9324	49	130	8	0	6	3	2	0	0	20
9325	171	455	8	0	4	7	3	0	0	25
9326	34	84	9	0	7	7	3	0	0	28
9327	68	167	15	45	28	31	21	0	118	269
9328	136	332	9	0	22	3	4	0	0	41
9329	152	393	8	0	4	0	2	0	0	15
9330	111	301	10	0	14	7	4	0	0	41
9331	163	434	14	0	8	33	3	0	0	64
9332	69	185	15	12	13	28	13	0	0	93
9333	609	1839	162	103	76	211	213	66	0	1133
9334	274	778	81	16	41	64	13	0	0	215
9335	110	305	149	56	49	76	14	9	0	632
9336	85	219	16	0	24	42	6	0	0	124
9337	360	2045	140	49	69	151	48	3	748	1355
9338	279	728	21	0	6	0	2	0	0	29
9339	165	456	28	18	19	0	8	0	0	126
9341	174	464	10	0	10	0	2	0	0	28
9342	424	1152	13	0	26	0	2	0	0	86
9351	154	429	8	0	9	0	2	0	0	23
10077	681	1693	36	15	63	43	21	6	17	238
10084	608	1060	28	18	92	47	21	12	6	366
10086	564	1177	39	18	101	62	25	12	1	391
10087	147	336	227	81	284	248	210	24	0	1336
10088	975	2538	31	18	96	63	77	12	4	422
10089	297	941	30	18	80	46	12	12	0	319
10090	236	507	49	35	92	71	12	12	55	609
10091	326	742	600	147	234	149	43	10	0	1318
10092	137	354	25	17	81	46	12	12	0	314
10093	272	643	62	137	95	72	17	30	251	741
10094	258	593	28	59	46	28	35	8	0	244
10095	170	418	20	16	46	49	10	7	0	179
10096	254	656	81	71	244	305	31	10	0	834
10097	247	514	123	40	171	262	21	18	0	1670
10098	293	661	116	39	148	70	26	13	73	1096
10099	585	1170	56	55	291	289	117	20	0	1056
10100	182	401	277	182	102	64	19	12	0	964
10101	584	1121	17	14	107	71	32	6	0	340
10102	302	633	255	67	232	124	30	15	150	1183
10126	418	1121	52	52	94	169	13	12	0	514
10127	134	526	7	9	19	544	1359	2	70	2016
10128	769	2155	399	125	389	323	333	18	0	2103
10129	402	765	28	21	92	64	13	13	0	364
10130	492	1039	40	31	91	88	19	12	0	301
10131	535	1299	10	10	48	244	8	4	0	641
10132	468	1057	50	173	259	271	437	36	199	1542

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10133	775	1585	24	32	79	650	79	7	0	897
10134	628	1120	588	213	272	467	170	47	0	2132
10294	1377	3149	58	40	193	194	23	11	237	795
10349	1083	3290	38	52	193	50	29	14	0	428
10351	314	828	17	15	43	24	9	6	0	135
10352	419	1104	44	30	75	78	19	14	206	515
10353	608	1428	70	48	83	65	25	13	188	921
10354	276	642	54	31	116	171	120	7	0	524
10360	717	2111	35	117	46	107	55	7	0	400
10363	677	1623	107	71	54	42	39	16	0	364
10367	418	841	426	334	296	275	80	60	0	1780
10368	667	1759	75	118	120	126	41	13	0	725
10369	169	382	133	126	218	133	144	21	0	967
10372	226	832	879	234	624	332	27	18	0	2286
10373	796	2036	72	39	174	202	36	19	0	702
10374	842	2149	24	18	38	75	27	6	0	229
10376	1146	2544	22	15	77	29	45	6	0	236
10377	1664	3870	195	283	708	163	48	32	194	1723
10378	1102	2406	53	33	97	115	81	17	0	440
10379	567	1426	174	22	256	155	60	16	696	1740
10380	998	2640	50	24	203	93	15	11	228	779
10381	1832	4301	88	99	89	103	31	18	0	507
10382	944	2653	293	42	88	90	29	14	0	788
10383	660	1825	266	135	109	99	35	22	0	708
10384	689	2007	31	10	53	35	6	5	61	294
10385	457	1310	369	26	85	84	15	12	0	735
10386	530	1256	19	18	45	29	16	6	0	174
10387	783	2166	98	22	58	87	10	7	214	528
10388	353	1054	18	16	63	113	11	6	24	281
10389	1469	4126	19	18	61	188	15	6	0	375
10390	844	2303	18	15	51	24	9	6	0	174
10391	1516	3710	145	30	668	120	372	19	427	1930
10392	538	1711	47	56	84	126	20	14	0	390
10393	1365	3948	52	41	178	117	31	17	0	478
10394	689	1557	16	15	49	65	9	6	0	208
10395	1676	4537	46	22	92	32	91	6	163	545
10396	229	519	129	35	128	119	39	20	0	644
10397	68	170	66	25	89	56	16	13	0	404
10398	88	280	16	18	56	33	12	9	0	289
10399	247	743	138	21	142	92	38	12	242	812
10400	159	497	245	42	289	257	71	20	0	1051
10401	410	1084	28	12	47	35	10	7	406	590
10402	803	2396	400	52	198	85	39	18	0	847
10403	279	754	87	32	348	169	61	6	218	1353
10404	795	1793	337	92	128	72	19	13	0	788

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10405	1169	2338	81	70	591	128	117	19	0	1150
10406	163	417	39	32	180	46	39	9	0	404
10407	1018	2489	79	29	655	582	327	20	0	1963
10408	299	809	12	12	46	46	13	4	0	157
10409	650	1402	112	62	95	46	29	12	3	513
10410	968	1836	175	39	385	103	83	13	38	1033
10411	1265	2562	41	30	127	86	51	13	266	852
10412	452	1198	285	102	104	164	33	25	0	753
10413	1371	2946	39	17	211	148	37	12	265	1069
10414	161	469	217	176	134	189	56	19	0	876
10415	727	1307	314	135	324	64	19	15	0	1101
10416	29	80	74	38	383	156	53	21	0	1072
10417	68	194	72	54	165	73	75	11	0	815
10418	461	934	294	132	659	343	228	63	0	1919
10419	117	261	84	78	134	139	47	6	0	839
10420	407	1014	12	14	46	22	10	5	139	282
10421	715	1588	102	46	143	47	23	11	0	409
10422	293	743	20	12	46	22	9	4	0	136
10423	580	1299	34	18	166	273	109	14	0	966
10424	320	1005	73	13	291	244	64	7	4	1079
10425	491	1062	10	12	43	20	18	4	45	184
10426	102	271	10	11	34	21	8	4	0	110
10427	171	500	13	12	66	27	25	5	0	181
10429	557	982	10	11	34	20	17	4	0	161
10431	221	517	10	11	46	45	16	4	0	149
10432	282	505	10	11	67	40	9	4	344	500
10433	710	1739	18	13	98	31	35	7	81	305
10437	101	280	10	11	45	78	21	4	0	184
10438	229	622	12	12	42	48	16	4	0	153
10439	495	1093	50	53	84	54	407	14	0	688
10440	72	189	12	17	35	21	8	4	0	112
10441	170	458	11	12	44	21	8	4	0	128
10442	270	586	10	11	47	36	10	4	22	155
10443	990	2346	38	63	36	62	22	4	0	248
10444	96	297	12	12	40	23	23	6	167	300
10445	293	595	12	12	125	166	10	6	23	372
10446	388	1005	18	13	69	116	25	8	340	616
10447	509	1320	15	13	70	66	30	6	138	368
10448	356	1020	13	13	87	26	11	6	0	221
10449	308	809	22	19	67	33	12	8	80	261
10450	703	1583	37	24	172	68	179	263	0	921
10451	575	1600	36	30	105	94	19	12	0	433
10452	562	1471	16	12	80	24	14	4	0	191
10453	480	1364	29	23	79	280	15	11	11	487
10454	164	387	117	209	380	572	60	33	0	1613

