
INDIRECT AND CUMULATIVE EFFECTS ASSESSMENT

**GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES**

NORTH CAROLINA
STIP NO: U-3321

March 31, 2009

Prepared for:
North Carolina Turnpike Authority



THE LOUIS BERGER GROUP, INC.

1001 Wade Avenue, Suite 400, Raleigh, North Carolina 27605
Tel (919) 866-4400 Fax (919) 755-3502 www.louisberger.com

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY	5
2.0 INTRODUCTION.....	32
3.0 DEFINITIONS AND METHODOLOGY	35
3.1 DEFINITIONS	35
3.2 METHODOLOGY	37
4.0 STUDY AREA BOUNDARIES (STEP 1).....	52
5.0 DEVELOPMENT MANAGEMENT PROFILES BY COUNTY (STEP 2).....	60
6.0 LAND USE (STEP 3).....	74
6.1 GASTON COUNTY.....	74
6.2 MECKLENBURG COUNTY.....	79
6.3 YORK COUNTY.....	80
6.4 CLEVELAND COUNTY.....	80
7.0 WATER RESOURCES AND WATER QUALITY (STEP 3 CONTINUED).....	81
7.1 WATERSHED	81
7.2 WATER SUPPLY WATERSHEDS	83
7.3 WETLANDS	84
7.4 STREAM CLASSIFICATIONS	85
7.5 STATE AND LOCAL STORMWATER MANAGEMENT ORDINANCES.....	87
7.6 RIPARIAN BUFFER RULES	87
7.7 DEPARTMENT OF TRANSPORTATION BEST MANAGEMENT PRACTICES.....	89
8.0 ENVIRONMENTAL RESOURCES (STEP 3 CONTINUED)	90
8.1 NATURAL RESOURCES	90
8.2 NATURAL HERITAGE SITES	91
8.3 AIR QUALITY	92
8.4 NOISE	93
8.5 CULTURAL RESOURCES.....	94
9.0 TRANSPORTATION (STEP 3 CONTINUED)	95
9.1 TRANSPORTATION ACTIONS.....	95
10.0 AGRICULTURAL LANDS/PRIME FARMLANDS (STEP 3 CONTINUED).....	98
11.0 SOCIOECONOMIC CHARACTERISTICS (STEP 3 CONTINUED).....	99
11.1 POPULATION.....	106
11.2 ENVIRONMENTAL JUSTICE.....	106
11.3 JOB GROWTH RATE	107
11.4 PER CAPITA INCOME	110
11.5 HOUSING STOCK MIX AND VALUE	111
11.6 COMMUTING AND ACCESSIBILITY	112
11.7 TOURISM	115
12.0 IDENTIFY POTENTIAL INDIRECT AND CUMULATIVE EFFECTS (STEPS 4 & 5).....	116
12.1 INDIRECT AND CUMULATIVE LAND USE EFFECTS	116
12.2 SURFACE WATER RESOURCES AND AQUATIC HABITAT EFFECTS	131

INDIRECT AND CUMULATIVE EFFECTS ASSESSMENT

GASTON EAST-WEST CONNECTOR

STIP No: U-3321

March 31, 2009

12.3 TERRESTRIAL COMMUNITY EFFECTS ASSOCIATED WITH INDUCED GROWTH AND LAND USE CHANGE..	133
12.4 EFFECTS TO THREATENED AND ENDANGERED SPECIES	135
12.5 SOCIOECONOMIC EFFECTS	137
12.6 AMBIENT NOISE ASSESSMENT	138
12.7 AIR QUALITY EFFECTS.....	138
12.8 INDIRECT EFFECTS TO CULTURAL RESOURCES.....	138
12.9 INDIRECT EFFECTS TO PRIME FARMLAND.....	139
13.0 APPENDICES.....	151
APPENDIX A. TRANSPORTATION IMPROVEMENT PLANS SUMMARY	152
APPENDIX B. LIST OF REVIEWED DOCUMENTS	167
APPENDIX C. SUMMARY OF INTERVIEWS WITH STAKEHOLDERS AND LOCAL OFFICIALS	168
APPENDIX D. NUMERIC RESPONSES FROM INTERVIEWEES.....	189
APPENDIX E. REPORT MAPPING	194
APPENDIX F. SCOPING COORDINATION WITH AGENCIES	195
APPENDIX G. REFERENCES	201

List of Tables

TABLE 1.1	WATER SUPPLY STREAMS.....	13
TABLE 1.2	CORRIDOR SEGMENTS COMPRISING EACH DETAILED STUDY ALTERNATIVE	16
TABLE 1.3	SUMMARY OF POTENTIAL INDIRECT AND CUMULATIVE IMPACTS BY COUNTY	17
TABLE 1.4	POTENTIAL ICES IN YORK COUNTY	18
TABLE 1.5	POTENTIAL ICES IN CLEVELAND COUNTY.....	20
TABLE 1.6	POTENTIAL ICES IN MECKLENBURG COUNTY	21
TABLE 1.7	POTENTIAL ICES IN GASTON COUNTY	23
TABLE 1.8	SUMMARY OF POTENTIAL ICES AT THE DETAILED STUDY ALTERNATIVE LEVEL	28
TABLE 2.1	CORRIDOR SEGMENTS COMPRISING EACH DETAILED STUDY ALTERNATIVE	33
TABLE 3.1	DESCRIPTION OF STUDY METHODS & PRIMARY DATA RESOURCES	44
TABLE 3.2	NOTABLE FEATURES	46
TABLE 5.1	ECONOMIC DEVELOPMENT INITIATIVES FOR FY 08	68
TABLE 6.1	MUNICIPAL LAND USE INFORMATION, GASTON COUNTY	75
TABLE 6.2	CHARLOTTE-DOUGLAS INTERNATIONAL AIRPORT PASSENGERS AND MAIL TONS, DOMESTIC AND INTERNATIONAL DESTINATIONS	79
TABLE 7.1	WATERSHED PROTECTION REQUIREMENTS	84
TABLE 7.2	WETLAND LOSSES (ACRES) 1995-2000	84
TABLE 7.3	WATER SUPPLY STREAMS.....	86
TABLE 7.4	STREAM LOSSES (LINEAR FEET), 1997-2000.....	87
TABLE 7.5	S.W.I.M. BUFFER	89
TABLE 8.1	NATURAL HERITAGE SITES OF GASTON COUNTY.....	91
TABLE 8.2	COMMON OUTDOOR NOISES	93
TABLE 11.1	POPULATION AND EMPLOYMENT INCLUDED IN THE ICE STUDY AREA	110
TABLE 11.2	PER CAPITA INCOME	111
TABLE 11.3	MEDIAN HOUSING VALUE	112
TABLE 11.4	COMMUTE STATISTICS OF GASTON COUNTY, 1990-2000	112
TABLE 12.1	DATA LAYERS USED TO CALCULATE GRID INDICES.....	119
TABLE 12.2	SUMMARY OF POTENTIAL INDIRECT AND CUMULATIVE IMPACTS BY COUNTY.....	140
TABLE 12.3	POTENTIAL ICE'S IN YORK COUNTY.....	141
TABLE 12.4	POTENTIAL ICE'S IN CLEVELAND COUNTY	143
TABLE 12.5	POTENTIAL ICE'S IN MECKLENBURG COUNTY.....	144
TABLE 12.6	POTENTIAL ICE'S IN GASTON COUNTY	146

List of Figures

FIGURE 1.1	NCDOT's 8-STEP ICE ASSESSMENT PROCESS.....	6
FIGURE 1.2	FOUR COUNTY STUDY AREA	APPENDIX E
FIGURE 1.3	GASTON EAST-WEST CONNECTOR DETAILED STUDY ALTERNATIVES.....	APPENDIX E
FIGURE 1.4	GASTON EAST-WEST CONNECTOR TIPS.....	APPENDIX E
FIGURE 3.1	NCDOT's 8-STEP ICE ASSESSMENT PROCESS	38
FIGURE 3.2	GASTON EAST-WEST CONNECTOR STUDY AREAS	APPENDIX E
FIGURE 4.1	TEMPORAL BOUNDARY.....	59
FIGURE 6.1	ICE STUDY AREA	APPENDIX E
FIGURE 6.2	DETAILED STUDY ALTERNATIVE SEGMENTS.....	APPENDIX E
FIGURE 7.1	ELEVATION AND WATERSHEDS.....	APPENDIX E
FIGURE 8.1	ENVIRONMENTAL FEATURES.....	APPENDIX E
FIGURE 10.1	FARMLAND AND PRIME AGRICULTURAL SOILS.....	APPENDIX E
FIGURE 11.1	GASTON COUNTY DEMOGRAPHICS	100
FIGURE 11.2	CLEVELAND COUNTY DEMOGRAPHICS	101
FIGURE 11.3	MECKLENBURG COUNTY DEMOGRAPHICS.....	102
FIGURE 11.4	YORK COUNTY, S.C. DEMOGRAPHICS.....	103
FIGURE 11.5	GASTON, MECKLENBURG, CLEVELAND, YORK DEMOGRAPHICS.....	104
FIGURE 11.6	ICE STUDY AREA DEMOGRAPHICS.....	105
FIGURE 11.7	EMPLOYMENT COMPOSITION (2007 ESTIMATED)	107
FIGURE 11.8	DAILY COMMUTER FLOWS (2000) AND PERCENT CHANGE (1990-2000)	113
FIGURE 11.9	TRAVEL TIME CHANGES (2030) WITH AND WITHOUT THE GASTON EAST-WEST CONNECTOR	APPENDIX E
FIGURE 11.10	10-MINUTE TRAVEL TIME ISOCHRONES FOR WEST SIDE AND EAST SIDE 2030.....	APPENDIX E
FIGURE 12.1	HUMAN AND NATURAL ENVIRONMENT SENSITIVITY	APPENDIX E
FIGURE 12.2	CUMULATIVE GROWTH POTENTIAL	APPENDIX E
FIGURE 12.3	CUMULATIVE GROWTH POTENTIAL AND HUMAN AND NATURAL ENVIRONMENT SENSITIVITY	APPENDIX E
FIGURE 12.4	COMMUNITY FEATURES.....	APPENDIX E
FIGURE 12.5	PUBLIC UTILITIES	APPENDIX E
FIGURE 12.6	DEVELOPABLE LAND	APPENDIX E
FIGURE 12.7	DEVELOPMENT OVER TIME	APPENDIX E
FIGURE 12.8	ALTERNATIVE INTERCHANGES	APPENDIX E
FIGURE 12.9	INTERCHANGE K	APPENDIX E
FIGURE 12.10	INTERCHANGES A & B	APPENDIX E
FIGURE 12.11	INTERCHANGE C	APPENDIX E
FIGURE 12.12	INTERCHANGES D AND E	APPENDIX E
FIGURE 12.13	INTERCHANGES F AND G.....	APPENDIX E
FIGURE 12.14	INTERCHANGE H.....	APPENDIX E
FIGURE 12.15	INTERCHANGES I AND J	APPENDIX E
FIGURE 12.16	WILDLIFE HABITAT	APPENDIX E

1.0 EXECUTIVE SUMMARY

The North Carolina Turnpike Authority (NCTA) is proposing to construct a toll road, known as the Gaston East-West Connector, from I-85 west of Gastonia in Gaston County to I-485/NC 160 in Mecklenburg County. The purpose of the proposed action is to improve east-west transportation mobility in the area around the City of Gastonia, between Gastonia and the Charlotte metropolitan area in general, and particularly to establish direct access between the rapidly growing area of southeast Gaston County and west Mecklenburg County. This project is based on the following:

- Need to improve mobility, access and connectivity within southern Gaston County and between southern Gaston County and Mecklenburg County.
- Need to improve traffic flow on the sections of I-85, US 29-74 and US 321 in the project study area and improve high-speed, safe regional travel service along the I-85/US 29-74 corridor.¹

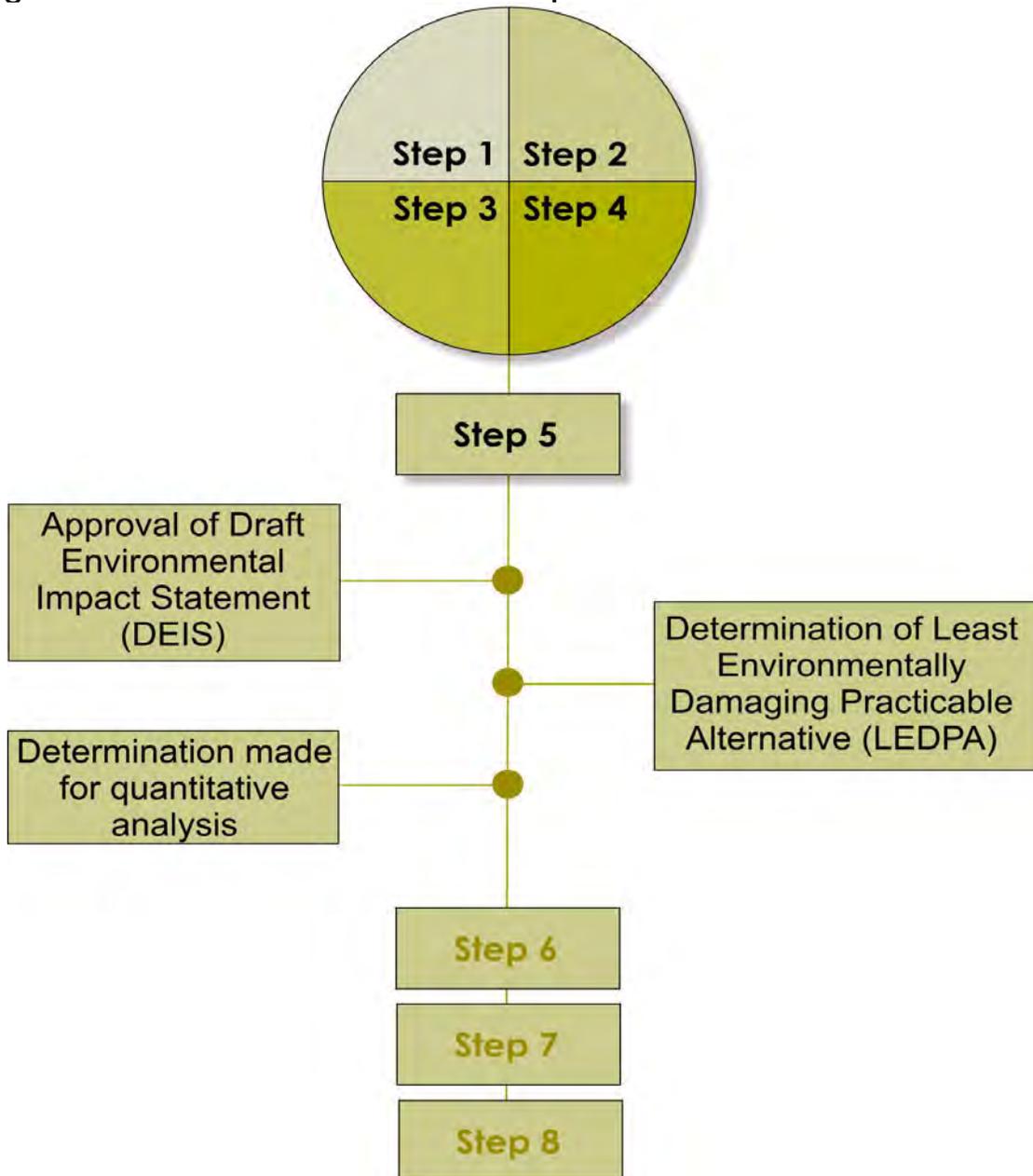
The proposed project is generally located in southern Gaston County and western Mecklenburg County, and near or partly within the municipalities of Bessemer City, Gastonia, Cramerton, and Belmont. In this area, the North Carolina Turnpike Authority (NCTA) proposes to improve east-west travel between I-85 west of Gastonia in Gaston County and I-485/NC 160 in Mecklenburg County.

The Gaston East-West Connector is designated as STIP Project No. U-3321 in the NCDOT's *2007-2013 State Transportation Improvement Program (STIP)*.

This Indirect and Cumulative Effects (ICEs) assessment evaluates the potential land use changes and environmental effects associated with the proposed Gaston East-West Connector. The general approach taken to evaluate ICEs associated with the proposed project follows the eight-step process adopted by North Carolina Department of Transportation in 2001. Steps 1-5 of this process as described in Section 3.2 of this report provide a qualitative approach for assessing ICEs for all Detailed Study Alternatives that were under active consideration at the time of this assessment. The completion of Steps 6-8 is not the focus of this report in that these steps are typically associated with quantitative analysis of potential impacts. The decision to analyze potential impacts quantitatively belongs to the agencies with federal oversight and approval authority of projects requiring NEPA. In any case, any quantitative analysis would involve the preferred alternative and would commence following the approval of the Draft

Environmental Impact Statement (DEIS). Figure 1.1 shows how the 8-step process is to be incorporated into this NEPA-level project review.

Figure 1.1. NCDOT ICE Assessment 8-Step Process



This report implements Steps 1-5 (a qualitative assessment) of the ICE analysis. Steps 6-8 (a quantitative assessment) would be addressed, if needed, in a separate report.

A quantitative assessment will be conducted on the Preferred Alternative following the approval of the Draft Environmental Assessment if it is determined by the Federal Highway Administration (FHWA) and the NCTA that such analysis is needed.

Methodology and Approach

The methodology used to describe in a qualitative fashion the ICE's for the Gaston East-West Connector project incorporated the five initial steps of a total eight step process adopted by the North Carolina Department of Transportation in 2001. This report focuses on the implementation of the following steps relating to ICEs associated with the Gaston East-West Connector. The methodologies applied herein are suggested in the NCDOT ICI Guidance and were developed in response to the specific nature of the project, and comments received from resource agencies and the North Carolina Turnpike Authority.

Step 1. Define Study Area Boundaries. Using an overlay technique based on spatial boundaries and mapping in combination with interview information from local experts, the analyst considered the following to determine the ICE Study Area:

- neighborhoods;
- political boundaries;
- community resources;
- public infrastructure;
- travel demand modeling;
- state and local stormwater management ordinances;
- watersheds;
- wetland areas;
- areas of known contamination;
- 100-year Flood Plain areas;
- threatened and endangered species and their critical habitat;
- land use; topography;
- soils;
- prime and unique agriculture lands;
- public lands and scenic;
- recreational and state natural areas;
- air quality;
- significant Natural Heritage Sites;

- wildlife and natural vegetation; and
- forest resources.

The ICE Study Area encompasses geographic areas having the potential for transportation impact causing activities.

Description of Study Areas

ICE Study Area. The ICE Study Area includes most of Gaston and parts of Cleveland, Mecklenburg, and York (S.C.) Counties (refer to Figures 1.2 & 3.2). The purpose of the ICE Study Area was to provide a basic level of geography that would encompass any foreseeable, potential indirect effects stemming from the proposed Gaston East-West Connector project. The ICE Study Area served as the basis for collecting data that was used later to refine the qualitative impact assessment study areas and impact assessments. The potential transportation impact causing activities would fall within a portion of the ICE Study Area and is more sharply described at the District and Interchange Areas levels.

Districts. The ICE Study Area was broken into 10 unique districts in order to facilitate discussions with local experts during interviews, as well as to provide a level of geography that would better describe potential indirect and cumulative effects that were more localized in nature. The District boundaries followed major roadway features as well as political boundaries to facilitate policy differentiations among the various units of government that were examined. The District boundaries facilitated discussions with the local expert interviewees as well as the reporting of results.

Interchange Areas. The third and smallest study area type was used to assess the unique changes that would potentially be produced by increasing accessibility in the immediate vicinity of proposed interchanges with the Gaston East-West Connector project. The size and shape of the Interchange Area boundaries was determined by considering the level of increased accessibility afforded by existing streets that would interchange with the proposed Gaston East-West Connector. Hence, if a proposed interchange was to be located in an area with a good level of street connectivity, the influence of the accessibility that the new interchange would afford increased or "stretched" the shape of the Interchange Area boundary. By considering the places where future interchanges might be located, the potential for indirect and cumulative effects that the higher level of immediate access to the proposed Gaston East-West Connector will afford these areas could be discussed more readily with local expert interview participants and in the reporting stage.

In addition to these three basic types of study areas, the final report also consolidates some of the results into discussions at the county level of geography as well as for the Detailed Study Alternative corridors.

A temporal boundary spanning from 1989 to 2030 was established for the ICE analysis. This temporal boundary is intended to encompass other past, present, and reasonably foreseeable future actions that could incrementally contribute to substantial changes in land use, in combination with the proposed project.

Step 2. Identify Study Area Direction and Goals. The investment climate, existing planning documents, and historical growth trends were considered to characterize the trends and policies of areas within the ICE Study Area as well as the potential for these areas to receive new growth and development.

Step 3. Inventory Notable Features. A variety of third-party data resources assessed through spatial grid modeling and information gathered during interviews with resource agency representatives and local experts was used to gather information on notable features considered in this report. Notable features is a broad term that describes characteristics of the environment that society would like to protect, emphasizing characteristics such as (1) recovery time from disturbance/destruction, (2) sensitivity to disruption, and (3) vulnerability to changes directly, indirectly, or cumulative induced by the project (NCDOT ICI Guidance Volume II, page III-28).

Step 4. Identify Effect-Causing Activities. A geographic information system (GIS) spatial grid analysis was developed utilizing data collected from third party sources and interviews with local experts and assembled at the correct geographic scale. The weighted data was attributed to the appropriate grid cell to represent the degree or magnitude of transportation effect causing activity.

Step 5. Identify Potential Indirect and Cumulative Effects for Further Analysis. Documenting the ICEs involved interpreting the GIS spatial grid analysis with qualitative assessments of the policy directions and goals and interviewee comments. Identified ICEs were analyzed in regards to their potential to affect land use or resources using a sliding scale of measurement ranging from very strong to weak.

The qualitative approach implemented throughout this assessment utilizes multiple information sources; technical knowledge; and professional judgment from several analysts that have experience in ICE work in North Carolina, nationally, and related fields such as demographic analysis,

community effect assessment, water quality, land use planning, and NEPA project planning. More specifically, this ICE assessment focused on the following information sources when identifying potential ICEs relating to the proposed project:

- local expert interviews;
- spatial grid analyses/assessment of networks of weighted data points;
- Policy context reviews conducted during this study as well as the Community Characteristics Report conducted earlier for this project; and
- Review and inventory of community and habitat notable features.

Potential beneficial direct effects associated with the proposed action include improved regional connectivity and demonstrable travel time savings and level-of-service improvements over forecasted No-Build conditions. Potential indirect effects that are beneficial include improving access to tourist attractions such as Daniel Stowe Botanical Gardens and Crowders Mountain State Park, as well as improving access to land that may be redeveloped or developed to a higher use and thus increase property tax revenues. Other, cumulative actions, such as private development actions to construct new homes and businesses, as well as new public water/sewer infrastructure, will provide economic and housing opportunities to residents as well.

Area Direction and Goals



Gaston County (see Figure 1.2), like its major city Gastonia, strives to accommodate land use growth and development through planning, policy, ordinances and utility infrastructure practices. The County has a Unified Development Ordinance establishing goals and objectives to manage existing and anticipated development. Much of the new growth in Gaston County is occurring in the south and southeast portions of the County near the South Fork of the Catawba River and Catawba River. The growth has led to the conversion of farmland and forested areas to more urbanized land uses.

The southeastern portion of Gaston County is estimated to surpass other portions of the County in regards to housing units. By 2010 the southeast portion of Gaston County is anticipated to grow by 3,800 housing units. The volume of housing is followed by the northeast portion of the County that is estimated to grow to 1,900 units in that same timeframe.

The City of Gastonia regularly extends utilities in an attempt to meet the needs of new development, but in some scenarios have been unable to keep pace with recent development. According to the Gaston Urban Area Metropolitan Planning Organization (GUAMPO), the majority of proposed projects scheduled for completion over the next 10—20 years are to be located in unincorporated areas of Gaston County that currently are not served by public water and sewer infrastructure.

Other Gaston municipalities including the City of Belmont; Town of Dallas; Cramerton; City of Kings Mountain; Town of McAdenville; City of Mount Holly; Town of Ranlo; City of Lowell; and Bessemer City are currently in a mode of residential and commercial growth.

Both the Gastonia-Mount Holly Connector and the southern portion of the Belmont-Mount Holly Loop have been identified as study corridors considered most vulnerable to future development.

Mecklenburg County (see Figure 1.2) is in the midst of a tremendous growth cycle. Mecklenburg County's *2015 Plan, Planning for Our Future* predicts that by the year 2015 that most available land within the County boundaries will likely have been annexed. The western portion of the County is currently experiencing land use change in the vicinity of the Charlotte-Douglas International Airport as the airport continues with its expansion including an additional runway. The completion of I-485 Outer Loop has also precipitated growth in the ICE Study Area, particularly waterfront properties near the Catawba River and its tributaries.

The Charlotte Region, including Mecklenburg, Gaston and Cleveland Counties is an inland port and among the top choices for major distribution operations due to its ideal location for interstate and intrastate commerce. The Charlotte Region's distribution network links not only to local and regional markets but also to national and international ones. The Region is currently served by three major interstate systems: I-77 north-south, I-85 north-south and I-40 east-west. If constructed the proposed Gaston East-West connector would also support the region's interstate system.

York County (see Figure 1.2) has experienced continued growth and economic vitality, particularly along the I-77 commuting corridor. The County has noted suburban sprawl characterized by a pattern of low-density residential development. Residential growth is disproportionately outpacing commercial and industrial growth. Most of York County's recent employment growth has been in logistics and warehousing. York County has proposed to adopt an Adequate Public Facilities Regulation Ordinance to better control residential growth in the County. To facilitate the management of projected land use change and population growth,

York County has developed the York County 2025 Comprehensive Plan with goals and strategies that are based broadly on quality of life issues; managed and sustainable growth; balanced transportation and public facilities priorities; and excellence in government.

Growth and development in Cleveland County is most noted in the municipal areas of the County. The largest category of land within Cleveland County is undeveloped property and farmland. The County's goals and policies regarding land use seem to be rooted in improving the quality of life for current land owners with a focus on existing towns, cities and villages and attracting business entities that would support economic development.

The median housing value in the ICE Study Area is greater than that reported for both North Carolina and South Carolina. Median home values in York County have increased 23.5% over the six-year period between 2000 and 2006. Only the figures for the Charlotte Region topped York County's median home values.

Water Resources

Water resources with the Catawba River Basin fall within one of three sections:

- The South Fork of the Catawba and its tributaries Henry Fork, Jacob Fork, and Indian Creek are considered to be in the midsection of the Catawba;
- The Lower Catawba Basin, Dutchman's Creek, Sugar Creek, McAlpine Creek, Twelve Mile Creek and Lake Wylie are encompassed in the drainage that contributes to flow over the North/South Carolina border; or
- Crowders Creek which joins in the drainage area of the South Fork Catawba.

North Carolina lists eight streams as having impaired biological integrity under the Final 2006 provisions of the Clean Water Act (CWA) (NCDENR, 303(d) list, 2006). The potential source of impairment for all of these streams is urban runoff and storm sewers. These streams are as follows:

- Abernethy Creek;
- Crowder Creek;
- Blackwood Creek;
- Catawba Creek;
- Catawba River;
- Sugar Creek; and
- Dallas Branch.²

There are also two 303(d) listed streams (SCDHEC, 303(d) list 2006) located in South Carolina, Crowder Creek and Lake Wylie.³

The Catawba River/Lake Wylie and the South Fork Catawba River have surface water designations indicating use as a water supply watershed. Table 1.1 provides information on these streams in the ICE Study Area.

Table 1.1 Water Supply Streams

Catawba River (Lake Wylie below elevation 570)	From I-85 bridge to the upstream side of Paw Creek Arm of lake Wylie	WS-IV, B; CA	Catawba	11-(122)
Catawba River (Lake Wylie below elevation 570)North Carolina portion	From the upstream side of paw Creek Arm of lake Wylie to North Carolina-South Carolina State Line	WS-V, B	Catawba	11-(123.5)
Unnamed Tributary at Belmont Abbey College	From a point 0.5 mile downstream of N.C. HWY 273 to Lake Wylie	WS-IV;CA	Catawba	11-123-(2); 11-123-(1)
South Fork Catawba River	From a point 0.4 mile upstream of Long Creek to Cramerton Dam and Lake Wylie at Upper Armstrong bridge (mouth of South Fork Catawba river)	WS-V	Catawba	11-129-(15.5)

(1) Final North Carolina Water Quality Assessment and Impaired Waters List (2006 Integrated 305(b) and 303(d) Report). Approved on May 17, 2007.

Class C: Waters protected for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.

Class B: Waters protected for all Class C uses in addition to primary recreation. Primary recreational activities include swimming, skin diving, water skiing, and similar uses involving human body contact with water where such activities take place in an organized manner or on a frequent basis.

Water Supply IV (WS-IV): Waters used as sources of water supply for drinking, culinary, or food processing purposes where a WS-I, II or III classification is not feasible. These waters are also protected for Class C uses. WS-IV waters are generally in moderately to highly developed watersheds or Protected Areas.

Water Supply V (WS-V): Waters protected as water supplies which are generally upstream and draining to Class WS-IV waters or waters used by industry to supply their employees with drinking water or as waters formerly used as water supply. These waters are also protected for Class C uses.

Natural Resources

The North Carolina Natural Heritage program identifies "Significant Natural Heritage Areas" (SNHAs) as the most important areas for natural diversity in North Carolina. While some of the SNHAs are under permanent protection, others are threatened by land use change. Gaston County has 12

identified sites of National State or Regional Significance and up to 25 sites of County significance.

Gaston and Mecklenburg Counties are in attainment areas for particulate matter (PM-10) and Particulate matter (PM-2.5) and the other criteria pollutants (carbon monoxide, oxides, nitrogen, etc.)

Land use change and development generally increase the level of ambient noise in communities and /or wildlife habitat. An increase in noise levels noise may be related to construction activities or noise pollution typical for more urbanized settings.

Demographics

Within the ICE Study Area, the largest increases in population between the years of 1990 and 2000 occurred in York County followed by the southern portions of Gastonia, along the edge of the municipal limits, the southeast and southwest sections of Gaston County, and the southern portions of Mecklenburg County. Much of the growth in the counties of Gaston and York is believed to be related to the close proximity of these counties to the Charlotte Region.

Census data on the block, county and national level from 2000 indicated that there are higher-than average black and/or Hispanic/Latino populations within the ICE Study Area located west of Bessemer City, west of Gastonia and around the general vicinity of the Charlotte-Douglas International Airport. The lowest reported median incomes are generally located in the block groups concentrated south and west of Bessemer City; west of Gastonia; and around the Charlotte-Douglas International Airport.

Gaston County has seen an increase in the services and trade sectors over the past decade. Residential development in the County is believed to have fostered this growth in the services and trade sectors. Manufacturing in Gaston has slowed considerably over the past decade, especially in textile-related industries.

Mecklenburg County benefits the Region greatly in terms of economics. The County reported the highest percentage of jobs in the sales (finance, insurance, and real estate) and services sectors amongst all counties in the ICE Study Area. Mecklenburg County continues to experience positive net growth in terms of overall employment.

York County's largest employment sector is manufacturing, followed by retail, healthcare and social assistance; accommodations and food service; and local government. Census data projections indicate that the labor force in York County will continue its trend of growth through the year 2025.

Cleveland County is still in the very early stages of the agriculture-to-services trend that has been seen in other areas within the Charlotte Region. The County reported the highest percentage of employment in agriculture and mining of any counties included in the ICE Study Area.

Implementation of any one of the proposed Detailed Study Alternatives is expected to offer travel time savings in geographic areas where the transportation network is the least dense. Some areas around interchanges will also see improvements in travel time in a range of three to fifteen minutes.

Detailed Study Alternatives

The proposed project would be a new location controlled-access toll facility. There are sixteen Detailed Study Alternatives under consideration. The corridor segments comprising the 16 Detailed Study Alternatives are shown in Table 1.2 and Figure 1.3. Generally, there are two-to-four corridor options at any one location. Combinations of these options add up to the 16 Detailed Study Alternatives.

Note: Some of the 16 Detailed Study Alternatives covered in this report may be eliminated due to potential direct impacts or feasibility.

Interchanges currently are proposed at 11-12 locations along the Detailed Study Alternatives, as listed below from west to east. The interchanges at the project termini at I-85 and I-485 would be freeway-to-freeway interchanges. The other interchanges would be service interchanges, meaning that there would be a traffic signal or stop sign where the ramps would connect to the cross-street:

- I-85;
- US 29-74;
- Linwood Road;
- Lewis Road (for Detailed Study Alternatives using Corridor Segment H1C – Detailed Study Alternatives 58, 64, 65, and 68);
- US 321;
- Robinson Road;
- Bud Wilson Road;

- Union Road (NC 274);
- South New Hope Road (NC 279);
- Southpoint Road (NC 273);
- Dixie River Road; and
- I-485.

Table 1.2 Corridor Segments Comprising Each Detailed Study Alternative

Detailed Study Alternative No.*	West Area - generally west of US 321	Central Area – Generally east of US 321 and west of NC 279 or the South Fork Catawba River	East Area – generally east of NC 279 or the South Fork Catawba River
	H Segments	J Segments	K Segments
4	H2A-H3	J4a-J4b-J2c-J2d-J5a-J5b	K2A-KX1-K3B-K3C
5	H2A-H3	J4a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K4A
6	H2A-H3	J4a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K1D
9	H2A-H3	J4a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K3A-K3B-K3C
22	H2A-H2B-H2C	J3-J2c-J2d-J5a-J5b	K2A-KX1-K3B-K3C
23	H2A-H2B-H2C	J3-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K4A
24	H2A-H2B-H2C	J3-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K1D
27	H2A-H2B-H2C	J3-J2c-J2d-JX4-J1e-J1f	K1A-K3A-K3B-K3C
58	H1A-H1B-H1C	J1a-JX1-J2d-J5a-J5b	K2A-KX1-K3B-K3C
64	H1A-H1B-H1C	J1a-J1b-J1c-J1d-J1e-J1f	K1A-K1B-K1C-K4A
65	H1A-H1B-H1C	J1a-J1b-J1c-J1d-J1e-J1f	K1A-K1B-K1C-K1D
68	H1A-H1B-H1C	J1a-J1b-J1c-J1d-J1e-J1f	K1A-K3A-K3B-K3C
76	H1A-HX2	J2a-J2b-J2c-J2d-J5a-J5b	K2A-KX1-K3B-K3C
77	H1A-HX2	J2a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K4A
78	H1A-HX2	J2a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K1D
81	H1A-HX2	J2a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K3A-K3B-K3C

*See Figure 1.3 for a map of the Detailed Study Alternatives and their corridor segments.

The project is in the financially constrained portion of the Gaston MPO Long-Range Transportation Plan. Its toll or non-toll status of the proposed project has not been finalized. The Gaston MPO currently lists the proposed project as a non-tolled facility but intends to amend its plan to show this project with tolls.

Findings

The summations of findings for this ICE report are provided on a county, District and Interchange level in Tables 1.3 through 1.8. Findings on a Detailed Study Alternative level are provided in Table 1.7. The findings provided in this report evaluate the indirect and cumulative effects of the Detailed Study Alternatives for the project in compliance with the National Environmental Policy Act (NEPA).

The sections in this report that follow will expand on these findings, and will describe the guidance and methodologies used throughout this ICE assessment.

Table 1.3 Summary of Potential Indirect and Cumulative Effects by County

County in ICE Study Area	Potential for improved mobility, access and connectivity	Potential for cumulative effects related to land use change	Potential for accelerated growth as a result of the project	Detailed Study Alternatives which contribute to overall indirect and cumulative effects
Gaston, NC	High	Moderate	High	All
Mecklenburg, NC	High	Moderate	Moderate	All
Cleveland, NC	Low	Low	Low	None
York, SC	Low-Moderate	Low	Moderate	All

The kinds of development that would produce non-point sources vary to some degree in each of the four counties considered, with the predominant land use type being scattered residential subdivision development already occurring and expected to continue to occur in many parts of the ICE Study Area. Isolated interchanges would support a higher potential for new or accelerated growth in commercial uses. A large quantity of undeveloped land in Cleveland and York Counties could receive large quantities of new residential development, but the potential is curtailed based on the distance from the proposed Gaston East-West Connector, slower economic development in Cleveland County, and capacity barriers imposed by public water/sewer and school infrastructure. The additional, 9,000-foot runway at Charlotte-Douglas International Airport will increase that facility's passenger and freight capacities, as will an increase in rail shipping capacity at this location and in the eastern section of the ICE Study Area. Scattered residential development in northern Mecklenburg and throughout southeastern and south-central Gaston County will be the predominant form of development. The cumulative impact will depend in part on local planning and policy guidelines, such as the Phase II water quality standards that are being considered in Gaston

County. Interchanges with the Gaston East-West Connector are physically within both Gaston and Mecklenburg Counties; notable for development potential during the analysis was the interchange of US 321 and NC 274 (both in Gaston County). Additionally, cumulative development from increased residential and tailing retail-oriented development are expected to continue in the attractive areas around the Catawba River (for example, in the River Bend and South Point Townships). Many of these homes are large, single-family detached units on one acre or more of land without public water/sewer connections.

Table 1.4 Potential ICE's in York County

Indirect Effects

The rate of development in York County is not anticipated to change due to the construction of the proposed Gaston East-West Connector. There would be no discernible difference in development rates between the construction of any one of the Detailed Study Alternatives and the No-Build Alternative.

In terms of measurable accessibility (2007 Metrolina Regional Travel Demand Model), the project would influence regional travel times in some areas in double-digit minutes saved.

On a more local level, interchanges of the proposed Detailed Study Alternatives are too distant to have much influence in York County.

The No-Build Alternative would not offer any travel time saving or improve accessibility for those traveling from or to portions of York County included in the ICE Study Area.

Cumulative Effects

In the absence of local stormwater ordinances and BMPs in York County and upstream locations including Gaston and Mecklenburg Counties, effects to water quality in York are anticipated to be greater with the construction of any one of the proposed Detailed Study Alternatives than with the No-Build Alternative. The longevity of indirect impacts that contribute cumulatively to water quality degradation in York County when considered with other actions is dependent on the magnitude and duration of upstream hydrologic events including sediment inputs (in absence of local stormwater ordinances and BMPs), flooding, land use change (including changes in land use regulations) and, ultimately, watershed stability. There has been water quality degradation in the portions of York County that have been included in

the ICE Study Area as evidenced by the amount of 303(d)-listed water resources that have the potential to be affected by this proposed project.

Water resources having the potential to be cumulatively affected by non-point source pollution occurring upstream of and within York County include the Catawba River, Lake Wylie and Crowders Creek, all of which are Section 303(d)-listed streams.

Detailed Study Alternatives numbered 58; 64; 65; 68; 76; 77; 78; and 81 would have comparable levels of indirect effects and cumulative effects to water quality and aquatic habitat as a result of induced development. These potential effects would be greater than those associated with the No-Build Alternative, but less than potential effects associated with Detailed Study Alternative numbers 4; 5; 6; 9; 22; 23; 24 and 27(see Figure 1.3).

The proximity of segments H2A, H3 and H2B to portions of Crowders Creek upstream of York County (generally west of US 321) would be expected to have the greatest amount of stormwater runoff effects in the absence of Best Management Practices for Detailed Study Alternatives numbered 4; 5; 6; 9; 22; 23; 24 and 27.

Detailed Study Alternatives with segment K4A in the eastern portion of Gaston County, (generally east of NC 279 or the South Fork Catawba River) upstream of York County, have a greater potential to indirectly affect National Wetland Inventory (NWI) areas. These Detailed Study Alternative numbers are 5; 23; 64; and 77. Detailed Study Alternatives numbered 4; 6; 9; 22; 24; 27; 58; 65; 68; 76; 78; and 81 would have comparable level of indirect effects and cumulative effects to NWI wetlands.

No direct or indirect effects to water resources are expected under the No-Action Alternative.

Table 1.5 Potential ICE's in Cleveland County

Indirect Effects

Rates of development in Cleveland County are not anticipated to change in correlation to the construction of the proposed Gaston East-West Connector. There are no distinguishable differences in development rates anticipated between the construction of any one of the proposed Detailed Study Alternatives and the No-Build Alternative.

Implementation of any one of the Detailed Study Alternatives would improve accessibility to the Charlotte Region, especially in the easternmost portion of the County.

The No-Build Alternative would not offer any accessibility benefits for Cleveland County.

Interchanges of the proposed Detailed Study Alternatives are too distant to have much influence in District 1, yet offer more in regards to accessibility and travel time savings than the No-Build Alternative. The level of traffic modeling conducted under the scope of this qualitative ICE assessment did not indicate any conspicuous differences between the proposed Detailed Study Alternatives, yet it is reasonable to assume due to proximity of the proposed interchange that Detailed Study Alternatives numbered 58; 64; 65; and 68 (shown in Figure 1.3) have the potential to influence accessibility and travel time savings, followed by Detailed Study Alternative numbers 76; 77; 78 and 81. Detailed Study Alternatives numbered 4; 5; 6; 9; 22; 23; 24; and 27 would have the least effects on accessibility and travel times.