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10455	935	2400	46	73	72	65	16	12	0	304
10456	389	1049	12	12	50	23	19	5	0	200
10457	481	1269	25	86	89	101	36	6	0	394
10458	370	1127	18	15	52	32	30	5	0	200
10459	654	1497	38	34	69	62	42	9	0	306
10460	32	90	110	34	134	57	24	11	0	2091
10461	83	239	201	44	258	129	55	7	0	1879
10462	668	1691	21	32	134	33	21	5	0	277
10463	662	1950	25	13	101	60	38	7	34	363
10464	527	1571	12	13	97	30	15	6	54	281
10465	558	1330	169	29	65	52	16	4	0	366
10466	1293	3109	60	43	137	87	61	16	416	867
10467	305	772	24	20	117	35	13	24	0	292
10468	813	2388	18	15	153	82	11	6	0	325
10469	513	1452	18	16	54	47	15	5	0	217
10470	916	2126	248	73	208	220	39	30	0	878
10472	1053	2694	18	13	80	57	55	6	141	428
10475	569	1610	12	13	58	26	11	6	205	353
10476	681	2244	89	19	301	210	70	12	0	1068
10480	362	1058	15	13	100	73	11	7	0	241
10809	557	1473	54	40	114	83	24	19	0	419
10813	604	1691	29	34	82	84	12	10	0	292
10814	160	481	23	11	46	36	7	5	0	164
10815	558	1580	52	14	101	66	9	8	0	418
10816	228	675	24	11	44	36	6	5	0	137
10817	172	514	40	18	94	80	15	12	0	637
10818	185	549	34	11	54	35	6	5	0	158
10819	328	943	27	12	63	48	9	7	0	194
10820	176	519	26	12	67	50	9	7	0	186
10821	226	665	24	10	44	34	6	5	0	133
10822	231	686	26	13	68	50	10	9	0	191
10823	197	575	60	16	80	62	9	26	0	439
10824	325	980	24	9	42	36	6	5	0	133
10825	248	759	27	11	72	38	16	5	0	212
10826	261	738	23	10	58	34	6	5	0	150
10827	497	1472	36	17	163	102	21	17	0	392
10828	368	1075	30	14	74	53	8	8	0	250
10829	398	1139	25	11	50	38	6	5	0	156
10830	212	626	24	11	45	35	6	5	0	141
10831	182	541	24	9	43	35	6	5	0	133
10832	188	559	25	10	44	36	6	5	0	137
10833	196	581	25	12	48	38	6	5	0	146
10834	202	597	26	12	65	43	7	5	0	183
10835	684	2058	39	18	178	100	21	17	0	427
10836	1587	4302	29	15	84	45	8	5	4	260

	2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10837	436	1220	25	10	43	40	6	5	0	145
10838	226	633	56	21	139	114	44	18	0	443
10839	331	946	114	12	72	43	7	6	190	485
10840	375	1407	24	10	49	34	6	5	0	168
10841	590	1641	98	16	89	69	14	10	85	410
10842	464	1283	105	15	257	87	38	9	0	977
10843	271	764	136	140	129	294	82	39	200	1138
10844	329	882	633	95	213	367	28	39	28	1540
10845	434	1276	24	10	43	34	9	5	0	145
10846	331	962	27	11	51	56	6	5	16	185
10847	249	721	23	9	41	34	6	5	0	133
10848	86	253	66	29	157	119	20	17	0	433
10849	382	1128	57	20	134	95	21	13	0	364
10850	1208	3077	92	90	411	167	44	23	70	989
10851	440	1224	25	12	246	164	6	5	0	467
10852	434	1301	38	12	85	43	7	5	0	246
10853	246	569	11	14	34	20	21	4	0	154
10854	629	1763	12	11	40	20	27	4	0	179
10855	308	894	10	11	58	20	25	4	0	173
10856	606	1787	29	11	70	51	11	5	0	208
10857	1310	3688	118	51	160	163	47	13	223	851
10858	901	2305	1004	485	102	197	63	29	118	2151
10859	263	475	87	68	48	55	31	10	0	470
10860	301	904	21	15	45	27	30	5	0	200
10861	322	968	14	15	42	31	30	5	0	198
10862	311	889	13	15	45	26	33	5	0	187
10863	714	2070	72	62	45	54	43	11	402	835
10864	198	566	40	34	162	101	54	15	0	670
10865	159	381	317	250	77	67	71	7	0	927
10866	352	797	174	150	107	346	156	14	216	1191
10867	235	693	81	151	94	85	85	21	0	575
10868	69	202	17	18	51	34	38	10	0	231
10869	115	322	27	18	51	34	35	6	0	263
10870	111	319	19	18	56	38	40	7	0	235
10871	331	727	281	76	81	148	40	8	0	882
10872	121	311	207	56	107	251	42	10	0	855
10873	860	2281	39	35	104	89	47	12	183	603
10874	137	349	58	58	706	88	57	12	0	1074
10875	1038	3288	34	32	105	76	54	13	0	591
10876	613	2006	14	15	37	29	36	5	0	201
10877	922	2779	13	12	41	27	8	4	0	127
10878	699	3006	146	96	586	716	1053	29	149	3171
10879	1704	4605	34	15	61	56	37	5	189	488
10880	945	2854	256	210	252	257	167	57	55	1368
10881	703	2386	18	13	135	32	33	6	0	284

TAZ	2030									
	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10882	90	253	12	13	51	24	10	5	2	138
10883	724	2439	252	34	235	114	67	15	0	917
10884	190	606	12	12	41	51	9	5	0	164
10885	682	1853	10	11	84	19	7	4	0	180
10886	333	948	12	12	37	22	15	5	161	291
10887	682	2038	37	26	127	54	75	11	116	500
10888	427	1257	26	13	142	32	20	6	0	275
10889	377	689	71	35	442	338	125	54	0	1318
10890	247	789	12	12	35	19	11	4	0	112
10891	678	1701	11	12	79	22	9	4	0	267
10892	547	1629	246	95	105	58	138	18	134	833
10893	292	379	435	159	162	102	13	13	192	1209
10894	1062	2968	27	16	304	106	17	8	0	546
10897	398	842	10	11	55	37	13	4	0	143
10898	199	545	15	13	73	34	11	6	234	411
10899	380	828	581	370	171	107	205	14	0	1601
10900	832	2207	83	34	103	238	24	13	187	765
10902	691	1951	136	29	62	57	23	18	0	362
10903	816	2676	33	41	111	128	13	9	0	440
10904	769	2478	23	38	98	42	12	7	0	252
10905	423	977	574	662	342	310	96	42	14	2302
10906	2550	5381	43	12	140	32	19	5	0	359
11059	586	1203	190	30	709	572	418	131	0	2102
11060	573	1169	147	49	446	358	160	95	0	1480
11061	938	2262	762	115	637	729	224	161	0	2780
11062	1134	2200	861	120	364	357	180	153	0	2331
11063	265	399	227	58	450	285	103	29	0	1968
11064	338	715	172	146	86	121	88	10	0	654
11065	121	352	63	42	161	396	89	15	0	1551
11066	513	1002	30	42	149	996	335	27	0	1723
11067	93	271	29	24	78	92	221	15	200	718

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
269	1922	5228	28	19	39	107	0	0	89	632
270	1163	2881	26	16	78	72	0	0	0	311
7002	1950	4802	39	13	33	21	4	0	0	178
7003	18	32	6	0	37	0	0	0	0	84
8091	59	138	0	0	4	1	0	0	0	5
8092	110	268	0	0	9	7	0	0	0	16
8096	94	220	-1	2	16	9	0	0	28	56
8097	174	410	1	0	8	2	0	0	0	11
8098	61	148	0	0	13	9	1	0	0	29
8099	86	204	0	0	12	7	0	0	0	26
8100	105	247	0	0	4	7	0	0	0	11
8101	82	192	0	0	3	1	0	0	0	4
8105	129	310	0	0	6	9	0	0	0	15
8106	144	342	0	0	7	7	0	0	0	14
8107	163	393	28	2	10	34	14	0	19	95
8108	82	194	0	0	4	2	0	0	-22	-16
8109	146	309	0	0	2	1	0	0	0	2
8110	162	383	1	0	5	6	0	0	168	180
8111	182	394	0	0	4	1	1	0	0	6
9001	60	160	13	0	12	4	4	0	0	46
9002	15	40	8	0	7	0	2	0	0	18
9003	31	83	11	0	11	21	7	0	0	69
9004	21	53	8	3	4	0	2	0	0	17
9005	81	214	9	0	9	3	2	0	0	30
9006	93	246	8	1	6	7	3	0	0	28
9007	23	59	9	14	9	9	4	0	0	49
9008	16	43	10	0	9	18	2	0	0	43
9009	20	53	10	0	11	4	4	0	0	45
9010	63	167	16	0	19	41	4	0	0	102
9011	84	222	9	17	6	0	3	0	0	39
9012	60	159	12	17	8	20	4	0	0	66
9013	655	1735	30	35	73	60	16	5	0	256
9014	141	395	19	19	25	33	16	6	0	141
9015	22	59	12	25	10	23	2	27	0	102
9016	16	42	12	0	11	0	2	0	0	28
9017	127	335	12	0	9	26	4	0	0	64
9018	36	94	19	14	25	43	9	0	0	592
9019	331	946	12	0	0	0	0	0	0	12
9020	244	696	15	0	10	3	0	0	0	29
9021	388	1107	18	0	28	5	3	0	0	69
9022	119	338	17	0	7	8	3	0	0	89
9023	147	412	9	0	6	0	0	0	0	22
9024	155	434	9	0	2	2	0	0	48	64
9025	112	311	8	0	0	0	0	0	0	8
9026	198	552	32	10	50	27	27	5	0	250