The No-Build Alternative would not offer any travel time saving for those traveling from or to portions of Cleveland County included in the ICE Study Area.

Cumulative Effects

Based on information obtained during the interviews in adjacent communities in Gaston County; low growth rates and potential for new growth associated with the proposed project; and small changes in accessibility that would accrue to the proposed Gaston East-West Connector, there were no cumulative effects associated with the proposed Gaston East-West Connector identified in Cleveland County.

Table 1.6 Potential ICE's in Mecklenburg County

Indirect Effects

Development related to the proposed Gaston East-West Connector is expected to be only minimally greater than what would occur with the No-Build Alternative. The proposed roadway could potentially accelerate non-residential construction plans, most particularly in the area of the Charlotte-Douglas International Airport. As District 6 continues to develop there will be more of a burden placed on local school systems and Emergency Management Services. There were no apparent differences identified between the 16 various Detailed Study Alternatives.

The proposed Gaston East-West Connector would provide improved accessibility to Gaston, York and Cleveland Counties especially in the western portion of the County.

The No-Build Alternative would not offer any accessibility benefits for Cleveland County.

The additional access provided by the Detailed Study Alternatives in Districts 5 and 6 (see Figure 3.2) would serve increasing levels of non-residential development around the proposed interchange as well as the high-end housing that is starting to appear around the waterfront areas in Mecklenburg County. There is no distinction of effects between the various Detailed Study Alternative interchange options.

Cumulative Effects

In the absence of local stormwater ordinances and BMPs, water quality effects are likely to occur. Water resources having the potential to be cumulatively affected by non-point source pollution includes the Catawba River, Beaverdam Creek, Legion Lake, Irwin Creek, Little Sugar Creek, McAlpine Creek and Dallas Branch. There is no discernible difference in the potential for water quality effects between the Detailed Study Alternatives.

Detailed Study Alternatives with segment K4A in the eastern portion of Gaston County, (generally east of NC 279 or the South Fork Catawba River) upstream of York County, have a greater potential to indirectly affect National Wetland Inventory (NWI) areas. These Detailed Study Alternative numbers are 5; 23; 64; and 77. Detailed Study Alternatives numbered 4; 6; 9; 22; 24; 27; 58; 65; 68; 76; 78; and 81 would have comparable level of indirect effects and cumulative effects to NWI wetlands.

No direct or indirect effects to water resources are anticipated with the No-Action Alternative.

Increased traffic volumes in the southern portions of Mecklenburg County would be expected to generally increase ambient noise levels to a greater degree than the No-Build Alternative within the ICE Study Area. There would be no discernible differences in ambient noise levels between the Detailed Study Alternatives.

The assessment of the indirect effects on identified cultural resources focuses on the presence of National Register listed or eligible sites in the county where induced growth and other land use change is anticipated to occur. Construction of any one of the proposed Detailed Study Alternatives has the potential to affect cultural resource sites to a greater degree than the No-Build Alternative. There is no appreciable difference between the Detailed Study Alternatives in regards to the effects to cultural resources because the noted cultural resource sites are in the vicinity of the proposed interchange of the Gaston East-West Connector with I-485.

Table 1.7 Potential ICE's in Gaston County

Indirect Effects

All Detailed Study Alternatives provide equal access across the Catawba River. The construction of the Gaston East-West Connector would provide another access route across the Catawba River into the southeast portion of Gaston County, potentially facilitating faster growth and different kinds of development in the southeast and southern portions of the County. The proposed project would also provide better access to the west and northwest portion of the County, potentially changing the existing growth pattern in Bessemer City that is primarily residential and commercial to more light industry growth. As the County continues to grow there will be more of a burden placed on local school systems and Emergency Management Services.

The No-Build Alternative would not offer any accessibility benefits for Gaston County.

Habitat fragmentation within the ICE Study Area is anticipated to continue correspondingly with land use change. The proposed project and its associated development are anticipated to affect terrestrial communities to a greater degree than what would be expected to occur with the No-Build Alternative.

Detailed Study Alternatives with segments H1C, J1C, K1A and K4A have a greater potential to indirectly affect upland species due to fragmentation in that these segments are located the farthest distance away from previously fragmented forestland. The Detailed Study Alternatives including these segments and having the greatest potential for habitat fragmentation are: 5; 6; 23; 24; 27; 58; 64; 65; 68; 77; 78; and 81 (shown in Figure 1.3). Detailed Study Alternatives numbered 4; 9; 22; and 76; would have comparable level of indirect effects due to habitat fragmentation.

The proposed project and its associated development will affect habitat of the Schweinitz's sunflower (*Helianthus schweinitzii*), a federally endangered species, to a greater degree than what would occur with the No-Build Alternative. Detailed Study Alternatives with segment K2A have a greater potential to indirectly modify existing habitat for the Schweinitz's sunflower through land use change and /or may create new habitat along side of the proposed roadway or other roadways associated with anticipated growth and development. Detailed Study Alternatives including segment K2A are 4, 22, 58, and 76.

The potential exists for the smooth coneflower (*Echinacea laevigata*), a federally endangered species, to be affected to a greater degree by the Detailed Study Alternatives than the No-Build Alternative due to the cumulative effects of habitat fragmentation and land use change. Potential habitat for this species occurs throughout the ICE Study Area.

The potential exists for the bog turtle (*Clemmys muhlenbergii*) a federally threatened species, to be affected to a greater degree by the Detailed Study Alternatives than the No-Build Alternative due to the cumulative effects of habitat fragmentation and land use change.

The potential exists for Michaux's sumac (*Rhus michauxii*) a federally endangered species, to be affected to a greater degree by the Detailed Study Alternatives than the No-Build Alternative due to the cumulative effects of habitat fragmentation and land use change. Potential habitat for this species occurs throughout the ICE Study Area.

Significant Natural Heritage Areas in Gaston County that are threatened by existing and future development pressures associated with the proposed Detailed Study Alternatives include Crowders Mountain State Park, Stagecoach Road Granitic Outcrop and Penegar. Detailed Study Alternatives numbered 58; 64; 65 and 68 have the greatest potential to indirectly affect SNHAs due to their close proximity of these sites.

The No-Build Alternative is not anticipated to have indirect or cumulative effects on Natural Heritage Sites.

The assessment of the indirect effects on identified cultural resources focuses on the presence of National Register listed or eligible sites in the County where induced growth and other land use change is anticipated to occur. Construction of any one of the proposed Detailed Study Alternatives has the potential to affect cultural resource sites to a greater degree than the No-Build Alternative. Detailed Study Alternatives numbered 58; 64; 65; and 68 have the highest potential to indirectly affect sites that are listed on the National Register or eligible to be listed due to the close proximity of segments in these Detailed Study Alternatives to cultural resource sites. These sites are located in areas having the potential to experience future growth associated with the proposed project and other likely foreseeable actions. The remaining Detailed Study Alternatives numbered: 4; 5; 6; 9; 22; 23; 24; 27; 76; 77; 78; and 81 have the potential to indirectly affect cultural resources, but at a lower

rate and magnitude than those listed above.

Construction of any one of the proposed Detailed Study Alternatives in District 2 would provide improved access between Bessemer City and the Charlotte Urban Area which is supportive of the City's desire to attract commercial/industrial growth to the area. Construction of any one of the Detailed Study Alternatives is likely to increase the rate of development in the County, especially in the southern and southeastern portions when compared to the No-Build Alternative. There would be no distinguishable difference in development rates between any one of the Detailed Study Alternatives.

City officials have expressed noted concerns with any Detailed Study Alternative that would remove interchange access to Edgewood Road, which currently serves as a gateway to the City and used by local residents. Growth patterns in District 2 in the absence of the proposed Gaston East-West Connector (No-Build Alternative) would likely follow existing patterns and consist of mixed residential and commercial growth, particularly in the Edgewood Road area.

When compared to the No-Build Alternative, the proposed Gaston East-West Connector has much greater potential to increase roadway capacity on US 74 and I-85 in District 3 allowing more growth to occur in this District. Future residential growth patterns in this district in the absence of the proposed project would likely occur adjacent to access roads north and south of I-85. There would be no distinguishable difference in roadway capacity improvements among the Detailed Study Alternatives.

Areas in District 7 & 8 are anticipated to experience continued land use change and residential development without the construction of the proposed Gaston East-West Connector (No-Build Alternative), but not as rapidly as with construction of any one of the Detailed Study Alternatives. There would be no distinguishable difference in development rates between the Detailed Study Alternatives. Construction of any one of the Detailed Study Alternatives would discernibly increase the suitability for infill development and redevelopment that enhances existing industrial uses. Commercial and residential development near Robinson Road and Bud Wilson Road may be slowed due to the level of difficulty in getting public water and sewer services provided in those areas (see Section 12.1.4).

Cumulative Effects

The proposed Gaston East-West Connector would provide greater access to potential developable land in the southern and western portions of the County when compared to the No-Build Alternative. Detailed Study Alternatives numbered 58; 64; 65; and 68 would provide the greatest access to the southern and western portions of Gaston County. Access to potential developable land to the western portion of Gaston only would be improved to an equivalent degree through the construction of any one of the following Detailed Study Alternative numbers: 58; 64; 65; 68; 76; 77; 78; and 81. Access to potential developable land to the southern portion of Gaston only would be improves to an equivalent degree through the construction of any one of the following Detailed Study Alternative numbers: 58; 64; 65; and 68. The remaining proposed Detailed Study Alternatives (4; 5; 6; 9; 22; 23; 24 and 27) would offer the least improvement to potential developable land located in the southern and western portions of Gaston County.

The growth and development related to the proposed Gaston East-West Connector is expected to add cumulatively to existing pressures on Gaston County's infrastructure as the County struggles to keep pace with recent growth and development.

In the absence of local stormwater ordinances and BMPs, effects to water quality are anticipated with the construction of the proposed Gaston East-West Connector. Water resources having the potential to be cumulatively affected by non-point source pollution includes the following 303(d) listed water resources: Catawba River, Abernathy Creek, Catawba Creek, Crowders Creek, McGill Creek, and Blackwood Creek.

Detailed Study Alternative numbers: 58; 64; 65; 68; 76; 77; 78; and 81 would have comparable level of indirect effects and cumulative effects to water quality and aquatic habitat as a result of induced development. The proximity of segments H2A, H3 and H2B to portions of Crowders Creek in the west area (generally west of US 321) of proposed alternatives would be expected to have the greatest amount of stormwater runoff effects in the absence of Best Management Practices for Detailed Study Alternative numbers: 4; 5; 6; 9; 22; 23; 24 and 27.

Detailed Study Alternatives with segment K4A in the eastern portion of Gaston County, (generally east of NC 279 or the South Fork Catawba River) upstream of York County, have a greater potential to indirectly affect National Wetland Inventory (NWI) areas. These Detailed Study Alternative numbers are 5; 23; 64; and 77. Detailed Study Alternative

numbers 4; 6; 9; 22; 24; 27; 58; 65; 68; 76; 78; and 81 would have comparable level of indirect effects and cumulative effects to NWI wetlands.

No direct or indirect effects to water resources are anticipated with the No-Action Alternative.

Anticipated cumulative effects associated with the construction of any one of the proposed Detailed Study Alternatives may include terrestrial community alteration effects relating to land use change, including fragmentation and wildlife habitat loss beyond that which has already occurred in the ICE Study Area and the No-Build Alternative.

Increased traffic volumes in the southern portions of Gaston County would be expected to generally increase ambient noise levels within the CIA Study Area to a greater degree than the No-Build Alternative. There would be no discernible differences in ambient noise levels between the Detailed Study Alternatives.

Future growth in the ICE Study Area in the absence of the proposed project (No-Build Alternative) has the potential to convert important farmlands that are protected through a conservation easement but at a lesser rate and /or magnitude of any one of the Detailed Study Alternatives.

Construction of the proposed project would improve access to developable land in both District 7 and 8, and provide travel time savings for those wanting to reside in Gaston County and commute to the Charlotte Region. The level of traffic modeling conducted under the scope of this qualitative ICE assessment did not indicate any conspicuous differences between the proposed Detailed Study Alternatives, yet it is reasonable to assume that since Detailed Study Alternative numbers 58; 64; 65, and 68 follow a more southeasterly direction than the other Detailed Study Alternatives that the travel time savings would be slightly less than that experienced with the other Detailed Study Alternatives. There is no distinction of effects between the various Detailed Study Alternative interchange options.

Table 1.8 Summary of Potential ICE's at the Detailed Study Alternative Level

Detailed Study Alignment (See Figure 1.3 for Detailed Study Alternative mapping)	Accessibility/Travel Time Savings	Change in Rate of Development	Visual-Aesthetic*	Transportation System*	Prime Farmland	Compatibility with Goals*	Public Policy**	Effect to Neighborhoods*	Ambient Noise	Air Quality	Residential Demand*	Commercial Demand	Wetlands, Sensitive Water Features**	Natural Environment Features**	Significant Natural Heritage Areas	Threatened and Endangered Species and their Designated Habitat	Cultural Resources
 4	5 to 10 minutes	Weak to Moderate	Strong	Very Strong	Weak to Moderate	Strong	Moderate Policy, Occasional Enforcement	Very Strong	Weak to Moderate Increase	None to Very Weak	Strong	Strong	Very Strong	Weak to Moderate	Weak to Moderate	Weak to Moderate	Weak to Moderate
 5	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Weak to Moderate	Strong	Moderate Policy, Occasional Enforcement	Very Strong	Weak to Moderate Increase	None to Very Weak	Very Strong	Strong	Very Strong	Strong	Weak to Moderate	Strong	Weak to Moderate
 6	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Weak to Moderate	Strong	Moderate Policy, Occasional Enforcement	Very Strong	Weak to Moderate Increase	None to Very Weak	Very Strong	Very Strong	Very Strong	Strong	Weak to Moderate	Strong	Weak to Moderate
 9	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Weak to Moderate	Strong	Moderate Policy, Occasional Enforcement	Very Strong	Weak to Moderate Increase	None to Very Weak	Strong	Strong	Very Strong	Weak to Moderate	Weak to Moderate	Strong	Weak to Moderate
 22	5 to 10 minutes	Weak to Moderate	Strong	Very Strong	Weak to Moderate	Strong	Moderate Policy, Occasional Enforcement	Very Strong	Weak to Moderate Increase	None to Very Weak	Strong	Strong	Very Strong	Weak to Moderate	Weak to Moderate	Weak to Moderate	Weak to Moderate
 23	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Weak to Moderate	Strong	Moderate Policy, Occasional Enforcement	Strong	Weak to Moderate Increase	None to Very Weak	Very Strong	Very Strong	Very Strong	Strong	Weak to Moderate	Strong	Weak to Moderate
 24	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Weak to Moderate	Strong	Moderate Policy, Occasional Enforcement	Strong	Weak to Moderate Increase	None to Very Weak	Very Strong	Strong	Very Strong	Strong	Weak to Moderate	Strong	Weak to Moderate
 27	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Weak to Moderate	Strong	Moderate Policy, Occasional Enforcement	Very Strong	Weak to Moderate Increase	None to Very Weak	Strong	Strong	Very Strong	Strong	Weak to Moderate	Strong	Weak to Moderate
 58	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Strong	Strong	Moderate Policy, Occasional Enforcement	Very Strong	Weak to Moderate Increase	None to Very Weak	Very Strong	Strong	Strong	Strong	Strong	Weak to Moderate	Strong
 64	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Very Strong	Strong	Moderate Policy, Occasional Enforcement	Weak to Moderate	Weak to Moderate Increase	None to Very Weak	Very Strong	Very Strong	Strong	Strong	Strong	Strong	Strong

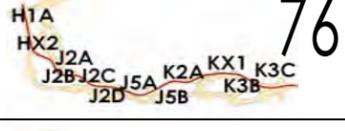
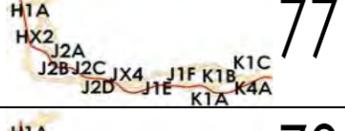
Detailed Study Alignment (See Figure 1.3 for Detailed Study Alternative mapping)	Accessibility/Travel Time Savings	Change in Rate of Development	Visual-Aesthetic*	Transportation System*	Prime Farmland	Compatibility with Goals*	Public Policy**	Effect to Neighborhoods*	Ambient Noise	Air Quality	Residential Demand*	Commercial Demand	Wetlands, Sensitive Water Features**	Natural Environment Features**	Significant Natural Heritage Areas	Threatened and Endangered Species and their Designated Habitat	Cultural Resources
 <p>65</p>	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Very Strong	Strong	Moderate Policy, Occasional Enforcement	Weak to Moderate	Weak to Moderate Increase	None to Very Weak	Very Strong	Strong	Strong	Strong	Strong	Strong	Strong
 <p>68</p>	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Very Strong	Strong	Moderate Policy, Occasional Enforcement	Strong	Weak to Moderate Increase	None to Very Weak	Very Strong	Strong	Strong	Strong	Strong	Strong	Strong
 <p>76</p>	5 to 10 minutes	Weak to Moderate	Strong	Very Strong	Strong	Strong	Moderate Policy, Occasional Enforcement	Very Strong	Weak to Moderate Increase	None to Very Weak	Strong	Strong	Weak to Moderate	Weak to Moderate	Weak to Moderate	Weak to Moderate	Weak to Moderate
 <p>77</p>	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Strong	Strong	Moderate Policy, Occasional Enforcement	Weak to Moderate	Weak to Moderate Increase	None to Very Weak	Strong	Very Strong	Strong	Strong	Weak to Moderate	Strong	Weak to Moderate
 <p>78</p>	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Strong	Strong	Moderate Policy, Occasional Enforcement	Weak to Moderate	Weak to Moderate Increase	None to Very Weak	Very Strong	Strong	Strong	Strong	Weak to Moderate	Strong	Weak to Moderate
 <p>81</p>	5 to 10 minutes	Weak to Moderate	Very Strong	Very Strong	Strong	Strong	Moderate Policy, Occasional Enforcement	Strong	Weak to Moderate Increase	None to Very Weak	Strong	Strong	Strong	Strong	Weak to Moderate	Strong	Weak to Moderate
No-Build Alternative <i>(construct other TIP projects but NOT Gaston E-W Connector)</i>	No Change (possibly worse)	No Change (possibly worse)	Weak to Moderate	None to Very Weak	None to Very Weak	Weak to Moderate	Moderate Policy, Occasional Enforcement	None to Very Weak	Weak to Moderate Increase	None to Very Weak	Very Strong	Weak to Moderate	Strong	Weak to Moderate	Weak to Moderate	Weak to Moderate	Weak to Moderate

Table 1.8 (continued, Definitions)

Variable	Description	Measurement			
Accessibility/Travel Time Savings	<i>The potential effects of the proposed Detailed Study Alternatives in estimated travel time change to nearby public facilities and economic hubs when considered with other likely actions that may induce land development. (e.g., schools, recreational facilities, power stations, etc.) The potential effects of the proposed Detailed Study Alternatives in estimated emergency response times when considered with other likely actions that may induce land development.</i>	5 to 10 minutes	2 to 5 minutes	Less than 2 minutes	No Change
Rate of Development	<i>The anticipated rate of residential, commercial and light industrial development related to the proposed project.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Visual-Aesthetic*	<i>The estimated magnitude to which the proposed Detailed Study Alternatives will affect the community's character when considered with other likely actions that are may induce land use change.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Transportation System*	<i>The potential beneficial effect of the proposed Detailed Study Alternatives will have on the existing transportation system within the ICE Study Area, when considered with other probable actions.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Prime Farmland	<i>The potential effects of the proposed Detailed Study Alternatives on the continued production and viability of farming operations.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Land use-Compatibility with Goals*	<i>The estimated, potential degree to which the proposed Detailed Study Alternatives are consistent with the local plans.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Public Policy**	<i>The estimated, potential degree to which governmental entities adjacent to the proposed Detailed Study Alternatives adhere to and enforce their own policies, particularly those related to managing and regulating new development.</i>	No Public Policy, Weak Enforcement	Weak Policy, Weak Enforcement	Moderate Policy, Occasional Enforcement	Strong Public Policy, Strong Enforcement
Project Proximity to Neighborhoods*	<i>Estimated potential effects of the proposed Detailed Study Alternatives on existing neighborhoods, as measured by proximity. Detailed Study Alternatives with "very strong" effects are adjacent or very close to numerous neighborhoods along their route. Detailed Study Alternatives with "weak to moderate" effects are adjacent or very close to a few neighborhoods.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Ambient Noise	<i>Anticipated level of ambient noise increase related to the proposed action, land use change and induced development.</i>	Very Strong Increase	Strong Increase	Weak to Moderate Increase	None to Very Weak Increase
Air Quality	<i>Measures effect to air quality conformity determinations in the ICE Study Area.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Residential Demand*	<i>The potential cumulative effects on residential unit and land conversion demand of the proposed Detailed Study Alternatives when considered with other actions likely to induce land use change.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Commercial Demand	<i>The potential, anticipated cumulative effects on commercial property and land conversion demand of the proposed Detailed Study Alternatives when considered with other actions likely to induce land use change.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Wetlands, Sensitive Water Features**	<i>The potential effect of the Detailed Study Alternatives on wetland areas, impaired waterways, and water supply watersheds.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Natural Environmental Features**	<i>The potential to affect terrestrial species and habitat through habitat fragmentation.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Significant Natural Heritage Areas	<i>The potential to affect Significant Natural Heritage Areas.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Threatened and Endangered Species and their Designated Habitat	<i>The potential effects of the proposed action on species designated as being Threatened or Endangered.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak
Cultural Resources	<i>The potential effects of the proposed action sites that are listed or eligible to be listed on the National Register of Historic Places.</i>	Very Strong	Strong	Weak to Moderate	None to Very Weak

No-Build Alternative

The No-build alternative would not add a high vehicle capacity roadway in the area south of the City of Gastonia and southwestern Mecklenburg County. This alternative would not result in land use change beyond what is already occurring or likely to occur in the southern portions of Gaston County and the southwestern portion of Mecklenburg County in the absence of the proposed Gaston East-West Connector. The No-build alternative is not expected to change current residential development trends, but may constrain residential development in the future as traffic congestion on existing east-west transportation routes, including I-85, worsens, resulting in increased travel time. Commercial and industrial development is expected to continue to be represented by a very small percentage of land use in southern Gaston County and southwestern Mecklenburg County. Gaston County is likely to experience a lower rate of land use change with the No-Build Alternative than any of the proposed Detailed Study Alternatives.

Indirect and cumulative effects on natural resources including: water resources and aquatic habitat degradation; loss of forestland; loss of prime farmland; and loss of wildlife and fragmentation of wildlife habitat will continue in the future in the absence of the proposed project, but not as quickly or to the magnitude of any one of the Detailed Study Alternative alternatives.

Appendix A lists transportation projects that have been included in county and state Long Range Transportation Plans (LRTPs) and county and regional level air quality conformity determination reports (see Figure 1.4). These projects are included in these plans and reports as actions with independent utility, meaning that the projects have been deemed beneficial even if no additional transportation improvements in the areas are made. The same is true for the expansion of the Charlotte-Douglas International Airport.

2.0 INTRODUCTION

Methodology Summary – The purpose of this report is to document a qualitative assessment addressing the potential for Indirect and Cumulative Effects (ICEs) associated with implementing the proposed Gaston East-West Connector. The assessment of ICEs is identified as a requirement under the National Environmental Policy Act (NEPA) of 1969; the North Carolina State Environmental Policy Act (SEPA); and under the Council on Environmental Quality (CEQ) regulations implementing NEPA.

The purpose of the indirect effect and cumulative effect assessment is to ensure that federal actions such as the proposed Gaston East-West Connector consider the full range of potential environmental consequences associated with a proposed action. These consequences include effects and effects in the immediate vicinity of the proposed project, as well as those that may be further removed in time and location. Furthermore, effects from other actions in the past; currently underway; or are deemed likely to occur must also be considered when they have the potential to affect the environment in a cumulative fashion when considered with potential effects from the proposed project.

The North Carolina Turnpike Authority (NCTA) follows the guidance adopted by the North Carolina Department of Transportation (November, 2001) for the purpose of identifying and assessing Indirect and Cumulative Effects of transportation projects as part of the NEPA/SEPA assessment processes. This guidance, as well as that of CEQ and FHWA, was used extensively when examining the magnitude of land use change potential associated with the proposed Gaston East-West Connector alternatives. Other factors considered as part of this assessment include habitat and wildlife fragmentation effects; accessibility changes; forecasted economic growth; and public policy regarding growth and development within the ICE study boundary area.

The qualitative indirect and cumulative effects assessment methodology, process, and findings for the proposed Gaston East-West Connector are documented in this report. The assessment considered sixteen Detailed Study Alternatives (see Table 2.1) and the No-build alternative as defined below. Its findings and conclusions may be used as a reference during the identification of the Preferred Alternative. This report utilizes an approach that qualitatively assesses project-induced Indirect and Cumulative Effects, as well as effect interactions with the natural and human environments.

Table 2.1 Corridor Segments Comprising Each Detailed Study Alternative

Detailed Study Alternative #	West Area - generally west of US 321	Central Area - generally east of US 321 and west of NC 279 or the South Fork Catawba River	East Area - generally east of NC 279 or the South Fork Catawba River
	H Segments	J Segments	K Segments
4	H2A-H3	J4a-J4b-J2c-J2d-J5a-J5b	K2A-KX1-K3B-K3C
5	H2A-H3	J4a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K4A
6	H2A-H3	J4a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K1D
9	H2A-H3	J4a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K3A-K3B-K3C
22	H2A-H2B-H2C	J3-J2c-J2d-J5a-J5b	K2A-KX1-K3B-K3C
23	H2A-H2B-H2C	J3-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K4A
24	H2A-H2B-H2C	J3-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K1D
27	H2A-H2B-H2C	J3-J2c-J2d-JX4-J1e-J1f	K1A-K3A-K3B-K3C
58	H1A-H1B-H1C	J1a-JX1-J2d-J5a-J5b	K2A-KX1-K3B-K3C
64	H1A-H1B-H1C	J1a-J1b-J1c-J1d-J1e-J1f	K1A-K1B-K1C-K4A
65	H1A-H1B-H1C	J1a-J1b-J1c-J1d-J1e-J1f	K1A-K1B-K1C-K1D
68	H1A-H1B-H1C	J1a-J1b-J1c-J1d-J1e-J1f	K1A-K3A-K3B-K3C
76	H1A-HX2	J2a-J2b-J2c-J2d-J5a-J5b	K2A-KX1-K3B-K3C
77	H1A-HX2	J2a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K4A
78	H1A-HX2	J2a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K1D
81	H1A-HX2	J2a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K3A-K3B-K3C

See Figure 1.3 for a map of the Detailed Study Alternatives and their corridor segments.

Interchanges currently are proposed at 11-12 locations along the Detailed Study Alternatives, as listed below from west to east. The interchanges at the project termini at I-85 and I-485 would be freeway to freeway interchanges. The other interchanges would be service interchanges, meaning that there would be a traffic signal or stop sign where the ramps would connect to the cross-street.

- I-85
- US 29-74
- Linwood Road
- Lewis Road (for Detailed Study Alternatives using Corridor Segment H1C – Detailed Study Alternatives 58, 64, 65, and 68)
- US 321
- Robinson Road
- Bud Wilson Road
- Union Road (NC 274)
- South New Hope Road (NC 279)
- Southpoint Road (NC 273)
- Dixie River Road

- I-485

The project is in the financially constrained portion of the Gaston MPO Long-Range Transportation Plan (LRTP, dated May 24, 2005). In the LRTP, the toll or non-toll status of the proposed project was not finalized. The Gaston MPO currently lists the proposed project as a non-tolled facility but intends to amend its plan to show this project with tolls.

3.0 DEFINITIONS AND METHODOLOGY

Methodology Summary – The purpose of this section is to provide a foundation of understanding for key words and general methodologies that are applied throughout this report. The methodology used to describe ICE's in a qualitative fashion for the Gaston East-West Connector project incorporated the initial five of the total eight step process adopted by the North Carolina Department of Transportation. The five-step process references information on land use planning and its integration into the transportation planning process. Our intent in applying the following steps is to utilize land use assessment as a tool to better forecast areas of future growth and potential ICEs to the natural and human environments, including upland species habitat.

Step 1- Identify Study Area boundaries. A temporal boundary spanning from 1989 to 2030 was established based on the length of time the potential ICEs of the proposed project singly or in combination with other past present or anticipated actions or trends could incrementally contribute to substantial changes in land use.

The spatial boundaries developed in consideration of jurisdictional commuting, growth management, watershed / habitat, and public involvement boundaries included an ICE Study Area Boundary.

Step 2- Identify Study Area Directions and Goals. Information gained through planning documents and expert interviews were condensed to describe and identify directions and goals of municipalities and counties within the FLUSA.

Step 3 - Inventory Notable Features. Information gathered through the review of third party sources, municipal GIS data, and expert interviews were utilized to inventory notable features.

Step 4- Identify Effect-Causing Activities. A spatial grid analysis method was utilized allowing for the identification of potential ICEs based on weighed results.

Step 5 - Analyze Indirect and Cumulative Effects. Identified ICEs were analyzed in regards to their potential to affect land use or resources using a sliding scale of measurement ranging from very strong to weak.

3.1 Definitions

The following is a listing of definitions as accepted by the North Carolina Department of Transportation (NCDOT) in their guidance entitled, "Assessing Indirect and Cumulative Effects of Transportation Projects in North Carolina" (NCDOT ICI Guidance, 2001), which follow the Council on Environmental Quality (CEQ) definitions as well as the Code of Federal Regulations (40 CFR 1500 to 1508) and court decisions.

Accessibility. Accessibility is the ease of movement between two places, often measured in terms of the time of travel required between the two places in congested conditions. Often, accessibility is measured with and without the proposed project to help ascertain which portions of the study area may be affected by changes to land accessibility.

Cumulative Effect. Cumulative effects are “environmental effects resulting from the incremental effects of an activity when added to other past, present and reasonably foreseeable future activities regardless of what entities undertake such actions. Cumulative effects can result from individually minor but collectively significant activities taking place over time and over a broad geographic scale, and can include both direct and indirect effects.” (see 40 CFR 1400 to 1508). Like indirect effects, cumulative effects can be further differentiated into categories as defined by the Council on Environmental Quality: repetitive effects caused by the project; project effects that interact with a sensitive receptor to create a non-linear effect; effects arising from multiple sources that produce additive effects; effects arising from multiple sources that combine to form a non-linear effect.

Direct Effect. Direct effects are caused by the proposed action and generally occur at the same time and place as the project.

Indirect Effect. Indirect effects “. . . are caused by the action and are later in time and farther removed in distance, but must be 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 and water and other natural systems, including ecosystems” (CEQ 1986, 40 CFR 1500 to 1508)). The terms effect and effects are used synonymously in the CEQ regulations (see 40 CFR 1500 to 1508). It is important to emphasize that indirect effects considered during NEPA must be reasonably foreseeable; not every conceivable scenario should be evaluated. Indirect effects may occur in three forms: alteration of the environment relating to land use change; and development related to the accessibility changes from a proposed transportation project; and effects relating to land use change that may occur with or without the action or project. The focus of this assessment is on the latter two of the three indirect effect forms.

Significance. The term “significance” refers to the degree to which the proposed action affects public health or safety; the unique geographical characteristics of the surrounding area; the potential for controversy; the

possibility of unknown risks; and the potential effect on endangered species. Both context (the setting of the project over time and space) and intensity (severity of effect) are incorporated into the practical definition of significance, and the interpretation of context and severity may be viewed differently by different stakeholders.

3.2 Methodology

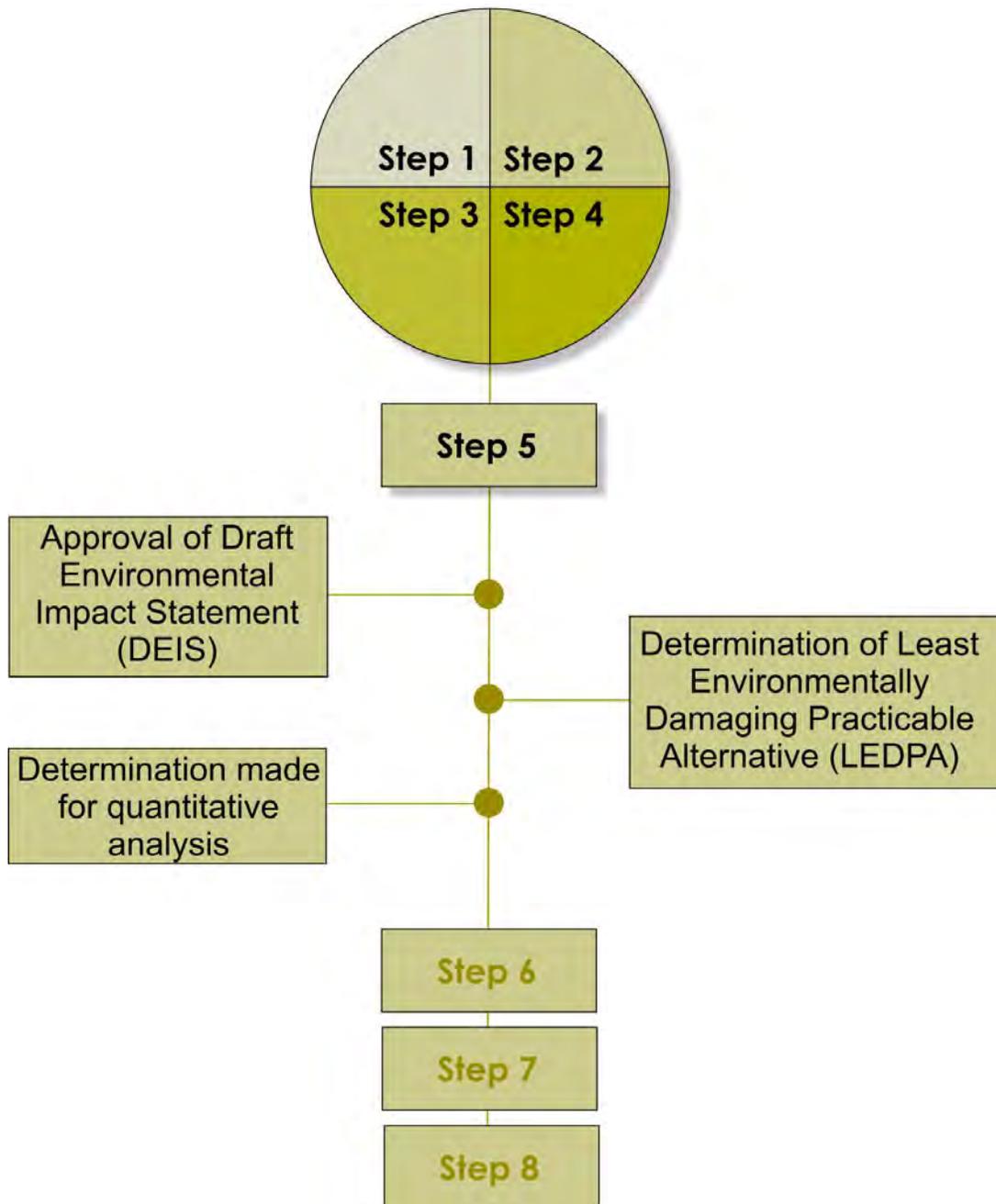
The general approach to defining Indirect and Cumulative Effects (ICEs) is defined by the *NCDOT ICI Guidance* (2001), the Council on Environmental Quality (esp. *Considering Cumulative Effects Under NEPA*, 1997), National Cooperative Highway Research Program Reports 403 and 466 (2001 and 2002, respectively), State/Federal regulations, and past case law.

At the core, indirect effect and cumulative effect assessments are primarily about gathering data on potentially sensitive natural and community resources; assessing the reasonably foreseeable effects of a proposed project and other actions in the same geographic area; and evaluating the interaction among the proposed project, other actions, and the resources.

This Indirect and Cumulative Effects (ICEs) assessment evaluates the potential land use changes and environmental effects associated with the proposed Gaston East-West Connector. The general qualitative approach taken to evaluate ICEs associated with the proposed project follows the eight-step process adopted by North Carolina Department of Transportation in 2001.

The following summarizes the particular technical approaches to describing in a qualitative fashion the Indirect and Cumulative Effects for the Gaston East-West Connector project. The order of the items presented is sequenced according to the eight-step guidance adopted by the North Carolina Department of Transportation in 2001. This report includes a qualitative ICE assessment, in accordance with Steps 1-5 of the methodology recommended in the NCDOT's guidance.

Figure 3.1. NCDOT 8-Step ICE Assessment Process



Steps 1-5 (Qualitative Assessment-Indirect Impact Identification)

Steps 1-5 (see Figure 3.1) of the ICE assessment process as described below provide a qualitative approach for assessing ICEs for all Detailed Study Alternatives that were under active consideration at the time of this assessment.

Step 1. Define Study Area Boundaries. Using an overlay technique based on spatial boundaries and mapping in combination with interview information from local experts, the analyst considered the following to determine the ICE Study Area:

- neighborhoods;
- political boundaries;
- community resources;
- public infrastructure;
- travel demand modeling;
- state and local stormwater management ordinances;
- watersheds;
- wetland areas;
- areas of known contamination;
- 100-year floodplain areas;
- threatened and Endangered Species and their critical habitat;
- land use; topography;
- soils;
- prime and unique agriculture lands;
- public lands and scenic;
- recreational and state natural areas;
- air quality;
- significant Natural Heritage Sites;
- wildlife and natural vegetation; and
- forested resources.

The ICE Study Area encompasses geographic areas having the potential for transportation impact causing activities.

Description of Study Areas

ICE Study Area. The ICE Study Area includes most of Gaston and parts of Cleveland, Mecklenburg, and York (S.C.) Counties (refer to Figures 1.2 & 3.2). The purpose of the ICE Study Area was to provide a basic level of geography that would encompass any foreseeable, potential indirect effects stemming from the proposed Gaston East-West Connector project. The ICE Study Area served as the basis for collecting data that was used

later to refine the qualitative impact assessment study areas and impact assessments. The potential transportation impact causing activities would fall within a portion of the ICE Study Area and is more sharply described at the District and Interchange Areas levels.

Districts. The ICE Study Area was broken into 10 unique districts in order to facilitate discussions with local experts during interviews, as well as to provide a level of geography that would better describe potential indirect and cumulative effects that were more localized in nature. The District boundaries followed major roadway features as well as political boundaries to facilitate policy differentiations among the various units of government that were examined. The District boundaries facilitated discussions with the local expert interviewees as well as the reporting of results.

Interchange Areas. The third and smallest study area type was used to assess the unique changes that would potentially be produced by increasing accessibility in the immediate vicinity of proposed interchanges with the Gaston East-West Connector project. The size and shape of the Interchange Area boundaries was determined by considering the level of increased accessibility afforded by existing streets that would interchange with the proposed Gaston East-West Connector. Hence, if a proposed interchange was to be located in an area with a good level of street connectivity, the influence of the accessibility that the new interchange would afford increased or "stretched" the shape of the Interchange Area boundary. By considering the places where future interchanges might be located, the potential for indirect and cumulative effects that the higher level of immediate access to the proposed Gaston East-West Connector will afford these areas could be discussed more readily with local expert interview participants and in the reporting stage.

In addition to these three basic types of study areas, the final report also consolidates some of the results into discussions at the county level of geography as well as for the Detailed Study Alternative corridors.

A temporal boundary spanning from 1989 to 2030 was established for the ICE analysis. This temporal boundary is intended to encompass other past, present, and reasonably foreseeable future actions that could incrementally contribute to substantial changes in land use, in combination with proposed project.

Step 2. Identify Study Area Direction and Goals. The investment climate, existing planning documents, and historical growth trends were considered to characterize the trends and policies of areas within the ICE Study Area as well as the potential for these areas to receive new growth and development.

Step 3. Inventory Notable Features. A variety of third-party data resources assessed through spatial grid modeling and information gathered during interviews with resource agency representatives and local experts was used to gather information on notable features considered in this report.

Step 4. Identify Effect-Causing Activities. A geographic information system (GIS) spatial grid analysis was developed utilizing data collected from third party sources and interviews with local experts and assembled at the correct geographic scale. The weighted data was attributed to the appropriate grid cell to represent the degree or magnitude of transportation effect causing activity.

Step 5. Identify Potential Indirect and Cumulative Effects for Further Analysis. Documenting the ICEs involved interpreting the GIS spatial grid analysis with qualitative assessments of the policy directions and goals and interviewee comments. Identified ICEs were analyzed in regards to their potential to affect land use or resources using a sliding scale of measurement ranging from very strong to weak.

The completion of steps 1-5 are the principal focus of this report, although some work has been completed that would serve the purpose of Step 6. Additional documentation on consequences and mitigation opportunities, as well as quantitative assessments, is not the subject of this report. Steps 1-5 are more in keeping with the scoped qualitative approach that not only supports a Preferred Alternative, but sets up areas to focus on should a quantitative assessment of effect on resources (Steps 7 and 8) be deemed necessary by the N.C. Turnpike Authority, and the Federal Highway Administration (FHWA), in cooperation with other agencies.