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9027	188	544	10	0	2	20	0	0	0	34
9028	193	534	21	18	27	35	18	7	0	152
9029	257	715	20	0	21	12	12	3	188	307
9030	363	1038	16	0	6	83	3	0	0	127
9031	151	429	45	100	136	147	52	18	0	535
9032	212	606	14	0	4	6	37	0	34	115
9033	162	463	12	0	0	0	0	0	0	12
9034	82	236	12	0	0	2	3	0	0	20
9035	90	258	15	0	2	3	0	0	0	32
9036	217	575	21	0	5	2	2	0	0	30
9037	196	558	12	0	0	1	0	0	0	16
9038	443	1172	39	89	86	112	27	9	0	413
9039	127	353	69	31	57	44	23	4	0	250
9040	40	109	93	0	33	8	5	0	0	161
9041	84	235	83	65	62	49	14	4	0	326
9042	463	1362	35	73	108	100	31	9	0	389
9043	15	41	71	5	22	18	4	0	0	177
9044	188	554	22	5	16	17	5	79	0	271
9045	39	115	24	4	14	17	8	4	0	208
9046	6	17	136	45	89	80	25	5	0	1058
9047	164	484	40	0	67	65	43	8	256	845
9048	94	266	75	0	0	0	5	0	0	89
9049	114	336	27	31	43	175	19	4	0	336
9050	61	194	24	0	8	4	3	0	0	67
9051	184	534	16	11	45	25	8	3	0	162
9052	106	309	41	12	32	23	7	3	25	227
9053	68	203	18	0	3	3	0	0	0	109
9054	3	8	24	24	69	36	13	3	0	428
9055	201	662	42	35	75	54	25	19	0	296
9056	329	964	48	28	236	98	50	7	240	970
9057	904	2659	28	133	56	59	18	6	0	321
9058	221	656	27	38	53	52	27	4	0	221
9059	159	444	98	1	17	6	6	0	0	165
9060	118	328	38	46	65	48	31	5	0	900
9061	36	107	23	1	14	15	14	0	78	271
9062	146	407	31	66	115	70	47	5	0	703
9063	33	92	29	1	226	29	49	82	0	1100
9064	393	1094	22	30	52	40	13	5	0	205
9065	260	753	15	17	38	28	8	3	58	182
9066	194	514	26	20	30	32	8	4	0	135
9067	73	203	13	0	9	2	0	0	0	33
9068	30	83	13	0	14	0	0	0	0	50
9069	74	206	14	3	5	6	2	0	0	36
9070	49	135	20	17	73	29	72	3	0	530
9071	71	196	18	16	53	23	8	3	0	177

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9072	52	146	18	0	11	3	57	0	0	106
9073	135	374	24	40	51	72	18	5	0	257
9074	12	33	8	0	2	0	3	0	0	14
9075	92	252	28	72	165	73	164	9	0	555
9076	146	408	53	60	83	82	43	8	0	381
9077	308	856	13	98	7	2	2	0	0	127
9078	60	168	25	21	20	39	48	3	0	204
9079	16	44	123	46	472	129	91	60	9	1450
9080	35	96	63	23	110	56	90	3	12	587
9081	34	93	30	44	57	36	16	4	0	948
9082	13	35	28	19	144	37	4	1	0	304
9083	4	16	32	3	98	41	63	0	0	301
9084	60	166	23	19	19	58	14	0	6	167
9085	23	62	26	14	22	43	9	3	0	159
9086	43	137	26	22	11	52	12	0	0	166
9087	262	736	70	27	81	50	25	5	0	572
9088	387	1081	19	0	18	11	21	1	0	232
9089	0	45	32	25	199	312	327	67	0	1074
9090	13	35	31	33	38	41	245	9	0	883
9091	6	17	18	1	2	0	5	0	0	165
9092	16	44	18	1	13	0	28	0	0	69
9093	13	35	18	1	58	2	20	0	0	315
9094	7	20	20	1	81	64	39	3	0	241
9095	24	65	18	1	35	22	9	0	93	182
9096	0	0	18	1	0	0	0	0	0	19
9097	24	67	20	13	30	17	5	3	0	100
9098	382	1065	29	51	87	72	25	8	46	376
9099	22	66	18	1	0	0	5	0	0	38
9100	31	106	23	1	7	3	0	0	16	58
9101	155	432	18	1	0	0	0	0	0	22
9102	190	529	24	40	83	54	32	5	0	274
9103	131	365	13	0	14	2	0	0	0	38
9104	440	1168	29	25	36	40	12	4	0	170
9105	786	2067	34	58	68	81	36	5	0	317
9106	1115	2949	30	34	50	58	14	5	0	224
9107	493	1373	13	0	1	1	1	0	0	25
9108	424	1334	39	75	114	164	40	11	168	670
9109	16	51	20	1	19	23	29	0	0	170
9110	1	3	32	44	65	80	16	5	0	262
9111	3	7	18	1	3	165	0	0	188	380
9112	10	34	23	1	103	23	1	0	147	367
9113	0	84	25	2	16	152	33	1	0	257
9114	5	14	30	32	85	286	23	3	0	643
9115	24	65	25	25	50	14	13	2	0	157
9116	21	58	27	34	83	56	38	3	3	1283

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9117	18	136	34	22	52	96	670	3	0	912
9118	35	168	25	1	58	103	55	3	0	284
9119	1011	2812	31	66	81	87	26	8	0	335
9120	268	747	18	1	7	0	0	0	0	29
9121	8	97	29	17	28	73	13	3	0	193
9122	30	82	27	9	20	19	11	3	0	386
9123	8	23	25	1	15	5	134	0	36	1101
9124	761	2120	27	45	68	65	22	7	0	276
9125	436	1214	30	53	101	77	30	8	0	433
9126	456	1205	21	0	5	0	2	0	0	28
9127	65	181	31	30	51	43	24	5	0	632
9128	11	31	23	3	58	10	7	0	11	541
9129	81	226	21	3	19	16	13	2	141	379
9130	0	0	19	1	-1	-1	0	0	0	2437
9131	240	667	25	7	32	27	327	4	0	503
9132	513	1361	52	17	83	51	107	4	0	370
9133	274	942	26	22	45	43	26	5	0	492
9134	176	466	26	23	44	36	10	4	0	157
9135	292	775	27	24	37	39	11	4	0	156
9136	399	1061	25	12	20	22	11	2	0	105
9137	866	2308	28	25	40	38	11	4	0	163
9138	141	375	59	11	17	22	7	4	0	146
9139	131	347	29	121	55	64	15	5	0	316
9140	297	789	21	0	5	2	2	0	0	36
9141	180	478	37	46	34	44	20	10	0	253
9142	151	403	30	12	26	34	21	2	188	381
9143	236	622	21	0	5	0	2	0	0	31
9144	113	297	9	30	11	7	3	0	0	62
9145	127	334	9	17	13	3	2	0	0	46
9146	594	1580	25	17	42	30	8	4	0	145
9147	1047	2784	28	36	47	56	15	5	0	209
9148	76	202	15	14	25	7	6	0	0	178
9150	78	209	12	0	15	4	4	0	85	127
9151	35	93	15	12	21	13	8	0	0	91
9152	79	218	53	33	29	57	11	4	0	373
9153	98	271	83	97	35	67	32	26	48	931
9154	147	405	75	102	21	79	30	1	33	506
9155	71	187	12	48	24	23	10	0	0	200
9156	62	164	10	14	15	10	8	0	0	59
9157	79	210	15	30	18	29	16	0	0	133
9158	120	333	111	70	44	65	28	18	0	684
9159	85	234	37	78	29	47	30	0	0	226
9160	65	172	39	69	42	49	31	16	0	326
9161	111	292	14	14	17	32	3	11	0	95
9162	91	240	9	0	8	9	5	0	0	34