The methods used to create this report relied heavily on local expert interviews; third-party data typically expressed as geographic information system (GIS) "layers;" and analyses of local plans and policies that relate directly to the proposed project or to growth and development activities that may influence or add to the Indirect and Cumulative Effects. A list of local plan reviewed during this ICE assessment can be found in Appendix B. Table 3.1 identifies the assessment steps, methods, and data resources.

As part of the ICE scoping process for this report, representative from the Federal Highway Administration; NCDOT, North Carolina Turnpike Authority

and their representatives met with representatives from US Fish and Wildlife Service (US FWS) and NC Wildlife Resources Commission (NCWRC) representatives on June 29, 2007. The purpose of the meeting was to collaboratively identify the sensitive resources, define the study methodologies, study area boundaries and confirm the timeframe for the assessment. The scoping meetings included individuals believed to be the most knowledgeable on these subjects.

Minutes from these meetings can be found in Appendix F. The NCWRC representative expressed concerns including potential indirect effects to upland species including habitat fragmentation. Based on this input it was determined that the ICE assessment should include a section devoted to addressing potential effects on wildlife habitat including fragmentation.

A similar meeting was held with North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality (DWQ) on July 26, 2007. DWQ agreed with the proposed multi-county qualitative approach of assessing potential ICEs associated with the proposed project and boundaries based on local watersheds.

Defining the ICE Study Area, District Boundaries and Temporal Boundaries (STEP 1)

ICE Study Area boundaries were defined using an initial boundary of county governments, specifically Gaston, York (South Carolina), Cleveland and Mecklenburg. The study area boundary that describes the extent of changes anticipated to occur as a result of a proposed project is called the ICE Study Area boundary. The Detailed Study Alternative boundary was further refined by considering demographic boundaries derived from US Census; major streets; watersheds; environmental features; commuting patterns derived from US 2000 Census Journey-to-Work and travel demand model data sets; comments from local expert interviews; and political boundaries for local governments such as Clover, SC and Kings Mountain.

The selection of some ICE Study Area boundary considerations are performed in light of the anticipated extent of the effects of the proposed project, as represented (for example) by the commuting patterns with and without the proposed project in place. For many projects, this "commuteshed" must be assumed through reasonable estimations or Census Journey-to-Work data; for the Gaston East-West Connector project, information on commuting patterns was refined by using the regional travel demand model. Average commute times and estimated maximum reasonable commute times based on vehicle commutes were used to observe travel distances around the proposed project.

Changes in land use may have immediate effects on a watershed or habitat that give rise to broader ecosystem, water quality, or water quality issues.⁴ To anticipate the full range of effects, it is appropriate to size the ICE Study Area to match the extent of potentially affected watersheds or habitat features.⁵ ICE Study Area boundary considerations for this report include the watersheds in which the proposed project are located, and the habitat requirements of both commonly found species and those designated as significant by Federal or state agencies.

Table 3.1 Description of Study Methods and Primary Data Resources

1. Study Area Boundaries	ICE Study Area boundary comprised Gaston and counties adjacent to the west, south, and east, and based on commuteshed review. Minor study areas around interchanges were created based on accessibility from cross-streets and prior development patterns observed around existing interchanges.	<ul style="list-style-type: none"> ■ Mecklenburg-Union Regional Travel Demand Model ■ U.S. Census (esp. Journey-to-Work) ■ Aerial photography ■ Interviews with local planning professionals ■ Meetings with environmental resource agencies (i.e. NC DENR, NC WRC, US FWS)
2. Study Area Direction and Goals	A review of relevant plans and policies, as well as interviews with professional staff in the areas of planning, engineering, real estate development, and environmental advocacy to create development management profiles for major units of government.	<ul style="list-style-type: none"> ■ Various local planning documents ■ Interviews with local area experts
3. Notable Features	Interviews with local area experts and third-party geographic databases were used to create a composite resource inventory and mapping.	<ul style="list-style-type: none"> ■ Numerous third-party databases (e.g., NWI, NHI, NCDOT) ■ Interviews with local area experts ■ Natural Resources Technical Report, TIP No. U-3321, (NCTA, August 2007)
4. Effect-Causing Activities	Interviews with local area experts; review of proposed project; examination of commuteshed alterations were used to create a composite map of potential effect areas.	<ul style="list-style-type: none"> ■ Interviews with local area experts ■ Mecklenburg-Union Regional Travel Demand Model
5. Identify ICEs for Further Analysis	Review of Steps 1-4 with the North Carolina Turnpike Authority and GEC staff.	<ul style="list-style-type: none"> ■ Assessment results from previous steps ■ Discussions with NCTA

ICE Study Area boundaries may be defined in those places that anticipate a higher level of direct access from the proposed transportation facility; in this case, interchanges with surface streets. Interchange study areas are not simple radii around the interchange, but instead are “deformed” in the direction of reduced travel times along the cross-streets. Even in locations

that possess freeway-to-freeway interchanges, travel times may still be reduced and accessibility increased on nearby cross-streets.

The ICE Study Area boundary for this project was separated into ten distinct districts for the purposes of managing data more efficiently and to facilitate focused discussions with individuals that were interviewed regarding the potential effects of this proposed project. Due to the size of ICE Study Area it was commonly found that interviewees had specific knowledge that they could offer about one or a few of the districts, but were only able to speak in more general terms about the ICE area as a whole. Districts were beneficial in determining and weighing their information for the purposes of this ICE assessment.

The boundaries of Districts were determined based on the location of major roads, geographical boundaries and watershed boundaries.

Interchange areas in the ICE Study Area were defined within the ICE Study Area as areas with the potential for unique land use change associated with improved accessibility due to proposed interchanges.

Policy Directions and Goals (Step 2)

The authors reviewed numerous policy and planning documents in the course of developing a qualitative profile of the policy context and goals for the varying communities that may be affected by the proposed Gaston East-West Connector project. Appendix B presents each of the items reviewed as a part of this study.

Often, the varying nature of political and economic climates forces new policy directions in a particular area or governing jurisdiction. One of the principal effects of such a shift is the level of adherence that a local planning or governing body displays towards existing comprehensive plans, guidance, or policies. To assess this level of adherence, a study was undertaken of recent rezonings and variances of Gaston County, its municipalities and Mecklenburg County (this was supplemented by a question in the local expert interviews that asked how likely the local government was to accommodate new development by allowing variances of existing policies).

Information on Notable Features (Step 3)

A variety of third-party data resources was used to gather information on notable features considered in this report (see Table 3.2). Notable features are defined simply as the combination of natural and man-made elements

of the environment that possess important preservation aspects. Conversations with local experts also enhanced information about these resources.

Table 3.2 Notable Features

Resource	Resource
Land Cover (relating to wildlife habitat)	Land Use
Wildlife Corridors	Infrastructure: Roads, Utilities, Railroads, Power Plants
Bogs/NWI identified wetlands	Minority and Low Income Populations
Floodplains	Cultural Resources
Watershed and Water Resources	Prime and Unique Farmland
Impaired Waterways	Nonattainment or Maintenance Areas
Water Resource Buffers	Designated Growth Areas
Water Quality/Erosion & Sedimentation	Airports
Significant Natural Heritage Areas	Community Facilities: Schools, Hospitals, Churches, Cemeteries
Natural Heritage Element Occurrences	Historic Sites and Districts
Threatened and Endangered Species	Parks/Recreational Areas and Tourism Attractions
Open Spaces	

Identify Effect-Causing Activities (Steps 4 & 5)

In order to manage and assess the large quantity of data obtained for the ICE study, a geographic information system (GIS) approach was utilized in the following manner:

1. Data was collected and assembled at the correct geographic scale and projection;
2. A grid of cells representing one square mile was prepared and overlaid on the base mapping from Step (1).
3. The data from Step (1) was attributed to the appropriate grid cell created in Step (2).

This approach resembles in many respects the Land Use and Suitability Analysis (LUSA) documented, for example, by Collins, et. al.⁶ While the earliest applications of the overlay technique that is the foundation of LUSA date back at least to 1902 (Olmstead and Eliot) and later to Ian McHarg (1960's and 1970's), more modern advances in the manipulation of digital spatial data have made the technique viable for larger and more complex study areas.

In general, three primary maps were created and analyzed for this project: one for notable features of the built and natural environment; one for

factors that contribute to the potential for development; and a composite map that indicates where notable features and potential for development may conflict. Supplemental mapping was developed for specific natural environment components that required an exclusive assessment of condition indicators that are unique to the resource. Upland species habitat suitability mapping was developed when assessing the likelihood of ICE's associated with upland species. Likewise, a map identifying water basins and sub-basins and other water resources was developed. In each case, the map was populated with information attributed to the grid cells described previously, producing a composite picture of the sensitivity of the demographic and minor study areas to future development.

Another feature of the analysis process used for the Gaston East-West Connector ICE Study was the use of local expert interviews. Representatives from local agencies that were familiar with the study area were identified during the project scoping process. Further refinements to the specific interviewees and specific questions to be asked of each were conducted with the N.C. Turnpike Authority. Appendix C and Appendix D provides information on each of the interviewees, their representation, and a summary of the comments that were provided.

The local experts from a variety of fields were either personally interviewed or remotely interviewed by telephone using a map showing the study corridor alternatives, surrounding areas, and polygons representing 10 districts and each proposed interchange. A number of questions were asked of each participant, some of which varied depending on the type of agency being represented in the interview (planning, environmental, or economic). An attempt was made to ascertain the level of knowledge of each interviewee for each of the districts; in some cases only the districts or interchange buffer areas where the participant expressed good knowledge were assessed. A Likert scale of 1 through 5 was used to represent the knowledge of the districts as well as the strength of the development potential with and without the proposed project. A poster-size study area map was presented to interviewees to generate responses relating to specific districts and interchange areas (a small scale representation of this map is shown as Figure 3.2). The authors studied both unweighted and weighted (by district familiarity) responses. A weighted response was simply the cross-product of the interviewee's stated familiarity with the district and their individual response.⁷ Appendix C presents the summary recorded for each of the local expert interviews. The weighted responses of the interviewees become an input to the Cumulative Growth

Potential map (see Figure 12.2). See Table 12.1 for a description of all the effects to that map.

Documenting the ICEs involved interpreting the overlay mapping technique results described previously with qualitative assessments of the policy directions and goals and interviewee comments. The No-build alternative was referenced as a baseline against which change in land use was evaluated. The authors involved in the preparation and conduct of the interviews with local experts, collaborated on the results to help balance differing opinions on matters of qualitative judgment and how to phrase specific descriptions.

Approach to Assessing Effects to Upland Species Associated with Land Use Change (Steps 4 & 5)

GIS overlay mapping techniques were combined with spatial grid analysis when determining the degree of potential effects on wildlife habitat, water quality and ecosystem processes as a whole. A spatial grid analysis of ecological resources and land use was applied through GIS modeling to three project scenarios; Existing Conditions, Build, and No-Build (absence of the project). The indirect land use analysis assumes that effects to forest land may result from forest fragmentation and the conversion of forest habitat due to indirect land use change.

An important component of assessing potential indirect effect on wildlife habitat is to consider potential changes in habitat "connectivity." Whether land cover types are open fields (possibly utilized for agriculture), forests, wetlands, rivers or streams the connectivity of a wildlife species to food, water, shelter, and breeding areas is essential when determining the sustainability of a particular species. Indicators considered when considering potential change in wildlife habitat connectivity are as follows:

- Direct effects to land cover;
- Land topography (i.e., land contours);
- Direct effects to forested riparian buffers;
- Existing and planned road network;
- Utility easements;
- Planned land use conversion;
- Comments from local expert interviews; and
- Existing and projected population growth areas.

Another component of wildlife habitat conditions is the percentage of forest cover within the ICE Study Area. The percent of forest cover contained in the largest patch of forest in the ICE Study Area is an indirect

indicator of habitat fragmentation.⁸ Forests become fragmented when a large, continuous tract of forested land is broken up into smaller “patches” or “islands” (i.e., a parcel of forested land surrounded by non-forested land). Introduction of forest edges in areas that were formally forested often changes the wildlife species composition within and near these edges, making it more likely that predatory species will become more entrenched. There is growing evidence that habitat fragmentation is directly related to the loss of regional and global biological diversity.⁹ Indicators considered when assessing potential change in forest cover include the following:

- Proposed interchange areas;
- Forest edge modifications;
- Planned land use conversion; and
- Existing and projected population growth areas.

The degree of habitat fragmentation is measured from existing conditions that, for the purposes of this report, represent a benchmark for habitat fragmentation. The majority of the forestlands in the ICE Study Area are fragmented by agriculture lands, low-density residential and commercial development; roadway corridors, and water resources. Indicators used to make this determination included the following:

- Existing roadway networks;
- High density and low density residential development;
- Commercial development;
- Impervious surfaces;
- Prior land use conversion;
- Prior population growth;
- Prior disturbance of forested riparian buffers; and
- Existing utility easements.

Approach to Assessing Effects to Water Quality Associated with Land use Change (Steps 4 & 5)

Techniques similar to those implemented with assessing upland species habitat were utilized when assessing the likelihood that the proposed project would affect water quality. Effects on water quality can be positive or adverse. An example of where a proposed action could have a positive effect on water quality is in the case where stormwater management measures are implemented in an area in such a manner that the amount of stormwater runoff from that site is actually reduced from what would naturally occur. Such mitigation measures are usually the result of the Federal and state permitting processes; state buffer rules; DOT BMPs, local floodplain ordinances, Phase II stormwater and watershed ordinances

aimed at protecting water resources. Sources of water degradation effects typically include changes in hydrological regime or conditions including stormwater runoff, sedimentation, nutrient loading and water temperature deviation. Indicators considered when assessing potential change in forest cover include the following:

- Percentage of impervious surfaces;
- Direct effect to riparian buffers;
- Proximity of proposed project to 303(d) classified streams or rivers;
- Stream or river crossings;
- Potential residential and commercial development;
- Areas of proposed interchanges; and
- Areas of existing and anticipated population growth.

Steps 6-8 (Quantitative Analysis-Indirect Impact Modeling)

The completion of Steps 6-8 in NCDOT's 8-Step ICE assessment process (see Figure 3.1) is not the focus of this report in that these steps are typically associated with quantitative analysis of potential impacts. The decision to analyze potential impacts quantitatively belongs to the agencies with federal oversight and approval authority of projects requiring NEPA. In the case, any quantitative analysis would involve the preferred alternative and would commence following the approval of the Draft Environmental Impact Statement (DEIS). Figure 3.1 shows how the 8-step process is to be incorporated into this NEPA-level project review.

Steps 6-8 (a quantitative assessment) would be addressed, if needed, in a separate report. A quantitative assessment will be conducted on the Preferred Alternative following the approval of the Draft Environmental Assessment if it is determined by the Federal Highway Administration (FHWA) and the NCTA that such analysis is needed.

Step 6. Analyze Indirect and Cumulative Effects. The *NCDOT ICI Guidance* presents a number of qualitative and quantitative assessment techniques that can be used to create an effect assessment for ICEs. It is important to recognize that this area of practice is still evolving, and that larger, more complex projects may require more robust *quantitative* assessments at some point in the planning process.

Step 7. Evaluate Analysis Results. Often overlooked, but still very important to many detailed ICE analyses, is conducting sensitivity and risk analysis on the results of the ICE assessment (Step 6). This allows a greater understanding of "what if?" kinds of questions and delineates the assumptions used in the ICE analyses.

Step 8. Assess Consequences and Develop Mitigation and Enhancement Strategies. Practicality, responsibility, and various mitigation techniques are discussed in the *NCDOT ICI Guidance*. A key concept is that multiple agencies representing land use, transportation, and private development actors have roles to play in the mitigation, enhancement, and avoidance of ICEs. An emphasis is placed on resource management, conservation, and traditional land planning mechanisms.¹⁰

4.0 STUDY AREA BOUNDARIES (STEP 1)

Methodology Summary – The spatial boundaries of the ICE Study Area were initially established based on features including watershed boundaries, demographic data sets, and notable features (see Figure 1.3). The ICE Study Area was refined to identify geographic areas having the potential to be affected by the transportation project's indirect or cumulative effect on land development (see Figure 3.2).

A temporal boundary was established based on the length of time the potential ICEs of the proposed project singly or in combination with other past present or anticipated actions or trends could incrementally contribute to substantial changes in land use. This boundary spans from 1989 to 2030.

Major transportation-related actions can have complex and long-term effects on the environment. Actions meeting the definition of "major actions" include those that are "likely to precipitate significant foreseeable alterations in land use; planned growth, development patterns, traffic volumes, travel patterns, and transportation services."¹¹ Environmental processes typically operate on spatial and temporal scales much greater than that of most projects and as a result, projects may have effects disproportionate to their apparent size and duration.¹²

4.1 Spatial Scope for Indirect and Cumulative Effects

In general, the spatial scale of Indirect and Cumulative Effects are consistent with the notable features and their processes that have the potential to be reasonably affected. Each of the notable features considered in this qualitative assessment have their individual spatial boundary determined by the potential of residual environmental effects on that particular notable feature and its processes. When considering cumulative effects, the spatial boundary is expanded to include synergistic effects of other actions (federal or non-federal) deemed likely to occur that are independent of the proposed Gaston East-West Connector but may have impacts on the same geographic area. Actions that may affect the ICE Study Area are described below. These projects are in various stages of planning and development.

Transportation:

- NCDOT Project U-2408 is on NC 274 (Bessemer City Road/North of US 29-74) from NC 275 to US 29074 in Gaston County. Project U-2408 is proposed to widen existing NC 274 (Bessemer City Road/North of US 29-74) to a multi-lane facility.

- NCDOT Project U-2713 is on SR 1131 (Linwood Road) from Crowders Creek to US 29-74-NC 274 (Franklin Boulevard) in Gaston County. Project U-2713 is proposed to widen existing Linwood Road (SR 1133) to a multi-lane facility, with some roadway relocation. The total project length is 2.2 miles.
- NCDOT Project U-3405 is on NC 274 (Gastonia Highway) from SR 1484 (Maine Avenue) to NC 275 in Bessemer City. Project U-3405 is proposed to widen existing NC 274 (Gaston Highway) to a five-lane curb and gutter facility.
- NCDOT Project U-3411 is on NC 160 (West Boulevard) from east of I-485 (Charlotte Outer Loop) to Horseshoe Lane. U-3411 is proposed to relocate West Boulevard and improve to multi—lanes on new location.
- NCDOT Project 4915 is the extension of Southridge Road to the Dole Processing Plant in Bessemer City.
- SCDOT improvement to US 321.
- SCDOT improvements to SC49.
- Expansion of the Charlotte-Douglas International Airport and subsequent improvements to Old Dowd Road, Wallace Neel Road and NC 160 from I-485 to East of Byrum Drive.
- Charlotte-Douglas International Airport's Strategic Development Plan includes the development and operation of a truck/rail inter-modal facility at the airport.

Infrastructure:

- Public water and/or sewer service area (current and planned), see Figure 12.6.

Residential Development locations in Gaston County (current and planned):

- US 273;
- NC 274;
- NC 279;
- US 321;
- Along water fronts and coves of Catawba River and South Fork Catawba River;
- Crescent resources, 1,600 acres of undeveloped land belonging to Duke Power that may be developed into manufacturing/research park;
- Berewick-mixed use development with 1,000 homes currently under construction in Mecklenburg Co., just south of Dixie River Road; and

- Mixed use development planned for area near Wilson farm Road\New Hope Union Road.

The individual spatial boundaries of notable features considered for this ICE assessment are as follows:

- Neighborhoods;
- Political boundaries (i.e., municipal boundaries, census groups);
- Community resources (i.e., cemeteries, schools, historical places, places of worship, community centers);
- Public infrastructure (i.e., proposed roadways, schools, water/sewer facilities);
- Travel Demand Model-generated traffic assignments and TAZ data;
- Information derived from local development policies and planning documents;
- State and local stormwater management ordinances (i.e., stream buffer requirements);
- Watersheds;
- Wetland areas;
- Areas with known contamination;
- 100-year Flood Plain areas;
- Threatened or Endangered Species and their critical habitat;
- Land Use/land use controls (i.e., growth areas, rezonings, annexation areas);
- Topography;
- Soils;
- Prime and unique agricultural lands;
- Public lands and scenic, recreational, and state natural areas;
- Air quality;
- Significant Natural Heritage Sites;
- Wildlife and natural vegetation; and
- Forest resources.

The total sum of each individual spatial boundary defines the spatial boundary of this ICE assessment. The overall spatial boundary is not static and is subject to change as additional information and data become available.

Description of Study Areas

ICE Study Area. The ICE Study Area includes most of Gaston and parts of Cleveland, Mecklenburg, and York (S.C) Counties (refer to Figure 3.2). The purpose of the ICE Study Area was to provide a basic level of geography that would encompass any foreseeable, potential indirect effects

stemming from the proposed Gaston East-West Connector project. The ICE Study Area served as the basis for collecting data that was used later to refine the qualitative impact assessment study areas and impact assessments. The potential effects of the Gaston East-West Connector would fall within a portion of the ICE Study Area and is more sharply described at the District and Interchange Areas levels.