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9166	86	230	8	0	8	0	3	0	0	22
9170	66	174	9	0	13	3	5	0	0	36
9171	57	151	13	0	20	6	7	0	0	79
9173	62	162	9	0	9	0	2	0	0	23
9176	86	228	11	0	12	4	2	0	0	34
9187	1314	3839	45	129	42	163	19	31	0	440
9189	583	1621	20	35	38	40	17	5	0	170
9190	1147	3042	35	62	66	102	23	8	0	336
9191	429	1193	32	33	88	59	29	6	0	485
9192	332	973	69	76	40	116	14	19	257	601
9193	588	1715	44	47	21	68	9	17	418	630
9194	813	2383	556	71	579	251	417	17	0	1974
9195	240	698	35	76	22	87	11	16	0	253
9196	205	570	17	23	30	27	11	3	0	121
9197	614	1623	35	29	44	56	14	4	0	223
9198	275	729	24	14	38	24	7	4	0	120
9199	131	380	11	9	13	15	4	2	0	59
9200	133	388	16	11	27	22	6	3	47	163
9201	290	848	5	5	9	5	5	2	0	33
9202	246	716	8	6	11	9	9	3	0	49
9204	297	954	42	0	1	2	3	0	0	48
9205	384	1236	30	28	47	34	16	4	0	182
9206	166	482	11	9	11	12	4	2	0	53
9207	236	751	31	29	65	35	63	4	0	252
9208	255	816	33	33	65	48	21	4	0	240
9209	157	501	29	28	40	32	23	4	0	177
9210	91	291	26	23	31	23	9	3	0	137
9211	240	768	78	89	139	269	46	68	3	753
9212	11	32	103	6	99	55	19	5	0	509
9213	14	40	75	11	30	32	22	3	0	387
9214	7	21	337	73	7	778	2	72	0	1284
9215	244	736	34	14	59	47	6	6	0	175
9216	352	1051	56	0	7	0	0	0	0	63
9217	145	385	21	0	5	2	2	0	0	30
9218	718	2101	20	0	6	8	2	0	73	127
9219	139	399	12	0	2	2	0	0	19	38
9220	88	251	12	0	0	0	0	0	0	12
9221	139	397	18	0	7	10	3	0	0	142
9222	369	1054	12	0	0	1	0	0	0	16
9223	463	1324	49	115	152	164	57	17	0	595
9224	272	777	12	0	6	3	0	0	0	24
9225	170	478	15	0	9	5	2	0	0	88
9226	124	347	10	0	5	1	0	0	0	28
9227	173	481	13	0	0	0	0	0	0	15
9228	58	165	12	0	2	3	5	0	0	61

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9229	94	265	9	0	6	0	1	0	0	19
9230	176	492	9	0	13	0	0	0	0	23
9231	171	475	23	0	27	12	20	3	0	192
9232	91	255	15	10	14	18	9	2	0	85
9233	258	732	20	17	23	31	16	5	0	128
9234	359	1002	16	1	36	4	7	0	0	80
9235	121	335	16	8	33	13	6	2	0	93
9236	24	67	24	1	52	14	11	2	0	299
9237	14	38	18	19	10	55	29	0	0	163
9238	28	76	8	0	0	0	0	0	0	8
9239	69	190	16	0	20	3	2	0	15	113
9240	151	468	23	35	49	45	21	5	0	210
9241	41	112	18	19	26	24	7	3	0	107
9242	190	531	13	0	7	0	0	0	0	25
9243	68	198	25	29	40	44	12	4	293	472
9244	0	0	28	21	86	147	67	0	0	445
9245	85	252	29	12	91	53	9	3	86	346
9246	45	115	5	27	9	7	4	0	0	57
9247	8	25	17	0	0	0	0	0	0	45
9248	14	41	47	0	64	11	3	0	0	363
9249	0	0	24	1	28	14	3	2	0	200
9250	183	508	29	8	27	25	16	2	0	322
9251	99	289	21	20	11	14	4	0	441	524
9252	17	50	84	6	27	14	3	0	0	246
9253	3	6	136	39	51	175	12	3	250	920
9254	4	11	124	0	4	14	2	0	0	291
9255	12	35	109	6	20	21	4	1	0	302
9256	10	28	57	0	9	2	0	0	0	70
9257	9	26	33	12	48	219	21	3	76	576
9258	56	157	103	45	26	92	61	0	0	388
9259	73	205	67	24	33	35	9	3	0	187
9260	83	241	19	5	13	9	3	0	100	154
9261	144	427	43	77	73	190	18	4	0	447
9262	63	166	21	0	22	15	2	0	0	69
9263	300	882	22	17	26	26	9	3	0	136
9264	138	407	24	31	62	41	23	4	0	198
9265	209	617	32	60	90	80	25	9	0	324
9266	55	161	23	19	15	12	9	0	0	88
9267	176	518	17	0	12	0	0	0	0	32
9268	170	502	29	51	113	57	16	5	710	1098
9269	121	349	16	17	25	26	10	3	0	118
9270	161	446	23	33	44	46	16	5	0	195
9271	47	136	11	3	7	8	3	0	0	43
9272	139	401	14	9	15	97	5	3	129	277
9273	105	306	14	10	21	20	20	3	0	104

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9274	14	45	27	0	7	9	29	1	385	462
9275	61	194	26	20	39	20	19	3	0	144
9276	98	283	16	78	34	18	18	2	0	195
9277	62	198	22	0	0	1	0	0	0	26
9278	47	154	24	9	13	99	8	2	0	163
9279	70	223	53	34	37	71	15	7	0	241
9280	134	395	7	9	9	10	8	4	0	50
9281	234	688	7	20	10	12	14	3	676	746
9282	445	1293	6	6	9	8	10	2	0	55
9283	116	338	715	0	322	107	6	4	0	1159
9284	118	312	22	7	13	11	4	2	0	64
9285	229	668	33	24	10	40	5	11	0	126
9286	162	478	47	183	71	122	49	14	99	640
9287	843	2465	34	0	7	3	0	0	0	47
9288	202	589	9	0	46	3	6	0	0	64
9289	170	495	19	26	37	37	12	4	0	149
9290	101	282	17	17	20	21	9	3	0	101
9291	84	232	12	0	0	0	0	0	0	14
9292	631	1834	8	13	12	17	17	5	209	287
9293	695	2036	577	71	213	195	114	1	0	1172
9294	982	2624	27	25	37	41	12	5	0	169
9295	86	240	23	13	41	23	22	3	230	403
9296	79	220	11	0	0	0	0	0	0	13
9301	348	939	24	14	36	25	13	4	0	129
9302	975	2854	35	41	13	53	7	10	0	172
9304	1245	3319	32	52	60	79	20	6	0	285
9305	666	1765	28	27	40	48	17	4	0	181
9306	178	498	21	14	23	23	9	3	0	206
9307	40	111	18	3	13	13	9	0	53	138
9308	163	453	24	45	54	59	18	5	0	233
9309	175	561	16	0	5	5	5	0	3	59
9310	4	10	32	48	90	72	22	5	141	452
9311	10	29	23	3	24	5	6	0	0	87
9312	54	150	29	32	55	41	48	5	0	224
9313	287	801	13	0	3	3	1	0	0	27
9314	531	1413	27	16	23	28	8	4	0	117
9315	69	194	21	12	22	22	11	4	0	111
9316	525	1400	23	0	10	6	4	0	345	393
9317	424	1132	23	0	5	4	7	0	0	42
9318	71	187	17	0	10	0	4	0	0	35
9319	21	54	10	14	10	45	3	0	0	85
9320	16	44	12	14	15	4	5	0	0	88
9321	13	35	12	3	11	3	4	0	0	37
9322	58	153	25	0	11	9	4	0	0	54
9323	17	44	14	0	12	18	3	0	0	63

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
9324	28	74	8	0	6	3	2	0	0	20
9325	77	202	8	0	4	7	3	0	0	25
9326	13	35	9	0	7	7	3	0	0	28
9327	15	39	15	26	27	31	21	0	73	204
9328	33	88	9	0	16	3	4	0	0	35
9329	85	225	8	0	4	0	2	0	0	15
9330	61	162	9	0	11	7	4	0	0	35
9331	71	188	14	0	8	33	3	0	0	64
9332	42	111	15	12	13	28	13	0	0	93
9333	133	459	101	88	52	117	70	39	0	627
9334	116	320	81	16	40	59	13	0	0	209
9335	61	168	105	10	47	67	14	5	0	410
9336	59	155	16	0	23	42	6	0	0	123
9337	83	751	32	26	56	128	33	3	278	641
9338	249	661	21	0	5	0	2	0	0	28
9339	62	163	18	16	19	0	8	0	0	114
9341	56	146	9	0	9	0	2	0	0	23
9342	97	257	12	0	22	0	2	0	0	66
9351	90	238	8	0	9	0	2	0	0	22
10077	106	306	17	14	37	22	7	5	10	132
10084	59	166	23	16	75	42	10	10	6	304
10086	52	146	24	16	75	43	10	10	0	299
10087	33	92	51	34	128	81	15	13	0	462
10088	68	191	23	16	74	42	10	10	4	297
10089	39	109	23	16	73	41	9	10	0	290
10090	36	100	24	17	74	44	9	10	30	351
10091	83	237	47	33	54	27	9	5	0	199
10092	34	94	23	16	74	41	9	10	0	291
10093	83	237	30	38	54	36	11	11	116	322
10094	79	226	16	19	34	20	8	5	0	122
10095	74	214	17	14	37	23	7	5	0	123
10096	80	239	21	30	70	37	9	5	0	200
10097	38	107	33	20	92	66	10	11	0	487
10098	38	106	28	24	99	44	10	10	43	450
10099	52	146	25	33	101	64	11	11	0	380
10100	35	98	40	29	82	44	10	10	0	361
10101	42	137	12	12	38	19	8	4	0	109
10102	42	122	45	24	102	59	12	12	52	452
10126	48	138	25	21	76	54	10	10	0	314
10127	28	148	6	8	14	26	49	1	19	129
10128	60	168	64	42	139	89	18	13	0	542
10129	43	123	25	18	81	47	10	11	0	313
10130	46	148	31	24	40	27	8	7	0	150
10131	38	281	9	9	28	23	6	3	0	103
10132	38	143	14	32	60	32	22	9	65	256

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10133	54	174	12	14	37	40	9	5	0	132
10134	50	139	60	40	84	78	10	12	0	441
10294	128	399	31	25	59	57	10	7	64	269
10349	454	1849	33	30	73	40	13	11	0	230
10351	142	403	16	14	37	21	8	5	0	120
10352	176	495	34	26	61	41	12	11	95	310
10353	107	306	29	25	54	34	11	9	88	296
10354	81	231	18	16	42	29	14	5	0	144
10360	106	335	17	28	34	26	10	5	0	139
10363	106	305	21	22	37	22	8	5	0	135
10367	43	122	62	65	119	78	14	14	0	498
10368	53	149	26	28	77	50	10	10	0	336
10369	33	92	30	29	82	49	11	10	0	341
10372	39	114	128	51	579	206	14	13	0	1118
10373	67	289	45	33	134	84	16	14	0	451
10374	121	346	16	14	34	24	8	5	0	121
10376	150	430	16	14	38	21	10	5	0	124
10377	190	542	42	62	122	47	12	12	94	420
10378	158	466	35	27	58	44	15	12	0	217
10379	184	556	50	16	133	94	18	11	290	646
10380	145	412	26	20	64	35	10	8	105	299
10381	462	1127	30	32	50	36	11	10	0	195
10382	144	414	42	25	61	38	12	10	0	225
10383	129	375	36	35	52	32	11	9	0	199
10384	191	580	23	9	42	32	5	4	61	190
10385	106	317	45	22	55	37	11	9	0	210
10386	99	285	15	14	34	20	7	5	0	115
10387	298	786	21	15	40	26	8	5	97	233
10388	101	303	17	15	41	28	8	5	7	142
10389	170	485	17	14	38	30	8	5	0	134
10390	132	383	16	14	36	21	7	5	0	120
10391	160	458	34	22	112	38	31	10	209	485
10392	104	304	28	25	51	38	11	10	0	187
10393	323	1224	36	18	125	86	16	12	0	308
10394	117	335	15	14	36	22	7	5	0	119
10395	372	1106	19	16	44	22	12	5	49	191
10396	36	102	31	19	81	49	10	11	0	328
10397	31	84	26	18	77	44	10	10	0	307
10398	28	95	12	15	45	25	9	6	0	137
10399	38	105	31	19	88	47	10	10	127	452
10400	33	91	37	27	113	60	10	10	0	377
10401	39	127	12	11	36	20	8	5	124	232
10402	126	362	39	27	66	26	10	7	0	201
10403	79	229	18	15	62	27	10	5	96	272
10404	205	212	44	35	96	44	9	10	0	358

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10405	77	215	29	30	135	51	11	11	0	389
10406	74	210	17	16	50	22	8	5	0	138
10407	69	239	38	25	146	107	16	13	0	486
10408	37	123	11	11	32	19	7	3	0	96
10409	53	148	29	22	74	41	10	10	3	312
10410	70	198	34	27	225	47	10	10	21	504
10411	403	848	23	25	101	44	10	10	135	484
10412	106	303	34	42	67	32	11	8	0	223
10413	86	238	25	16	85	52	10	10	146	495
10414	77	228	41	50	101	72	48	12	0	387
10415	195	436	44	34	283	44	10	11	0	561
10416	29	80	26	19	130	52	10	10	0	400
10417	61	182	21	27	115	43	52	6	0	363
10418	461	934	61	19	392	204	92	61	0	853
10419	65	192	13	22	41	27	29	4	0	206
10420	42	139	11	11	34	19	8	4	35	137
10421	46	259	14	14	41	19	8	5	0	116
10422	36	119	11	11	31	18	7	3	0	94
10423	56	160	26	16	85	66	11	11	0	368
10424	34	202	15	12	64	30	10	5	4	176
10425	41	134	9	11	31	17	7	3	10	101
10426	28	95	9	10	29	17	6	3	0	87
10427	31	105	11	11	36	19	8	4	0	104
10429	347	531	9	10	28	15	6	3	0	86
10431	31	103	9	10	31	17	7	3	0	90
10432	32	107	9	10	33	17	7	3	94	186
10433	56	185	12	12	42	22	9	5	26	144
10437	27	90	9	10	31	19	7	3	0	92
10438	36	121	11	11	31	19	7	3	0	95
10439	39	239	38	29	42	29	22	7	0	180
10440	29	100	11	11	31	18	7	3	0	94
10441	31	105	10	11	31	17	7	3	0	92
10442	35	115	9	10	31	17	7	3	6	96
10443	50	165	10	16	28	17	7	3	0	93
10444	28	96	11	11	36	20	9	5	27	134
10445	36	119	11	11	43	25	8	5	4	122
10446	41	137	12	12	46	29	10	6	90	224
10447	47	166	12	12	40	23	9	5	36	154
10448	49	159	12	12	42	22	9	5	0	121
10449	38	128	18	16	38	22	8	5	42	164
10450	60	167	32	21	100	55	13	26	0	374
10451	44	149	28	24	47	30	10	7	0	168
10452	44	144	11	11	35	18	7	3	0	100
10453	43	180	23	19	46	36	9	7	4	163
10454	33	94	31	27	101	92	11	11	0	409