Districts. The ICE Study Area was broken into 10 unique districts in order to facilitate discussions with local experts during interviews, as well as to provide a level of geography that would better describe potential indirect and cumulative effects that were more localized in nature. The District boundaries followed major roadway features as well as political boundaries to facilitate policy differentiations among the various units of government that were examined. The District boundaries facilitated discussions with the local expert interviewees as well as the reporting of results.

Interchange Areas. The third and smallest study area type was used to assess the unique changes that would potentially be produced by increasing accessibility in the immediate vicinity of proposed interchanges with the Gaston East-West Connector project. The size and shape of the Interchange Area boundaries was determined by considering the level of increased accessibility afforded by existing streets that would interchange with the proposed Gaston East-West Connector. Hence, if a proposed interchange was to be located in an area with a good level of street connectivity, the influence of the accessibility that the new interchange would afford increased or "stretched" the shape of the Interchange Area boundary. By considering the places where future interchanges might be located, the potential for indirect and cumulative effects that the higher level of immediate access to the proposed Gaston East-West Connector will afford these areas could be discussed more readily with local expert interview participants and in the reporting stage.

In addition to these three basic types of study areas, the final report also consolidates some of the results into discussions at the county level of geography as well as for the Detailed Study Alternative corridors.

4.2 Temporal Scope for Cumulative Effects

When considered in isolation, individual activities may appear to have minimal effects, but the overall consequences of recurring activity may be substantial.¹³ The setting of a temporal scope of analysis is largely dependent on the availability of data. Data useful for establishing a temporal scope for cumulative effects often reveals past, current, or

predicted trends and actions that have modified or have the potential to modify land use, notable features and/or to influence socioeconomic/demographic trends or conditions when considered in conjunction with the proposed project.

In determining the temporal scope of this Indirect Effects and Cumulative Effect Assessment, it is assumed that the temporal scope of cumulative effects is broader than the scope of analysis used in assessing direct and indirect effects.¹⁴ Thus the temporal scope for cumulative effects represents an overall, comprehensive scope of this assessment.

When considering the most appropriate temporal scope for this proposed project, it was deemed beneficial to consider its historic context. A brief historical context of the Gaston East-West Connector follows.

Note: Early references to "Garden Parkway" include a US 321 Extension. The US 321 extension would be a new-location roadway extending from US 321 north of the Town of Dallas to I-85 in Mecklenburg County. The US 321 Extension is now being considered as a separate project from the Gaston East-West Connector.

Gaston East-West Connector (Garden Parkway) - Period 1980's

- Plans to improve east-west mobility in southern Gaston County through construction of a new location roadway have been under discussion since the late 1980's. The need to improve east-west mobility and the bypass concept was first identified in 1989 during the citizen participation process associated with the update of the *Gaston Urban Area Thoroughfare Plan*.

Gaston East-West Connector (Garden Parkway) - Period 1990's

- The project (referred to as US 321/74 Bypass/Garden Parkway) was formally adopted in Gaston's 1991 *Urban Area Thoroughfare Plan*.
- In 1992, Gaston Urban Area MPO's Transportation Advisory Committee (TAC) requested the Mecklenburg-Union (MUMPO) Transportation Advisory Committee to place the proposed project on their thoroughfare plan.
- In 1994, the MUMPO TAC adopted a conceptual regional thoroughfare plan proposed by the Charlotte Committee of 100, which included the proposed project.

Gaston East-West Connector - Period 2000 to Present

- The North Carolina Department of Transportation began environmental studies for the Gaston East-West Connector in 2002.¹⁵ The US 321 Extension was eliminated from the project during this period.
- In July 2002, concurrence of the Purpose and Need was reached through the NEPA/404 Merger process. In February 2005, the NCTA Board selected the Gaston East-West Connector as a candidate toll facility and the project is now being developed by the NCTA.

The temporal scope for the proposed project is based on the length of time the effects of the proposed project singly, or in combination with other past, present, or anticipated actions or trends, could incrementally contribute to substantial changes in land use and/or trends and conditions. In the case of transportation projects, only projects that were both listed in the *Gaston 2030 Long Range Transportation Plan* and the *NCDOT Transportation Improvement Program (TIP) 2007-2013* were considered as likely to occur. A summary of actions or trends considered in establishing the appropriate temporal scope for the proposed project are as follows:

Period 1990's

- 1999 Daniel Stowe Botanical Garden was first opened to the public.
- A significant loss in the textile industry in Gaston County has been offset by an increase in the service and trade sectors.

Period 2000 to Present

- On-going Charlotte-Douglas International Airport Expansion to include 9,000-foot runway. Project is expected to be completed in 2010.
- Relocation of Wallace Neel Road, Western Boulevard, and Old Dowd Road is on-going and associated with the Charlotte-Douglas International Airport Expansion.
- Employment projections for Gaston County presented in the 2030 Long Range Transportation Plan show a drop in employment growth occurring from 2000-2010.
- Completion of I-485 in 2004.
- NC 274, NC 275 to US 29-74 (NCDOT TIP # U-2408). Widen to multi-lanes due to be let to construction in 2007.

Period 2010 to 2020

- The Southeast High-Speed Rail Corridor Study (Macon-Charlotte Southeast High Speed Rail Corridor).

- Charlotte-Douglas International Airport's Strategic Development Plan includes the development and operation of a truck/rail inter-modal facility at the airport.
- Gaston County's Comprehensive Planning Program predicts that by 2010 the southeastern portion of Gaston County is estimated to surpass other portions of the County in regards to housing units.
- SR 1131 (Linwood Road), Crowders Creek to US 29-74-NC 274 (Franklin Boulevard) (NCDOT TIP # U-2713), widen to multi-lanes, right of way and construction are currently unfunded.
- SR 1136 (Myrtle School Road), US 29-74 to SR 1255 (Hudson Boulevard), widen to multi-lanes, right-of-way and construction are currently unfunded.

Period 2020 to 2030

- Gaston East-West Connector, I-85 West of Gastonia to US 321 North of Gastonia. Four lane divided freeway on new location, right-of-way, and construction are currently unfunded.
- The updates to metropolitan planning organization Long-Range Transportation Plans (LRTP) must, according to federal regulations, extend a minimum of 20 years into the future. The current LRTPs or LRTP updates taking place now in the Region are extending to at least the year 2030.

Based on the available data, the determination was made that the temporal scope for this assessment spans from 1989 to 2030. This scope includes the anticipated design life of the project (25 years) which originates from the current NCDOT Long-Range Transportation Plan that was adopted in 2005.¹⁶

Figure 4.1 illustrates a composite of the factors that contribute to the determination of the temporal study boundaries.

5.0 DEVELOPMENT MANAGEMENT PROFILES BY COUNTY (STEP 2)

Methodology Summary – In addition to reviewing the plans adopted by local jurisdictions, reviews were also conducted of development policies, guidelines, utility provisions, and other actions in areas included in the ICE STUDY AREA that specifically provide information on the approach that local governments take towards managing growth in their jurisdictions. The following profiles focus on recent (typical: previous three years) histories of Planning Commissions; Boards of Commissioners; City or Town Councils and other bodies responsible for considering the degree that new development may effect cultural and natural resources in the ICE STUDY AREA. Jurisdictions included in the ICE STUDY AREA include the following:

- City of Gastonia, North Carolina;
- Gaston County, North Carolina;
- City of Charlotte, North Carolina;
- Mecklenburg County, North Carolina;
- York County, South Carolina;
- Cleveland County, North Carolina;
- City of Belmont, North Carolina; and
- Bessemer City, North Carolina.

Citations are provided in several instances that illustrate specific reactions towards development pressures, as well as instances where interview content with local staff and agency representatives support or refute the documented research.



The four counties discussed below are included in the ICE Study Area of the proposed Gaston East-West Connector.

Gaston County, North Carolina

The County of Gaston tends to rely more heavily on tourism than its major city, Gastonia, principally by highlighting gardens, parks, and historic attractions. Urban attractions are also marketed through the Gaston County Department of Tourism, including shopping and dining opportunities located primarily in the City of Gastonia.¹⁷

Significantly, the County is undertaking a Consolidated Utility Study to identify the feasibility of merging the public water and sewer systems of the various municipalities within the County. The County itself does not provide any public water or sewer utilities.

A review of both broad- and local-level land use planning and transportation goals and objectives was completed to determine the consistency of the proposed project with such goals and objectives. The following goals, objectives and policies are based in large part upon regional and local documents that address land use planning and zoning ordinances. For the purpose of this assessment, goals are considered to be broad statements that express priorities about how a specific area should develop and re-develop over time. Objectives are more specific than goals and are attainable through the implementation of planning policies and strategies.

The stated goals and objectives for *Gaston County's Unified Development Ordinance* include:

- addressing problems of sprawl patterns of land use;
- developing procedures and standards that safeguard Gaston County from "undesirable development";
- developing design guidelines that promote livable communities, including promoting street connectivity and placement of sidewalks in new residential development;
- creating a Unified Development Ordinance (UDO) that is readable and functional across jurisdictions (specifically, the UDO will create a standard set of definitions, zoning districts); and
- development approval processes that can be implemented by all local municipal governments in the County.¹⁸

The UDO was developed to streamline the development process and to make it more user-friendly. It combines and integrates the land use ordinances for Gaston County and some (but not all) of its municipalities into one document to include: zoning, subdivision ordinances, manufacturer ordinances, watershed water supply and flood damage prevention.

The stated goals and objectives of the *Gaston County 2030 Long Range Transportation Plan* are consistent with the development and growth desire for the jurisdictions that comprise the GUAMPO. Stated goals and objects in the Plan are as follows:

- Provide a safe, comprehensive and efficient transportation system that allows the movement of goods and people within Gastonia and from Gastonia to other places.
- Improve the quality of life for residents of the Gaston MPO area.
- Provide a transportation system that affords the public with mobility choices including walking, bicycling, and transit options.

- Provide a transportation system that is sensitive to significant features of the natural and human environment.
- Provide equitable transportation options to low income and minority neighborhoods.
- Require and promote transportation improvements to better connect Gaston County to other cities in the region, particularly Charlotte and Mecklenburg County.
 - Promote additional bridge crossings (Gaston East-West Connector, Mount Holly North Loop and widen existing) over the Catawba River to handle increases in traffic on I-85 and US 29/74.
 - Strengthen Gastonia's connection to the regional transportation network.
- Promote land use patterns that combine different uses such as industrial, retail, and residential.
- Develop an efficient street and highway network capable of providing an appropriate level of service for a variety of transportation modes.
- Promote an integrated multimodal local and regional public transit system.
- Develop a transportation system that integrates pedestrian and bicycle modes of transportation with motor vehicle transportation and encourages the use of walking and bicycling as alternative modes.
- Maximize rail and air transportation opportunities.
- Develop a transportation system that preserves and coexists with the natural and built environments.
- Support and promote a freight transportation system which supports the movement of goods.
- Make investment decisions for transportation modes that make the most efficient use of limited public resources.

According to the *2030 Long-Range Transportation Plan*, the Gaston East-West Connector is considered to be the most significant infrastructure project currently under consideration in Gaston County. The 2030 plan anticipates that, once constructed the Gaston East-West Connector would provide relief to I-85 and US -29/74 and US 321. Traffic projections indicate that both I-85 and US Highway 29/74 are projected to be at or near capacity. Gaston County's *2030 Long-Range Transportation Plan* indicated that the proposed Gaston East-West Connector and the expansion of the Charlotte-Douglas International Airport will provide a critical link for movement of goods between rail, highway, and air.¹⁹

This historical record indicates that the Gaston Urban Area Metropolitan Planning organization (GUAMPO) has consistently supported the project since its initial adoption. The MPO and its member communities have planned for and incorporated the Gaston East-West Connector (or, alternatively named, the Garden Parkway) for the last 18 years. Apart from placing the project into the fiscally constrained element of the LRTP, the *2030 Long-Range Transportation Plan* reinforces the place of this project relative to other, identified MPO transportation needs by noting that

“The importance of this project to Gaston County cannot be underestimated. The TAC considers the Garden Parkway the most significant project of all the facilities proposed for Gaston County and as such is item # 1 on the MPO’s Unmet Needs List. When built, it will serve as a reliever to I-85 and US 29/74, *both of which are projected to be at or near capacity, even with the bypass in place*” (emphasis in original text).²⁰

The Gaston East-West Connector was identified by the Gaston Urban Area Metropolitan Planning Organization Transportation Advisory Committee (TAC) as the number one project to relieve traffic congestion in the urban area.²¹ The Director for the City of Gastonia Planning Department stated in an interview that the project may act as a catalyst for retail development in the ICE Study Area.²²

City of Gastonia, North Carolina

With over 70,000 residents, Gastonia is the Charlotte-Gastonia-Rock Hill metropolitan statistical area’s second-largest municipality. Its population has expanded by 7.5% between 2000 and 2007²³. Gastonia presents a pro-development face through its government website address, the Gaston Economic Development Commission (GCEDC, www.gaston.org), Gastonia Downtown Development Corporation (www.gastoniadowntown.org), and Gaston Chamber of Commerce (www.gastonchamber.com).

General. Gastonia markets a “pro-business permit” process for new subdivisions and commercial properties. The City has a Unified Development Ordinance (unified subdivision and zoning ordinances), and suggests that the average turnaround time for subdivision development applications is three to four months from the time of plan submittal to building permit approval; two to three months’ time is suggested for site plan review and approval.

The City of Gastonia provides public water and sewer services for a large area, and regularly extends lines to meet the needs of new developments, particularly on the southern part of the city. Maps shared during interviews indicated several major new subdivisions on the southern side of Gastonia, all of which will utilize the City's public water and sewer. There was no indication during interviews that access to water and sewer has been limited as a growth management strategy. Topography has proved the only complicating factor in reaching utilities to some sections south of Gastonia, but plans exist to build a pumping station that would alleviate that issue. The Gastonia Planning Director expects that the entire area south of Gastonia would have public water and sewer available by the time the project is operational.

The City has exhibited other signs of being accommodating to new development; for example, granting vested rights for two-to-five years to the proposed Bethesda Oaks Subdivision and Howe Dairy Traditional Neighborhood Development project. These new development would not be required to comply with the new Phase II Stormwater Management Ordinance that the City has agreed to create.^{24, 25}

To address the development activity and improve quality, Gastonia recently created a "Resource Guidebook for Residential and Commercial Development" which provides guidance to developers and staff on aesthetic and design treatments, such as building setbacks, street cross-sections, pedestrian / bicycle connections, open space, and signage. The Guidebook, which emphasizes Planned Residential Developments, states that these guidelines represent "minimum standards", and may be exceeded.²⁶

Gastonia has taken other proactive steps to manage development, such as agreeing to create a Phase II stormwater management ordinance. The new ordinance will affect all new developments, although most dramatically affecting new residential development that would not otherwise be required to have permanent stormwater runoff controls in place. The City currently uses a Conditional Use Permit (CUP) process in many development cases that allows them to have a finer degree of control over proposed development design.

The Planning Commission and City Council do reflect on the *2010 Comprehensive Plan* (which is currently being updated) during some discussions pertaining to development effects, including a notable recent discussion regarding the height extension of wireless communications

towers within the SP (State Park) zoning district, which protects that part of Crowders Mountain State Park that the City annexed in August of 1996. On that occasion, the City Council voted unanimously to deny the ordinance revision that would have allowed the extension, citing extensive concerns by the public and Planning Commission regarding the visual and construction effects of the heightened tower facility.

At the same meeting, the City Council approved two requests for four-way stop controls at intersections to help mitigate concerns about neighborhood traffic, a potential indication that the government is cognizant and willing to act on issues related to traffic congestion.²⁷

City of Belmont, North Carolina

The City of Belmont is currently in a mode of residential and commercial growth. Development proposals in the November, 2007 minutes for the City's Planning Board include a 24-lot single-family home subdivision and a 48-slip marina with a retail store on River Drive. To better manage the residential and commercial growth, the Belmont City Council adopted the City of Belmont Comprehensive Land Use Plan in August of 2007 and adheres to the land use ordinances of the UDO. Belmont's Comprehensive Land Use plan is a policy document designed to work in sync with the legally binding Belmont Land Development Code adopted in 2003.²⁸ Since the Plan's adoption, the City Council has been considering proposed text amendments to change the Belmont Land Development Code. Many of the proposed text amendments are aimed at incorporating more consistency with the Belmont Comprehensive Land Use Plan. Examples of such proposed amendments to the Belmont Land Development Code include certain architectural requirements to single-family homes and a proposal to allow drive-through facilities in the Business Campus Development zoning district.²⁹

The City of Belmont currently offers both water and sewer services to areas within its boundaries. The City has extended their water and sewer facilities along NC 273 to the south end of the peninsula in order to service a new subdivision there. During interviews, planners noted that areas along that highway that are not currently serviced by the city utilities could easily tap into the new line, provided that they are annexed into the City.

Bessemer City, North Carolina

Bessemer City approved a new land use plan in August of 2007 and like many other municipalities in Gaston County they follow the land use ordinances of the UDO. According to Bessemer City's planning director, the

Plan rezoned the entire City. Bessemer City is actively embracing residential, commercial and industrial development. He noted that a significant incentive for mixed use development is the expedited, staff-level review for new mixed use development proposals. Some development code variances are allowed. The City provides public water and sewer services within its boundaries.

Mecklenburg County, North Carolina

Fueled by its center city, Mecklenburg is in the midst of a tremendous growth cycle.³⁰ Mecklenburg County's *2015 Plan* emphasizes the urban transformation that the County has experienced over the past decade. According to the Plan, low-density, suburban sprawl characterizes the current development pattern in Charlotte-Mecklenburg.³¹ The Plan predicts that by the year 2015 that most available land within the County boundaries will likely have been annexed.³²

The *2015 Plan* has established the following goals and objectives of the Charlotte-Mecklenburg area:

Goal I: Develop Charlotte as a unique and attractive urban center of a suburban region. Objectives include:

- The enabling of new development and infill development (residential and non-residential) that allows for mixture of uses, enhances existing neighborhood character, preserves older buildings and landmarks, is sensitive to its surroundings, is pedestrian-oriented, supports transit use and helps to revitalize deteriorating areas.
- Development of a balance of appropriate land uses and higher densities in key transit corridors and major activity centers to form an integrated land use and transportation system that will support multi-modal (i.e., roads, mass transit, aviation bicycles pedestrians) circulation.
- Creation of unique urban, pedestrian-oriented mixed use centers at key locations throughout the County.

Goal II: Provide for a more geographically balanced growth pattern within Charlotte-Mecklenburg. Objectives include:

- Increase development/revitalization within the "City Within A City."
- Stimulate quality growth on the northwest and west sides of the City and County.
- Ensure that existing stable neighborhoods are maintained and enhanced.

Goal III: Promote higher design quality in development, recognizing the importance of scale, attention to detail, and the relationship between land use and structures. Objectives include:

- Design development which is environmentally sustainable and which integrates the built environment with the natural environment.
- Use design elements such as lighting, landscaping, scale and innovative site plans to improve the safety of both residential and commercial areas.

Mecklenburg County's *2008-2010 Strategic Business Plan* sets the short-term direction for achieving the long-term goals identified by the Board of County Commissioners. The Plan outlines Mecklenburg County's goal to manage growth and to improve various aspects of the environment including air quality, water and land quality. The business strategy is described as being three-pronged:

- Permitting and enforcement of ordinances and regulations;
- Direct prevention and intervention/remediation services, including facilities and other resources to prevent pollution; and
- Public education and awareness to influence personal behavior that can prevent pollution.

The *2006 Performance Report* on Mecklenburg County's implementation of the Strategic Business Plan indicates that the County is not meeting its goals of managing growth and improving the environmental attributes of the area. Progress has been made in protecting natural resources through improved air, water, and land quality, but reaching its stated goals will require additional changes in the habits of residents, additional regulation, and increased county leadership.³³

Because it has more than 100,000 residents, the City of Charlotte had to obtain a Phase I NPDES permit to manage stormwater anywhere in the City. Charlotte's Phase I permit was received in 1993. Phase II of NPDES applied the same laws to smaller jurisdictions. In 2005, Mecklenburg County and the six towns it contains were granted a joint NPDES Phase II Permit to manage stormwater outside of the Charlotte City limits.