TAZ	Growth or Decline 2005-2030									
	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10455	66	214	26	38	40	27	9	7	0	162
10456	40	131	11	11	34	19	8	4	0	104
10457	44	143	12	20	41	23	9	5	0	127
10458	101	300	12	14	37	24	29	4	0	163
10459	120	355	20	23	54	37	31	6	0	214
10460	32	90	24	18	70	36	8	8	0	521
10461	62	184	18	17	55	31	34	4	0	464
10462	49	162	11	14	41	19	8	4	0	112
10463	55	197	12	12	45	25	10	5	6	136
10464	48	157	11	12	42	22	9	5	9	128
10465	39	130	17	12	32	17	7	3	0	101
10466	96	306	46	34	55	37	12	9	139	351
10467	42	138	20	17	47	26	9	8	0	146
10468	61	229	12	12	50	25	9	5	0	132
10469	46	164	11	12	34	19	8	4	0	104
10470	63	205	47	34	65	42	11	10	0	230
10472	72	232	12	12	42	23	10	5	41	164
10475	55	180	11	12	39	22	9	5	58	172
10476	53	246	21	17	94	48	17	9	0	255
10480	45	144	12	12	46	25	9	5	0	127
10809	314	878	48	36	95	56	19	15	0	313
10813	208	628	24	13	69	55	8	7	0	190
10814	150	452	22	10	42	33	5	4	0	128
10815	210	636	31	12	64	51	6	6	0	192
10816	169	507	23	10	41	34	5	4	0	127
10817	152	458	33	14	79	64	9	8	0	243
10818	156	472	24	10	43	33	5	4	0	130
10819	192	582	25	11	57	44	7	6	0	162
10820	166	499	25	11	62	46	8	6	0	170
10821	162	490	23	9	40	32	5	4	0	122
10822	174	523	24	11	62	45	8	7	0	169
10823	152	459	38	14	67	54	7	10	0	211
10824	188	566	23	9	40	34	5	4	0	125
10825	162	490	24	10	48	35	5	4	0	138
10826	163	492	22	9	43	32	5	4	0	125
10827	233	704	29	12	133	88	16	13	0	310
10828	206	619	28	12	58	48	6	6	0	173
10829	198	597	24	10	44	35	5	4	0	133
10830	164	494	23	10	42	33	5	4	0	128
10831	160	482	23	9	41	33	5	4	0	125
10832	164	496	24	10	42	34	5	4	0	129
10833	172	517	24	11	45	36	5	4	0	136
10834	168	507	25	11	51	40	5	4	0	148
10835	450	1355	31	13	131	85	16	13	0	309
10836	428	1301	24	10	49	35	5	4	4	144

	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10837	251	757	23	9	40	33	5	4	0	124
10838	156	472	46	19	97	78	13	10	0	274
10839	172	521	33	11	51	39	5	4	81	236
10840	174	779	23	9	42	32	5	4	0	127
10841	196	596	40	14	76	58	9	8	85	302
10842	265	787	34	12	92	54	10	6	0	247
10843	162	488	38	26	76	104	14	12	85	374
10844	175	529	622	87	170	330	19	35	28	1313
10845	318	957	23	9	40	32	5	4	0	124
10846	182	552	24	10	44	39	5	4	16	153
10847	161	484	22	9	39	32	5	4	0	121
10848	81	241	62	26	144	109	16	14	0	383
10849	182	548	37	16	106	75	13	10	0	271
10850	694	1692	47	26	169	105	16	13	20	417
10851	206	622	24	11	237	161	5	4	0	449
10852	190	573	26	11	54	39	5	4	0	150
10853	91	270	8	10	25	17	20	3	0	126
10854	122	365	8	10	25	16	20	3	0	125
10855	98	289	9	10	27	17	20	3	0	129
10856	266	804	24	10	46	37	5	4	0	137
10857	486	1471	45	19	105	90	14	10	64	364
10858	131	391	37	73	55	40	34	6	26	325
10859	82	239	14	21	38	26	29	4	0	186
10860	101	299	12	14	37	24	29	4	0	163
10861	105	310	12	14	37	24	29	4	0	165
10862	101	301	12	14	36	23	29	4	0	161
10863	131	390	14	21	38	25	30	4	145	330
10864	93	276	32	28	91	61	47	10	0	350
10865	69	204	21	28	57	42	66	5	0	276
10866	119	351	20	35	66	55	77	6	82	359
10867	89	265	17	31	50	33	37	6	0	225
10868	68	198	15	16	44	29	32	5	0	190
10869	80	234	16	16	44	29	33	4	0	194
10870	93	276	18	17	51	34	38	6	0	218
10871	84	249	19	23	43	31	30	4	0	213
10872	65	192	16	18	40	31	28	4	0	191
10873	321	729	25	28	67	45	34	8	59	313
10874	82	239	26	27	113	49	44	8	0	329
10875	179	533	27	28	73	49	38	9	0	294
10876	117	350	11	14	34	22	28	4	0	156
10877	269	930	11	11	31	17	7	3	0	93
10878	113	1955	32	37	111	73	109	10	45	493
10879	238	710	12	14	38	25	30	4	71	242
10880	67	220	28	41	87	48	21	14	19	293
10881	61	197	12	12	49	24	10	5	0	131

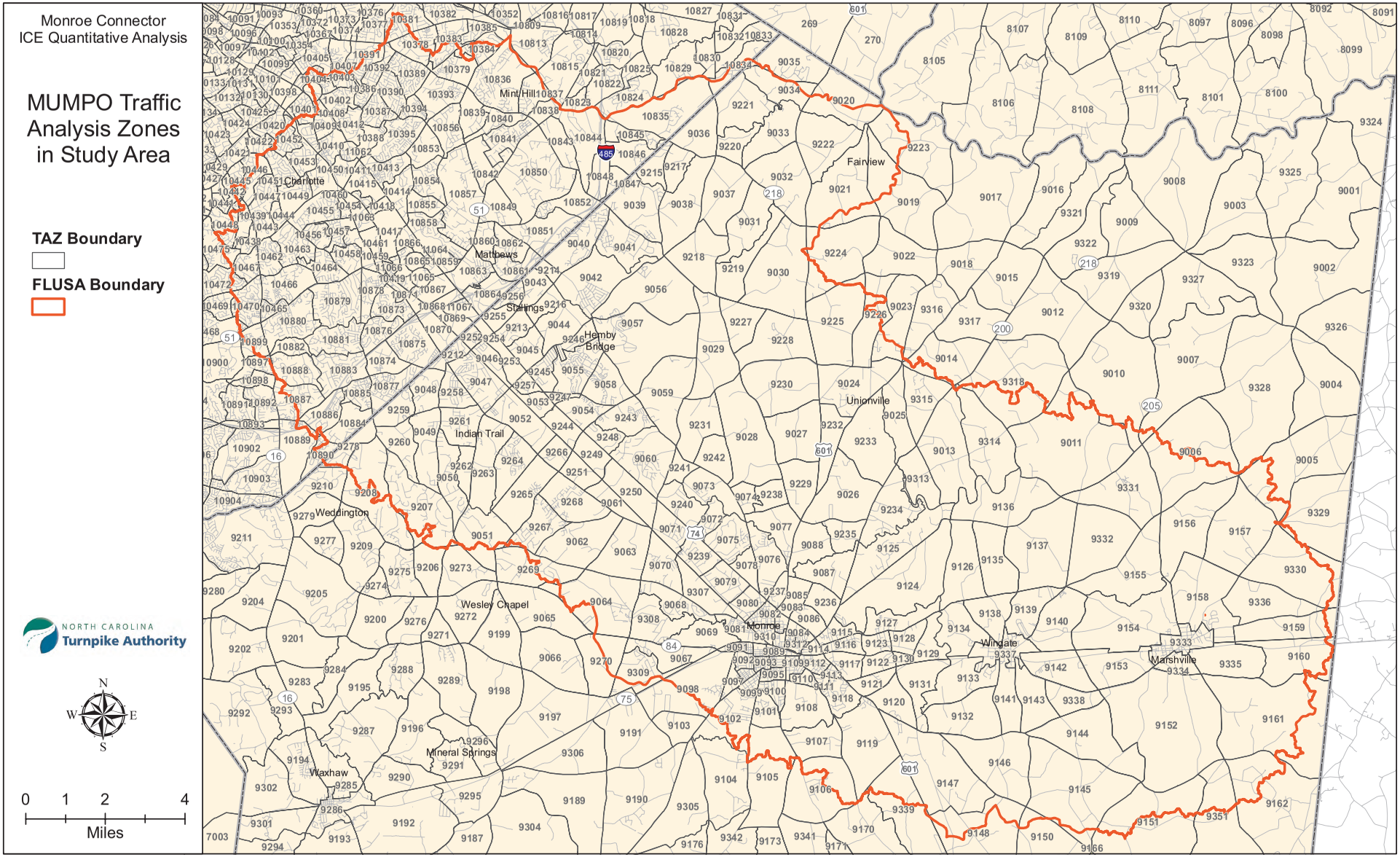
	Growth or Decline 2005-2030									
TAZ	Households	Population	RTL	HWY	LOSVC	HISVC	OFFGOV	BANK	EDUC	Total Employment
10882	34	112	11	12	37	21	9	4	2	112
10883	56	253	44	27	72	40	13	9	0	236
10884	36	121	11	11	33	19	8	4	0	101
10885	206	647	9	10	33	16	6	3	0	90
10886	55	178	11	11	33	19	8	4	55	156
10887	64	207	27	21	49	28	11	7	23	185
10888	54	177	12	12	49	23	9	5	0	128
10889	103	284	53	28	252	111	20	21	0	624
10890	43	141	11	11	30	17	7	3	0	92
10891	47	153	10	11	35	17	7	3	0	102
10892	48	160	35	30	46	28	13	7	22	197
10893	40	113	52	32	83	50	10	11	67	426
10894	74	239	14	14	74	31	10	6	0	174
10897	41	135	9	10	31	17	7	3	0	89
10898	34	109	12	12	42	23	9	5	69	190
10899	45	126	64	60	89	53	12	11	0	412
10900	71	229	34	26	64	47	13	8	66	286
10902	529	1465	24	18	48	30	11	8	0	160
10903	61	201	20	20	49	30	9	6	0	156
10904	59	193	18	19	42	24	8	5	0	131
10905	47	133	92	118	183	114	21	18	7	693
10906	124	400	12	11	43	19	8	4	0	116
11059	529	1076	151	21	517	484	356	127	0	1694
11060	501	1019	102	19	276	326	119	90	0	955
11061	595	1212	186	26	519	596	175	150	0	1681
11062	533	1084	85	24	271	323	139	150	0	1023
11063	48	133	48	23	117	179	14	13	0	617
11064	103	307	21	32	64	48	69	6	0	260
11065	102	300	17	28	61	48	53	6	0	294
11066	325	623	14	28	57	68	80	6	0	307
11067	90	263	21	21	65	44	179	7	94	462