City of Charlotte, North Carolina

Charlotte is currently the 20th most populous city in the nation and could become the 10th most populous by 2030.³⁴ Charlotte City Council has established "focus areas" including economic development and planning as well as transportation. Future goals for Charlotte in regards to economic development are to invest in public services, facilities and infrastructure,

along with sustainable commitment to business and entrepreneurship.³⁵ Charlotte's long-term economic health is in large part driven by the City's ability to facilitate private sector job growth and investment. The economic development focus area is directed by the Economic Development Committee which seeks to maintain, increase and enhance the quality and number of jobs available within Charlotte. Table 5.1 details economic development initiatives for fiscal year 2008 in Charlotte.

Table 5.1 Economic Development Initiatives for FY08³⁶

Initiative	Measure	Target	Prior Year Target
Promote a healthy business climate by implementing a strong business expansion and retention effort	Percent of targeted businesses retained or expanded	FY08: 100%	FY06: 100%
	Percent of job growth at targeted businesses	FY08: 5%	FY06: 2.9%
Develop Collaborative Solutions: Work with internal and external partners to grow Charlotte's hospitality industry	Hospitality tax revenues	FY08: 7% increase over FY05	FY05: 7.8%
	Convention Center utilization	FY08: 54%	FY06: 46%

The City of Charlotte takes a proactive approach to transportation planning and management. The City's overall goal is to become the premier city in the Country for integrating land use and transportation choices. Charlotte's *Transportation Action Plan* (TAP) details the City's transportation strategies and programs that are necessary to accommodate the City's anticipated future growth through 2030. The TAP's goals and policies are intended to meet land use objectives while enhancing the multi-modal capacity and connectivity of streets and thoroughfares, so that over the next 25 years an increasing percentage of residents are within short distances to neighborhood-serving land uses such as parks, schools, greenways, retail stores and employment areas.

The City currently has public water and sewer service areas covering nearly the entire western area adjacent to Gaston County. One relatively undeveloped area west of the airport currently has sewer but no water service.

York County, South Carolina

York County, South Carolina, has enjoyed continued growth and economic vitality due largely to its proximity to Charlotte. This growth has not been without a cost. Over the past decade, York County has experienced unprecedented suburban sprawl characterized mainly by a pattern of low-density residential development. It has been fueled by market demand associated with Charlotte's expansion and by an abundance of developable land and facilitated by incremental rezoning³⁷. Lower taxes, state incentives, lower housing costs, and good quality schools create a strong incentive for companies and individuals to move to York County from other areas within the Region.³⁸ York County's residential population has grown much faster than projected. According to the York County Industry Cluster & Target Market Study, 2,200 residential permits are being issued annually in York County and the County's population is approaching the 2015 population projection.

In 1996, York County adopted procedures to assess impact fees on new development, which had as one of its stated purposes "to implement the goals, objectives and policies of the county comprehensive plan relating to assuring that new development contributes its fair share towards the cost of public facilities necessitated by new development." Due to a variety of circumstances, impact fees have not served as an important growth management tool in York County.

York County has proposed to adopt an Adequate Public Facilities Regulation Ordinance to better control residential growth in the County. The purpose of the ordinance is to require developers to pay into a fund to offset the effect of their development if adequate school facilities are not currently available.³⁹ There is currently a \$2,400 per residence fee imposed to aid the schools in building new facilities.⁴⁰

Public utilities in northern York County are provided by several different entities. The Town of Clover provides its own water and sewer service, which actually draws from the City of Gastonia system, and additional services are provided by Carolina Water Service, Tega Cay and Riverview Water Service. The latter two have small, defined service areas that cover specific large subdivision developments in the southeast portion of the ICE Study Area. Carolina Water Service uses lines that are owned by York County to service development along the Highway 274 corridor, just west of Lake Wylie. The Town of Clover currently services within its town

boundaries, and has plans to expand service areas west, north and east of the town, but not south. Both the Town of Clover and Carolina Water Service expressed a willingness to extend service to any developer who is willing to pay for, and then turn over ownership, of the new lines. York County has incorporated a "conceptual urban services area" in its 2025 Comprehensive Plan (April 2004), which incorporates the service areas of the various utility providers (although there is some disagreement between this map and the proposed service areas for the Town of Clover, which is currently under discussion).

To facilitate the management of projected land use change and population growth, York County has developed the *York County 2025 Comprehensive Plan* with goals and strategies that support York County's Vision Statement. The Vision Statement is based broadly on quality of life issues; managed and sustainable growth; balanced transportation and public facilities priorities; and excellence in government. The latter includes the effective utilization of codes and standards to guide growth and improve development quality.⁴¹

York County's land use goals, and the strategies identified to accomplish them, address a broad array of growth-related challenges. These include measures to limit patterns of sprawl that consume valuable land and natural resources; overload roads and public facilities; create unfair tax burdens; and compromise the scenic character of York County's urban and rural areas. This approach to growth management does not seek to stop growth, or to impose a defined growth "cap" or a pre-determined "rate of growth," but is expected to have an effect on the timing, location, and patterns of growth by:

- encouraging maximum retention of open space;
- reserving land needed in the future for development of industry;
- providing greater flexibility within zoning districts to produce more compact mixed uses and investments in older urban areas; and
- "raising the bar" for quality and protection of natural resources.⁴²

On June 18, 2007 York County adopted the *Interim Development Ordinance*. This ordinance implements priority recommendations of the *York County 2025 Comprehensive Plan* and serves as a temporary bridge between the current regulations and the planned overhaul of those regulations, which are anticipated by County planning representatives to take several years to complete.⁴³ In addition to implementing several comprehensive plan initiatives, York County planning representatives believe that this ordinance addresses significant deficiencies in the existing

development regulations.⁴⁴ Specifically, this ordinance requires the following:

- Requires zoning and subdivision applications to be consistent with the York County *2025 Comprehensive Plan*;
- Promotes effective use of land by providing incentives for conservation subdivisions;
- Ensures that planned developments will be long-term assets for the County-creating stable neighborhoods and commercial areas;
- Increases the flexibility of rural residents to establish home-based businesses;
- Enables the creation of compatible neighborhoods services at the edges of neighborhoods;
- Establishes more stringent design standards for commercial development to ensure that it is both attractive and functional;
- Ensures that open spaces serve rather than burden future residents;
- Enables the County to ensure that new subdivisions do not shift capital costs to existing taxpayers and ratepayers; and
- Establishes a more rational platting process.

Prior to the 1972 and 1987 amendments to the Clean Water Act (CWA), point source discharges from industrial facilities, sewage treatments plants, and storm events were seen as the major contributors to water quality degradation in York County. In 1992, a permit was required for construction activities affecting five or more acres of land. In 2003, the National Pollutant Discharge Elimination System (NPDES) Program initiated Phase II controls. Phase II controls will affect all urbanized areas with 50,000 or more residents, or a population density of 1,000 or more per square mile and any construction activity disturbing one or more acre of land. On March 10, 2003, York County submitted their NPDES Phase II permit proposal for York County's urbanized areas, as designated by EPA to South Carolina's Department of Health and Environmental Control. Control measure goals were submitted along with the NPDES Phase II permit as listed below:

- Protect and preserve natural areas, wildlife habitat and agricultural and timber lands by ensuring zoning classifications adequately protect environmental areas;
- Regulate stormwater discharge in York County's urban areas in accordance with federal regulations through the use of Low-Effect Development (LID) and Best Management Practice implementation by developers, farmers, timber companies and any other group whose activities may cause land disturbances.

A number of regulatory methods have been adopted which further the need to preserve plant and wildlife habitat. York County has adopted a Traditional Neighborhood District floating zone, which provides for the conservation of 50 percent of the property of large mixed-use development. York County has also adopted the Catawba River Buffer Rules, which maintains land within 100 feet of a designated segment of the Catawba River in its natural state.

York County's Capital Projects Sales and Use Tax Programs Referendum, *Pennies for Progress Programs*, were initiated by York County in 1997. The purpose of the programs was to provide the citizens with a safer and more efficient roadway system. The projects were chosen by a Sales Tax Commission that represented the citizens of York County and then were approved by the voters in York County. York County was the first county in South Carolina to pass this type of sales tax to improve the road system. A benefit of this tax is ninety-nine cents of every sales tax dollar raised in York County stays in York County. York County is currently working on two sales tax programs to improve the road system in the county.

Cleveland County, North Carolina

Cleveland County's Land Use Plan is a statement of the community's vision for its own future and a guide to achieve that vision through the year 2015.⁴⁵ Goals and main objectives as set forth in their *Land Use Plan* are listed below.

Goals of the Cleveland County Land Use Plan

- To ensure that Cleveland County is comprised of well-planned, safe residential developments that offer housing choices that retain their value and meet the needs of the County's population.
- To ensure that land use and community planning in Cleveland County is coordinated among all parties, and to proactively and equitably enforce minimum housing and building code regulations, zoning regulations, and similar ordinances throughout the County planning jurisdictions.
- To develop well-planned, safely-designed, economically-viable commercial areas in designated portions of the County that serve the retail and commercial needs of County residents, and which will have continuing long-term beneficial effect for the County and which fit well with adjoining land uses.
- To promote and expand quality, environmentally friendly industrial development in those portions of the County that are served by adequate transportation and utility infrastructures.

- To ensure that Cleveland County contains viable, vibrant, and attractive cities, towns, and villages that serve as the focal point for development and community life.
- Develop and maintain a modern, safe and efficient multi-modal transportation network that serves the needs of the County residents and persons traveling through the County.
- To ensure that Cleveland County residents are provided with safe and sanitary water and sewer utilities, and with an energy infrastructure that supports economic development.

Main Objectives of the *Cleveland County Land Use Plan*

- Protecting the integrity and viability of the County's established neighborhoods.
- Maintaining an ongoing and pro-active minimum housing enforcement program.
- Upgrading manufactured housing and multi-family development standards in the County.
- Elimination of the commercial zoning district along State and federal highways in the County, and replacing with a series of commercial "nodes" at designated sites throughout the County.
- Designation of key areas in the County for future industrial development.

In Cleveland County, the City of Kings Mountain provides public water and sewer services to a limited area surrounding the town. The County provides water, but not sewer, services throughout a large portion of the County.

6.0 LAND USE (STEP 3)

Methodology Summary – To determine ICE's associated with the proposed Gaston East-West Connector, it is essential to understand the existing land use conditions. Land use and transportation planning often have a reciprocal relationship. Growth and development resulting from land use modification often acts as a catalyst for transportation needs, such as improving accessibility or reducing congestion in an area. The reverse can also be true in that improved accessibility can in some cases lead to land use change. The information in this section provides a current picture of land use conditions and growth patterns as they exist today in the ICE Study Area.

6.1 Gaston County

Gaston County is part of the Piedmont Plateau, located between the foothills of the Appalachians and the sandhills of the coastal plain.⁴⁶ It is bounded on the east by the Catawba River and Mecklenburg County; on the west by Cleveland County; on the north by Lincoln County; and on the south by York County, South Carolina.⁴⁷

Gaston County has 15 municipal incorporations (cities or towns) within its boundary.⁴⁸ Land use mapping of Gaston County reveals a pattern of development along major roadway corridors with infill development between the roads (see Figure 6.1). Commercial, office, and industrial uses are concentrated in the cities and towns, and along major transportation routes: I-85, US 321, US 74, and the rail corridor that roughly parallels I-85 and US 74.⁴⁹

Table 6.1 provides a summary of land use information for the various municipalities that may be affected by the implementation of the proposed project.

Table 6.1 Municipal Land Use Information, Gaston County

Municipalities	Location of Anticipated Growth	Type of Growth	Recent or Planned Annexations
City of Belmont	South along the peninsula formed by the Catawba and South Fork Catawba Rivers; North between McAdenville and Mount Holly	residential	yes
Bessemer City	Northeast, west	Residential, commercial, industrial	yes
Town of Cramerton	South	residential	no
Town of Dallas	North, south and west	Predominantly residential, commercial, industrial	yes
Gastonia	South	Residential, commercial, industrial	yes
City of Kings Mountain	North; towards the City of Bessemer and the city of Cherryville	Residential, commercial and industrial	yes
City of Lowell	Former Textile Operations	residential	no
Town of McAdenville	Former Mill Operation	residential	no
City of Mount Holly	North and West	Residential, commercial and industrial	Relinquishment of ETJ
Town of Ranlo	East, north and west	Residential	yes

Source: Gaston County Surface Water Supply Watershed Protection map, July 2007

Corridor studies are currently underway for several corridors in Gaston County that are considered most vulnerable by development. Two of these are the Gastonia-Mount Holly Connector and the southern portion of the Belmont-Mount Holly Loop.⁵⁰

County planning staff has identified two proposed intersections sites as potential “hot spots” for current and near-future development. The intersection of the future Gaston East-West Connector and NC-274 is one of the two sites. Located just north of the Daniel Stowe Botanical Garden, this area is a combination of vacant land and land developed for agricultural uses, plant nurseries, single-family housing, and a few commercial uses.⁵¹ The other identified “hot spot” for development is at the intersection of the future Gaston East-West Connector and US 321 in Gastonia. Existing conditions in this area are a combination of primarily industrial and residential uses it is surrounded by agricultural land on roughly three sides.⁵²

Residential growth continues to occur in the southeast corner of the County. According to the Belmont Chamber of Commerce, the River Bend and South Point townships of Eastern Gaston are the county's fastest growing residential areas. There are no major employment centers in the area within and near the Detailed Study Alternatives (see Figure 6.2).⁵³ Large subdivisions with one acre or larger lots are being developed; most of these developments do not have public water and sewer services.

According to GUAMPO, there is a need to provide public services (water and sewer) in Gaston County in order to reduce the effects on water and soil quality, but also to provide the ability to build various lot size developments. Inability to provide public services creates pressure and stress on the natural environment due to the need to build wells and septic tanks. Long-term effects on water and soil quality occur.⁵⁴ Several municipalities in Gaston County including Belmont, Cramerton, Gastonia and Mount Holly have excess wastewater treatment capacity. Yet many areas in the County that are not incorporated do not have access to municipal wastewater services.⁵⁵

A vast majority of the proposed projects are scheduled for the unincorporated area and southern portion of Gaston County. These areas are primarily underdeveloped, with the primary development pattern being residential and open space. The area contains no water and sewer infrastructure. However, this area is projected to see a higher percentage of Gaston's growth over the next 10-20 years.

A summary of municipalities that are located in Gaston County and that have experienced land use modification in response to growth and development either in the past or are likely to experience such change in the future as a result of or in accordance with the proposed project are provided below. These areas include the following:

- The City of Gastonia;
- The City of Belmont;
- The Town of Dallas;
- Bessemer City;
- The Town of Cramerton;
- The City of Kings Mountain;
- The Town of McAdenville;
- The City of Mount Holly;
- The Town of Ranlo; and
- The City of Lowell.

These municipalities and the ICE Study Area can be found on Figure 6.1.

The City of Gastonia is centrally located in Gaston County and encompasses approximately 43.5 square miles. Future growth is anticipated to be a mix of residential, commercial, and industrial. Land use in downtown Gastonia is characterized as mixed use with modern retail and civic uses. A site visit to downtown Gastonia indicated that the central business district is in the early stages of redevelopment, with the City investing an increasing amount of resources to see the area redevelop faster. Outside of the downtown area, non-residential development transitions into strip commercial along major arterial roads with single-family residential neighborhoods behind.⁵⁶ Areas around the outskirts of Gastonia are relatively rural and characterized by low-density residential and agricultural areas. Areas in or adjacent to the city limits of Gastonia are characterized by moderate- to high-density residential areas or areas of small businesses.⁵⁷

The City of Belmont is located in the eastern portion of Gaston County and has ready access to Charlotte and Mecklenburg County, Charlotte-Douglas International Airport, and the City of Gastonia by both Interstate 85 and US Hwy 29-74. Belmont is bordered by Mecklenburg County and the Catawba River to the east, the City of Mount Holly to the north, the Town of McAdenville to the northwest, and the Town of Cramerton to the west. Although some growth is possible to the north between McAdenville and Mount Holly, the predominant future growth is anticipated to take place to the south, along the peninsula formed by the Catawba and South Fork Rivers. This is evidenced by recent annexations, growth of subdivisions, and planned extensions of water and sewer lines. Predominant growth is anticipated to be residential in nature. Future growth is anticipated with the proposed Gaston East-West Connector.⁵⁸

The Town of Dallas is located in the geographic center of Gaston County, and is bordered to the south and east by the City of Gastonia. Although there is some room for potential growth towards the Gastonia corporate limits, the predominant growth is anticipated to the north and west as demonstrated by recent annexations along NC 279 and US 321. Predominant future growth is anticipated to be residential in nature, with a mix of commercial and industrial facilities.⁵⁹ The Town of Dallas is experiencing an expansion in subdivision growth. Its officials believe that the proposed project represents a major economic engine for Gaston County and all of its municipalities as well.⁶⁰

The City of Bessemer City is located in west central Gaston County, with the center of the City being within four miles of the Cleveland County Line. Bessemer City is predominately north of the I-85 corridor that runs through Gaston County, with the City of Gastonia to the east and the City of Kings Mountain to the southwest. Although there is room for some expansion by

annexation in most directions, a large portion of Bessemer City is currently undeveloped. Future growth is anticipated to be a mix of residential and industrial/commercial.⁶¹

The Town of Cramerton is located in east-central Gaston County, between the City of Belmont to the east and the City of Gastonia to the west. The northern town boundary is contiguous with that of McAdenville. Although limited growth is possible to the north, west, and east, the Town's greatest potential for growth is to the south. Predominant future growth is anticipated to be residential in nature.⁶²

The City of Kings Mountain, once known as White Plains, has the distinction of being located in two counties. Out of the 10,000 residents of Kings Mountain, only 590 live in Gaston County with the remaining living in Cleveland County. The City is bordered in part by the City of Gastonia to the east. As the City continues to grow into Gaston County, the primary growth is expected in the north toward the Bessemer City and the City of Cherryville, and is expected to be a mix of residential, commercial and industrial.

The Town of McAdenville is located in east-central Gaston County along NC 7, between the Town of Ranlo, City of Gastonia, Town of Cramerton, and the City of Belmont. Future annexation would be primarily confined to the north, in areas where it is feasible. Future growth is anticipated to be predominately residential and likely to occur adjacent to I-85.

The City of Mount Holly is located in the northeastern quadrant of Gaston County. A large portion of the City is located on the Catawba River and annexations have taken place on Mountain Island Lake. Mount Holly is for the most part bordered only by the City of Belmont to the south. Future development is anticipated to be to the north and west. With the completion of the proposed Mount Holly-Gaston Connector, additional growth is to be expected, especially along the NC Hwy 27 corridor, and is expected to be a mix of residential, commercial, and industrial. In the past decade, the City of Mount Holly has experienced an escalated demand for property near and along its lakes.

The Town of Ranlo is centrally located to the north of the City of Gastonia, along NC Hwy 7. Although there is no direct access to more land to the south of existing boundaries to the south, future annexations are possible to the east, north and west. Future growth is expected to be primarily residential in nature.

The City of Lowell is centrally located in the eastern half of Gaston County, between the City of Gastonia and a portion of the Town of Ranlo to the

west, and the Town of McAdenville to the east. Although growth by annexation is still possible, significant annexations are not expected due to proximity of other municipalities and the South Fork Catawba River. Future growth is anticipated to be primarily residential in nature, which will replace former textile operations.

6.2 Mecklenburg County

Mecklenburg County faces many challenges in addressing the growth and development experienced in both the residential and commercial realms of urbanization. Low-density, suburban sprawl characterizes the current development pattern in Charlotte-Mecklenburg. The Southwestern District of the County is experiencing rapid growth. According to Mecklenburg County's *2015 Plan*, much of this development is thought to have been spurred by the construction of the I-485 Outer Loop. Problems associated with suburban sprawl are the primary focus in this area. Charlotte-Mecklenburg's *2015 Plan* predicts that by the year 2015, most available land within the County boundaries will likely have been annexed.⁶³

Charlotte-Douglas International Airport, located in Mecklenburg County, provides regional access to the international market. In the year ending October, 2007, Charlotte-Douglas ranked 12th among the 855 domestic airports for which the Bureau of Transportation Statistics maintains records. US Airways is the dominant passenger carrier, with over 54% of all passengers using this airline. The number of passengers using the airport is increasing, with a 51% increase recorded between 2002 and 2007 for domestic destinations (refer to Table 6.2 for all destination statistics for this time period). On-time performance has slipped slightly during this period, and average delay increased slightly (although some of this change may be due to more carriers reporting in the latter part of this five-year period).⁶⁴ To accommodate this growth, Charlotte-Douglas International Airport is expected to expand by adding a 9,000-foot runway at the western edge of the airport. The expansion is needed to provide sufficient airfield capacity during peak operating periods, and to also provide a means of reducing delay during peak periods.⁶⁵ The expansion is expected to be completed in early 2010.⁶⁶

Table 6.2 Charlotte-Douglas International Airport Passengers and Mail Tons, Domestic and International Destinations

Year	Passengers	Freight
2002	524,842	8,654,576
2007	650,308	10,856,757
Difference	125,466	2,202,181
Difference (%)	24%	25%

Source: USDOT Bureau of Transportation Statistics, 2002 and 2007 T-100 Tables

6.3 York County

Approximately 80 percent of York County's unincorporated land remains underdeveloped as agricultural land, or developed land at very low intensities as agricultural residential use.⁶⁷ Also evident in the County's land use pattern are the extent of sprawl and the fragmented pattern of population growth in the rural area, typified by small, low-density residential subdivisions scattered county-wide.⁶⁸ According to York County's *2025 Comprehensive Plan*, it is this development pattern which represents the greatest threat to the County's future sustainability, ever-increasing demand for public services in remote rural locations, as well as the continued displacement of farmland.⁶⁹ The most potent factor for residential development is York County's proximity to Charlotte, principally along the I-77 commuting corridor.⁷⁰ This proximity and transportation link northward directs the most growth pressure to the County's northeast sector in the vicinity of Fort Mill. Areas surrounding rural-suburban edges are particularly likely to experience substantial growth pressures unless curbed by the Interim Development Ordinance and other new growth policies.