Monroe Connector
ICE Quantitative Analysis

MUMPO Traffic Analysis Zones in Study Area

TAZ Boundary

FLUSA Boundary



NORTH CAROLINA Turnpike Authority

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Appendix C

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Hartgen Analysis of Interchanges

	Crossing Road	Characteristics				Suitable Development			
		Crossing Road Traffic Volumes	Distance from Nearest Town Center	Distance from Public Water and Sewer	Distance to Interstate Highway	Motel	Gas Station	Fast-Food Restaurant	Sit-Down Restaurant
1	US 74 Business	95,600	1.8	0	1.5	Good	Fair	Good	Good
2	Indian Trail-Fairview Road	25,700	1.4	0	3.5	Good	Fair	Good	Good
3	Unionville-Indian Trail Road	18,200	1.1	0	5.7	Good	Fair	Good	Poor
4	Rocky River Road	16,100	1.1	0	7.1	Good	Fair	Good	Poor
5	Concord Highway	54,300	2.1	0	11.0	Good	Fair	Good	Poor
6	Morgan Mill Road	20,400	2.1	0	12.7	Good	Fair	Good	Poor
7	Austin Chaney Road	17,400	0.9	0	16.7	Fair	Good	Fair	Poor
8	Forest Hills School Road	3,600	1.9	0	18.6	Poor	Poor	Poor	Poor
9	US 74 Business	37,100	1.9	0	19.6	Fair	Fair	Fair	Poor

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Appendix D

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Other Federal Actions Summary

CDBG

CDBG funds are allocated to states and entitlement communities, the latter of which includes Charlotte. Contact was made with the North Carolina CDBG Contact, Gary Dimmick. On September 9, 2009, Mr. Dimmick recommended contacting Vickie Miller of the NC Department of Commerce to determine CDBG investments outside of Charlotte and Steve Wilson, the Housing Services Manager of Charlotte, to determine potential CDBG funds uses by the Charlotte entitlement community. On September 11, 2009, Mr. Wilson stated that Mecklenburg County received state funding only, which was primarily used to rehabilitate single family homes. He anticipated no infrastructure or development projects would contribute to cumulative effects, based on the Project Team's explanation of the process to him. Ms. Miller was contacted on September 11, 2009, and November 4, 2009, and was not aware of any potential of existing CDBG projects in the Study Area with the potential to cause cumulative effects.

ARRA Funding

On February 17, 2009, North Carolina Governor Beverly Perdue announced the creation of the Office of Economic Recovery and Investment. The purpose of the office is to ensure transparency, accountability, and efficiency in the handling of North Carolina's stimulus funds. The office's website allows users to access information on stimulus projects for each of North Carolina's counties. Total anticipated ARRA spending projected for Mecklenburg County and Union County are shown in Table 1.

The majority of the project types listed in Table 8 would not be expected to cause cumulative effects to the Study Area. The three nearest water projects to the Study Area are located in Mecklenburg County: the Torrence Creek and Torrence Creek Tributary #2 stream restoration project, anticipated to restore 15,600 feet of stream (NCRecovery.Gov, 2009b); the Revolution Park water reuse project; and the Muddy Creek Stream Restoration Project (North Carolina Governor's Office, 2009). It is anticipated that these projects would have positive effects on water quality in Mecklenburg County.

Projects determined to be most likely to contribute to cumulative effects were transit and highway projects. The transit projects included replacement of existing buses, improvements to intercity rail systems, and construction of the North Davidson Street bus maintenance facility and the Charlotte multi-modal center, which are outside the Study Area (NCDOT, 2009b). Therefore, it is not anticipated that these transit actions will result in cumulative effects within the Study Area.

Highway projects in the Study Area mainly include pavement rehabilitation, additions of turn lanes, intersection improvements, and stormwater improvements. These projects will not convert substantial acreage to transportation uses, and stormwater projects would likely have a long-term beneficial effect on regional water quality. ARRA funded highway projects that overlap the Study Area are summarized in Table 2.

Table 1: Projected ARRA Funding for Mecklenburg and Union Counties

Funding Type	Mecklenburg County	Union County
Food Stamps	$12,339,824	$1,569,472
Social Security	$26,340,500	$5,889,500
Increase in Unemployment Insurance Payments	$22,709,680	$3,985,407
Work Force Investment Act	$4,217,135	$524,121
Highways and Bridges (DOT) Projects	$37,345,126	$6,698,099
Transit	$20,821,406	$0
0% School Bonds	$25,962,000	$4,000,599
Energy Conservation	$7,604,700	$751,800
Community Development Block Grants	$1,262,296	$0
Homelessness Prevention	$1,930,217	$0
Local School Districts	$58,077,274	$10,934,419
Education Stabilization	$7,782,176	$0
Weatherization	$1,845,851	$1,845,851
Public Housing	$7,508,295	$416,930
Justice and Public Safety	$1,666,245	$29,350
Federal Department Direct Grants	$21,764,915	$321,168
Clean Water	$5,348,455	$0
Drinking Water	$0	$0
Community Services Block Grants	$1,811,113	$286,936
School Lunch Equipment	$125,992	$42,647
Total	$266,463,200	$37,296,298

Source: NCRecovery.Gov, 2009a. Funding totals as of August 18, 2009.

Table 2: ARRA Funded Transportation Projects in the Study Area

County	Route	Location	TIP #	Project Description	Length (miles)	Est. Cost	Let Date
Union, Mecklen-burg	NC 218	East of I-485 to west of US 601	R-5114 A	Rehabilitate Pavement	5.6	$1,928,709	May-09
Union	NC 218	East of US 601 to west of NC 205	R-5114 B	Rehabilitate Pavement	10.9	$3,480,424	May-09
Anson, Union	NC 218	East of NC 205 to US 74	R-5114 C	Rehabilitate Pavement	13.6	$4,634,986	May-09
Union	NC 218	Intersection of NC 218/US 601 and NC 218/NC 205	R-5114 D	Add Turn Lanes	N/A	$467,301	May-09
Union	Faith Church Road/Union-ville-Indian Trail Road	Intersection of Faith Church Road & Unionville-Indian Trail Road	U-5109	Intersection Improvements	N/A	$684,426	Aug-09
Mecklen-burg	North Trade Street/Matthe ws-Mint Hill Road	SR 1010 (East Johns Street) to US 74	U-5134	Full Depth Reclamation & Rehabilitation, Pedestrian Improvements & ADA Compliance	1.4	$550,000	Sep-09
Mecklen-burg	Charlotte - NC 51		U-5133B	ITS expansion - upgrade and expand traffic signal and management system	N/A	$805,000	Sep-09
Union	US 601 and NC 218		R-4436JD	Stormwater Improvements	N/A	$75,000	Oct-09
Mecklen-burg	Various	Various	R-4436JE, JF, JG	Stormwater Improvements	N/A	$450,000	Nov-09

Source: NCRecovery.Gov, 2009c.

Non-ARRA Highway Projects

The NCDOT's State Transportation Improvement Program (STIP) prioritizes potential highway projects based on available funding over the next five to ten years. To estimate future highway projects through the design year of the Monroe Connector/Bypass (2030), the MUMPO's Draft 2035 Long Range Transportation Plan (LRTP) was used (MUMPO, 2009). The draft 2035 LRTP included three potential scenarios: financially constrained projects that would be funded if no new funding sources were available, those that would be funded with the addition of a 0.125 cent sales tax, and those that would be funded with the addition of a 0.25 cent sales tax.

To determine the appropriate scenario for use in the cumulative effects analysis, NCDOT's Human Environment Unit was consulted. Under 40 CFR 150825(a)(2) the term "reasonably foreseeable" is not defined. NCDOT noted that courts have defined "reasonably foreseeable actions" as "one that is not 'speculative or indefinite,' Sierra Club v. Marsh, 976 F.2d 763, 768 (1st Cir. 1992); is 'imminent' or 'inevitable', Airport Impact Relief v. Wykle, 192 F.3d 197 (1 Cir. 1999); or one that can be sufficiently described so that consideration of its effects would be 'useful to a reasonable decision-maker,' Dubois v. United States Dep't of Agriculture, 102 F.3d 1273, 1286 (1st Cir. 1996). Reasonably foreseeable in the context of an environmental impact is one that is 'sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision.' Sierra Club v. Marsh, 976 F.2d 763, 767 (1st Cir. 1992)."

Based on these criteria, NCDOT advised that determinations of reasonably foreseeable projects for consideration in determining cumulative effects should be made on a case by case basis with emphasis placed on projects that have identified funding sources and/or are included in a comprehensive transportation plan or long range transportation plan, or are considered likely to take place by reasonable stakeholders.

On this basis, the draft 2035 LRTP was discussed with Stuart Basham of the City of Charlotte, who is working with MUMPO on the plan. During a conversation on October 26, 2009, Mr. Basham stated that based on the current economic and political climate, the "no new funding" scenario was the scenario most people in the community would consider reasonable, as it is not anticipated that new sales taxes were likely to be implemented. Expected funding sources were Equity funds (funding dispersed based on NCDOT's Equity Formula), Loop funds (funding from NCDOT's Urban Loop Fund for improvements to designated urban loops (I-485)), Unknown (to be identified later), and Local (from non-NCDOT sources). To provide a conservative estimate of potential cumulative effects, all projects included in the draft 2035 plan (under the "no new funding" scenario) were assumed as being built prior to the Monroe Connector/Bypass design year of 2030. These projects are summarized in Table 3.

A review was conducted to determine which other future projects might require permits from the US Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA), as this would elevate the non-Federal project to a Federal action (see discussion of Other Actions with Federal Permits). Based on past experience with NCDOT, projects funded through the equity formula (a combination of state and Federal funds) are commonly assumed to have a Federal permit requirement to allow NCDOT funding flexibility. The two projects assumed to be constructed using urban loop funds are improvements to I-485. Index # 3117 widens I-485 for a distance of nine miles through the Goose Creek Watershed and crosses several assumed perennial (blue-line) streams. It is assumed a Federal permit would be required.

Index # 3116 widens I-485 south of existing US 74 for a distance of five miles in the Crooked Creek and Fourmile Creek watersheds and also crosses several blue-line streams; therefore, it is assumed that this project would also require a Federal permit.

Of the four local projects listed, two are new location facilities: the extensions of Arequipa Drive (Index # 3026) and the Northeast Parkway (Index # 3217). Based on a GIS review, the Northeast Parkway has no clear impacts to blue-line streams or wetlands and could reasonably be considered non-Federal if, as listed, no Federal funding was used. Arequipa Drive crosses Irvins Creek; for that reason, it is assumed that a Federal permit would be required. There are two local widening projects: Trade Street (Index # 3340) and Idlewild Road (Index # 3008). The proposed widening of Trade Street would cross Fourmile Creek, and the widening of Idlewild Road crosses McAlpine Creek; therefore, a Federal permit is assumed for both of these projects.

There is one project listed as having an unknown funding source (Intersection Improvements to the Weddington Road/I-485 Intersection). The project (Index # 3121) would require a Full Interchange Justification Report and FHWA approval, which would also constitute a Federal action.

Table 3: Projects in the Draft MUMPO 2035 LRTP (Assuming No New Net Funding)

Index #	STIP #	Project Date	Name	Description	Funding Source
3054	U-2547	2015	Charles Street	Widening from Sunset Drive to Franklin Street	Equity
3146	U-3809	2015	Indian Trail Road	Widening from Old Monroe Road to Independence (US 74)	Equity
3267	U-3825	2015	Stallings Road	Widening from Old Monroe Road to Independence (US 74)	Equity
3165	U-4713B	2015	McKee Road Extension	New road from John Street to Campus Ridge Road	Equity
3340	NA	2015	S. Trade Street	Widening from Fullwood Lane to Weddington Road	Local
3121	NA	2015	I-485	Intersection improvement at Weddington Road	Unknown
3008	NA	2015	Idlewild Road	Widening from Piney Grove Road to Drifter Drive	Local
3217	NA	2025	Northeast Parkway Extension	New road from NC 51 to Matthews-Mint Hill Road	Local

Index #	STIP #	Project Date	Name	Description	Funding Source
3010	NA	2025	Independence Boulevard (US 74)	6 lanes +HOV or bus lanes from Confederate Drive to Village Lake Drive	Equity
3012	U-4714	2025	John Street/ Old Monroe Road	Widening from I-485 to Indian Trail Road	Equity
3016	NA	2025	Airport Road	Widening from Goldmine Road to 4th Street Extension	Equity
3116	NA	2025	I-485	Widening from NC 16 (Providence Road) to US 74	Loop
3117	NA	2035	I-485	Widening from US 74 to Albemarle Road	Loop
3013	U-5007	2035	NC 51	Widening from Matthews Township Parkway to Lawyers Road	Equity
3026	NA	2035	Arequipa Drive Extension	New road from Margaret Wallace Road to Sam Newell Road	Local
3011	NA	2035	Independence Boulevard (US 74)	6 lanes +HOV or bus lanes from Krefield Drive to Hayden Way	Equity
3142	NA	2035	Independence Boulevard (US 74)	6 lanes +HOV or bus lanes from Hayden Way to NC 51	Equity

Source: MUMPO, 2009.

Other Actions with Federal Permits

As discussed earlier in this appendix, projects that disturb streams or wetlands require permitting with the USACE under Section 404 of the CWA. The issuance of a permit under Section 404 constitutes a Federal action subject to the requirements of NEPA. The Project Team contacted USACE to discuss recent permit activity. Relatively few Individual 404 Federal permits had been issued in Mecklenburg and Union Counties during the latter half of 2009. This may be due, in part, to the recent economic downturn, which has reduced development activity, making it a poor surrogate for future development. USACE releases limited information on General Permits, so it was not possible to develop a screening mechanism that would allow a quantitative estimate of recent General Permits issued in the FLUSA. For this reason, it was considered inappropriate to develop an estimate to cover all potential Federal Actions through the design year of the project.