The counties of Mecklenburg, Gaston, and Cabarrus in North Carolina, along with Chester County in South Carolina, all represent employment destinations for those residing in York County.⁷¹

Residential growth is disproportionately outpacing commercial and industrial growth despite efforts to diversify the employment base.⁷² Most of York County's recent employment growth has been in logistics/warehousing, and efforts to attract the financial sector have been relatively successful.⁷³

6.4 Cleveland County

Cleveland County is located between Asheville and Charlotte. Cleveland County is centered between two of the largest metropolitan areas of the Carolinas -- Charlotte and Greenville/Spartanburg. Along with the county seat of Shelby and the City of Kings Mountain, Cleveland County also includes the towns of Belwood, Boiling Springs, Casar, Earl, Fallston, Grover, Kingstown, Lattimore, Lawndale, Mooresboro, Patterson Springs, Polkville and Waco.

The largest category of land within Cleveland County is undeveloped property. Much of this undeveloped land is farmland. The municipal areas within the county continue to grow despite the economic reversal that the loss of the textile industry has had on the towns and cities within this County.

7.0 WATER RESOURCES AND WATER QUALITY (STEP 3 CONTINUED)

Methodology Summary – This section provides information related to the Catawba watershed and wetland areas. Water quality information includes stream classifications, state and local stormwater ordinances and applicable riparian buffer rules.

Indirect effects to water resources and downstream water quality could occur as a result of the increases in impervious surfaces from development, and soil erosion and stream sedimentation due to soil disturbing activities.

7.1 Watershed

The project is in south-central North Carolina within the Piedmont physiographic province in the Catawba River basin. The rivers and streams of Gaston County generally flow from northwest to southeast, and most drain into either the Catawba River or its principle tributary, the South Fork Catawba River.⁷⁴ The Catawba River winds 224 miles through central North Carolina, originating in the eastern slopes of the Blue Ridge Mountains, and flowing southeast to the North Carolina-South Carolina border near Charlotte.⁷⁵ The Catawba River basin encompasses 3,285 square miles in 12 counties, including Gaston.

The elevation of Gaston County ranges from 587 feet above sea level in the southeast corner of the County to 1,705 feet in the southwest at the pinnacle of the Kings Mountain Range, with the average elevation being 825 feet above sea level.⁷⁶ The elevation of the watershed can be seen in Figure 7.1.

The Catawba River is composed largely of a series of impoundments, the Catawba chain lakes, a sequence managed by Duke Power for the purposes of hydropower generation. Lake Wylie is among these sequences of lakes. Water resources with the Catawba River basin fall within one of three sections.

- The South Fork of the Catawba and its tributaries; Henry Fork, Jacob Fork, and Indian Creek are considered to be in the midsection of the Catawba.
- The Lower Catawba Basin, Dutchman's Creek, Sugar Creek, McAlpine Creek, and Twelve Mile Creek are encompassed in the drainage that contributes to flow over the South Carolina border.
- Crowders Creek which joins in the drainage area of the South Fork Catawba.

The project, located in the Catawba River watershed, possesses a wide variety of land uses. Some tracts are still forested or in agricultural production. A large portion of the watershed is moderately developed as residential or industrial. Many of the waterways and wetlands within the watershed remain forested, although some of the streams have minimal riparian buffers. Potential threats to water quality in this area and downstream may include agricultural practices, land use change including land clearing which may contribute to soil erosion and increases in chemical runoff and nutrient input.

Existing development has affected the water quality of the Catawba River cumulatively as development has concentrated along the east side of Gaston County close to the Catawba River.⁷⁷ Land use changes from rural to urban as the river enters the Piedmont from the mountains. Nonpoint source pollution in runoff from agriculture and urban areas affects water quality in the streams, rivers and lakes downstream through the Catawba basin. Gastonia and Charlotte are both considered to be included in the list of these urban areas.⁷⁸ The west bank of the Catawba River also is home to the Allen Steam Station, a major coal-fired power plant operated by Duke Power.

The project is located in the Catawba River Basin (Hydrologic Unit Codes (HUCs): 03050101, 03050102, 03050103, DWQ subbasins 03-08-34, 03-08-36, and 03-08-37 respectively). A brief summary of each subbasin is provided below.

Subbasin 03-08-34 (see Figure 7.1). Subbasin 03-08-34 covers 324 square miles and is one of the most densely populated areas in North Carolina. The streams in this subbasin are part of the Catawba River Basin that spans both North Carolina and South Carolina. Water from this subbasin discharges into Lake Wateree, a 303(d) listed water in South Carolina. This subbasin contains the greater Charlotte area, and urban stormwater and municipal wastewater heavily influence the local streams. Charlotte is required to comply with National Pollutant Discharge Elimination System Phase I Stormwater regulations. Mecklenburg County is required to comply with Phase II stormwater regulations.⁷⁹ The City of Charlotte and Mecklenburg County have initiated stream buffer ordinances through the Charlotte-Mecklenburg "Surface Water Improvement & Management (S.W.I.M) program".⁸⁰ There are no Outstanding Resource Waters (ORW), High Quality Waters (HQWs) or Trout Waters (Tr) in areas of this subbasin included in the ICE Study Area.

Subbasin 03-08-36 (see Figure 7.1). The subbasin includes Gastonia, the southern rural portion of Gaston County, and parts of Bessemer City.⁸¹ This basin covers 104 square mile. One stream in this subbasin, Dallas Branch, is rated as being impaired. There are no ORW, HQWs or Tr in areas of this subbasin included in the ICE Study Area.

Subbasin 03-08-37 (see Figure 7.1). This subbasin has a drainage area of 106 square miles, one of the smallest subbasins in the Catawba River Basin. More than one-third of the streams within this subbasin are rated as impaired. Parts of Gastonia, Bessemer City, and Kings Mountain are within the subbasin. Major roadways bisecting the area are I-85 and US 321.⁸² There are no ORW, HQWs or Tr in areas of this subbasin included in the ICE Study Area.

7.2 Water Supply Watersheds

The water supply watershed ordinances in Gaston and Mecklenburg Counties were developed to protect this valuable resource. A brief summary of such watersheds is provided below.

Mountain Island Lake Sub Watershed. The Mountain Island Lake watershed has a surface area of 2,788 acres, and is the smallest of the three lake systems within the Catawba River Watershed. It serves as the primary water supply watershed for Mount Holly, Gastonia and Mecklenburg County.⁸³ Mountain Island Lake has 'good' to 'excellent' water quality. However, streams which flow into the lake are declining in terms of water quality.⁸⁴ Gaston County's Killians Creek and Johnsons Creek flow into Mountain Island Lake.⁸⁵

Lake Wylie Watershed. The Lake Wylie Watershed has a surface area of 12,139 acres. It is the largest of the sub-watersheds along the Catawba River, encompassing 1,160 square miles. This watershed serves as the water supply for Belmont and Rock Hill.⁸⁶

Tributaries draining into and forming arms of Lake Wylie in South Carolina include Catawba Creek, Mill Creek, Crowders Creek (South Fork Crowders Creek, Rocky Branch, Brown Creek, Beaverdam Creek, Camp Run), and Torrence Branch. There are a total of 37.2 stream miles and 4,500 acres of lake waters in this Catawba River/Lake Wylie watershed in South Carolina, all classified as freshwater.⁸⁷

Lake Wylie water quality is being threatened due to numerous sources of nonpoint pollution which has contributed to water quality degradation in its embayment and tributaries. High nutrient levels have been linked to algae blooms and fish kills in warmer months. The primary sources of pollution are urban runoff and wastewater treatment plant discharges. Urban runoff, wastewater treatment discharges, and agricultural runoff from Gaston and Lincoln counties are also significant problems.⁸⁸

Mecklenburg and Gaston counties have established the following water supply watershed protection requirements in the ICE Study Area as shown in Table 7.1.

Table 7.1 Watershed Protection Requirements

Zone	Zoning Jurisdiction	Built Upon Area	Lake/Stream Buffer
Upper Lake Wylie Watershed			
Protected Area	Charlotte/Mecklenburg	< or = 24%-Low Density	40 feet
		< or = 70%-High Density	100 feet
Critical Area	Charlotte/Mecklenburg	< or = 24%-Low Density	100 feet
		< or = 50%-High Density	100 feet
Lower Lake Wylie Watershed			
Protected Area	Charlotte/Mecklenburg	< or = 24%-Low Density	40 feet
		< or = 70%-High Density	100 feet
Critical Area	Charlotte/Mecklenburg	< or = 20%-Low Density	50 feet
		< or = 50%-High Density	100 feet
Catawba River			
Critical Area	Gastonia/Gaston	< or = 24%-Low Density;	30 feet
Protected Area		or 36% for projects without a curb and gutter street system	
		>24%- High Density	100 feet

Source: Watershed Protection Ordinance, Gaston County, North Carolina, October 1, 1997

7.3 Wetlands

A total of 122.83 acres of wetlands were lost in the Catawba River basin through permitted actions between 1996 and 2000.⁸⁹ During this period, 64.65 acres of wetlands were replaced through mitigation to compensate for permitted loss.⁹⁰ Table 7.2 lists the total loss of wetlands by subbasins within the ICE Study Area.

Table 7.2 Wetland Losses (acres), 1995-2000

03-08-34	42.88
03-08-36	1.05
03-08-37	0.88

Source: Watershed Restoration Plan for the Catawba River Basin, 2001.

7.4 Stream Classifications

North Carolina waters are classified according to their best-intended uses. Class "C" waters are protected for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner. There are no restrictions on watershed development activities.⁹¹

In York County, South Carolina, portions of Crowders Creek within the ICE Study Area are classified as "Freshwater" with designated use being:

- primary and secondary contact recreation;
- a water supply after conventional treatment in accordance with the requirements of South Carolina;
- fishing; and
- the survival and propagation of a balanced indigenous aquatic community of fauna and flora, and industrial and agricultural uses.⁹²

Section 303(d) of the Federal Clean Water Act requires states to develop a list of waters not meeting water quality standards or which have impaired uses. The 303(d) list and accompanying data are updated as the basin-wide plans are revised.⁹³ Waters considered supporting their uses may continue to appear on the 303(d) list because of standard violations. North Carolina lists eight streams as having impaired biological integrity under the Final 2006 provisions of the Clean Water Act (CWA) (NCDENR, 303(d) list, 2006). The potential source of impairment for all of these streams is urban runoff and storm sewers. These streams are as follows: Abernethy Creek; Crowder Creek; Blackwood Creek; Catawba Creek; Catawba River; Sugar Creek; Dallas Branch; and Long Creek.⁹⁴ There are also two 303(d) listed streams (SCDHEC, 303(d) list 2006) located in South Carolina, Crowder Creek and the Lake Wylie.⁹⁵

Both North Carolina and South Carolina have a draft 303(d) list for 2008 that is currently under public review. A comparison was made of available data to determine if there were any additional streams that should be disclosed in both of the revised drafts. Long Creek, in Mecklenburg County, North Carolina is currently not among listed streams in North Carolina's 303(d) List Draft for Public Review (January 2008).⁹⁶

The Catawba River/Lake Wylie and the South Fork Catawba River have surface water designations indicating use as a water supply watershed.

Table 7.3 provides information of the water supply streams in the ICE Study Area.

Table 7.3 Water Supply Streams

Catawba River (Lake Wylie below elevation 570)	From I-85 Bridge to the upstream side of Paw Creek Arm of Lake Wylie	WS-IV, B; CA	Catawba	11-(122)
Catawba River (Lake Wylie below elevation 570)North Carolina portion	From the upstream side of Paw Creek Arm of Lake Wylie to North Carolina-South Carolina State Line	WS-V, B	Catawba	11-(123.5)
Unnamed Tributary at Belmont Abbey College	From a point 0.5 mile downstream of N.C. HWY 273 to Lake Wylie	WS-IV;CA	Catawba	11-123-(2); 11-123-(1)
South Fork Catawba River	From a point 0.4 mile upstream of Long Creek to Cramerton Dam and Lake Wylie at Upper Armstrong Bridge (mouth of South Fork Catawba River)	WS-V	Catawba	11-129-(15.5)

*Final North Carolina Water Quality Assessment and Impaired Waters List (2006 Integrated 305(b) and 303(d) Report). Approved May 17, 2007

Source: http://h20.enr.state.nc.us/bims/reports/basinand_waterbodies/

Catawba River and Lake Wylie and the South Fork Catawba River carry surface water designations indicating uses as a water supply watershed. The Catawba River/Lake Wylie is designated as WS-V, and South Fork Catawba River is designated as WS-V. WS-V waters are protected as water supplies which are generally upstream of WS-IV waters (water protected as water supplies which are generally in moderately to highly developed watersheds). No categorical restrictions on watershed development or treated discharge shall be required.⁹⁷

Permitted stream effects in the Catawba River basin during the period of 1997 through 2000 totaled 104,306 linear feet. During that same time span,

33,355 linear feet of stream restoration were required to mitigate for these losses. The majority of these losses occurred in Subbasin 03-08-34, which encompasses the Charlotte area. Table 7.4 lists the total stream losses within the ICE Study Area.

Table 7.4 Stream Losses (linear feet), 1997-2000

Subbasin (NC DWQ)	Total
03-08-34	36,919
03-08-36	904
03-08-37	265

Source: Watershed Restoration Plan for the Catawba River Basin, 2001.

7.5 State and Local Stormwater Management Ordinances

Gaston County's stormwater ordinance established minimum requirements and procedures to control the adverse effects of stormwater runoff associated with new development.⁹⁸ Gaston County is a Phase II Stormwater community. All water from the proposed project and its bridges must be collected by drains or pipes and discharged into vegetated areas and/or silt basins where pollutants are filtered out naturally before entering streams.

Because it has more than 100,000 residents, the City of Charlotte in Mecklenburg County obtained a Phase I NPDES permit to manage storm water anywhere in the City. Charlotte's Phase I permit was received in 1993. Phase II of NPDES applied the same laws to smaller jurisdictions. In 2005, Mecklenburg County and its municipalities were granted a joint NPDES Phase II Permit to manage storm water outside of the Charlotte City limits.

York County's Phase II Stormwater permit was established in 2003. York County has stated that they will regulate stormwater discharge in York County's urban areas in accordance with federal regulations through the use of Low-Effect Development (LID) and Best Management Practices implemented by developers, farmers, timber companies and any other group whose activities may cause land disturbances.

7.6 Riparian Buffer Rules

The Catawba River is considered to be a nutrient sensitive management river basin. The Catawba Buffer Rules require a 50-foot minimum buffer width for new development along the Catawba River. Wider buffers may be necessary for steeper slopes, areas downstream of intense development, or for extra protection of highly valued uses such as drinking water.⁹⁹ New development must either treat the runoff from new

impervious areas to remove nitrogen to specified levels, or design stormwater discharges outside of a 50-foot riparian buffer so the flow will not re-concentrate before it reaches the stream.¹⁰⁰

Riparian buffer is a term used to describe lands adjacent to streams and comprised of an area of native trees, shrubs, and other vegetation. Vegetative buffers are effective at treating stormwater runoff and maintaining stream bank stability. The loss of riparian buffers can reduce water quality, diversity of wildlife, and fish populations.¹⁰¹ The loss of riparian vegetation results in increased water temperatures and decreased oxygen levels.

Permanent riparian buffer protection rules were enacted for the main stream of the Catawba River below Lake James to the North Carolina/South Carolina border. These rules also encompass the seven main stem lakes from Lake James to the North Carolina/South Carolina border. Lake Wylie is one of the main stem lakes in which the buffer rules apply.

The buffer protection rules apply within 50 feet of all riparian shorelines along the Catawba River main stem and the seven main stem lakes. The buffer is 50 feet wide and is measured from the waters edge (at full pond in the lakes) and has two zones of 30 feet (Zone 1 nearest to the water) and 20 feet (Zone 2 landward of Zone1).

Grading and clearing of vegetation in Zone 1 is not allowed except for certain uses. The outer 20-foot zone (Zone 2) can be cleared and graded, but it must be re-vegetated and maintain diffuse flow to Zone 1. Certain activities (including road crossings) may be allowed with mitigation but must first be reviewed and given written approval by the North Carolina Department of Environment and Natural Resources Division of Water Quality (DWQ) staff. The project crosses three water bodies that are part of Lake Wylie in which the Catawba River Riparian Buffer Rules will apply.¹⁰²

Mecklenburg County Surface Water Improvement and Management (S.W.I.M.) ordinance establishes buffers along streams. There are three different buffer sizes (35', 50', and 100') in Mecklenburg County depending on the size of the drainage. SWIM buffer requirements apply only to streams, whereas watershed buffers apply to both the lakeshore and streams. In situations where a stream is covered by both a watershed and SWIM buffer, the more stringent buffer requirement would apply. Table 7.5 provides the required buffers along streams based on drainage.

Table 7.5 S.W.I.M. Buffers

Required S.W.I.M. Buffers (Mecklenburg County)	Drainage Area of Stream
35-Foot	100 acres or greater
50-Foot	300 acres or greater
100-Foot	640 acres or greater

7.7 Department of Transportation Best Management Practices

The NCDOT implements Best Management Practice (BMP) on transportation project in accordance with their published handbook entitled [*Best Management Practices for Protection of Surface Waters*](#).¹⁰³ The NCTA intends to follow the NCDOT BMPs. Best Management Practices are defined as activities, practices and procedures undertaken to prevent or reduce water pollution. NCDOT’s BMP serves as a compendium covering both preventive and control measures that are implemented in NCDOT’s various activities.¹⁰⁴ These activities include general maintenance operations and facilities, construction operations including temporary erosion and sediment control, as well as project planning and design.

The South Carolina Department of Transportation implements their stormwater management manual entitled *Interim Stormwater Control Manual* to limit the discharge of sediment from the project site and to prevent post-construction peak discharge flow rates from exceeding the pre-construction peak discharge flow rates.¹⁰⁵

8.0 ENVIRONMENTAL RESOURCES (STEP 3 CONTINUED)

Methodology Summary – This section provides a description of natural resources that exist within the ICE Study Area. This information is important when assessing the cumulative effects of the proposed Gaston East-West Connector on environmental resources including:

- Natural Resources;
- Natural Heritage Sites;
- Air Quality;
- Noise; and
- Cultural Resources.

8.1 Natural Resources

The natural areas of Gaston County are spread across its land area and encompass a variety of natural features that include mountains, bogs, and old-growth forests.¹⁰⁶ The North Carolina Natural Heritage Program identifies SNHAs as the most important areas for natural diversity of the State.¹⁰⁷ Gaston County contains 7,790 acres of protected open space, which includes some SNHAs. While some of the Significant Natural Heritage Areas are under permanent protection, others are threatened by development pressure.¹⁰⁸

Table 8.1 lists the Gaston County Natural Heritage Sites as two distinct categories. The first category indicates sites of national, state, or regional significance, while the second category lists sites of County significance (see Figure 8.1).

Table 8.1 Natural Heritage Sites of Gaston County

Natural Heritage Sites of National, State or Regional Significance	Natural Heritage Sites of County Significance
Crowders Mountain State Park	Riverbend Peninsula Forest
Twin Brooks – Stanley Basic Forest	Saddler Road
Richard Rankin Complex	Airport Road East
Stagecoach Road Granitic outcrop and Wetland	Rhyne farm
Armstrong Ford	Stanley Creek Forest Complex
Jean Rankin Forest	Spencer Mountain Dam
Kenneth Oates Farm Forest	South Pasour Mountain – Piedmont Monadnock Forest
Laurel Hill Nursery Forest	Middle Pasour Mountain
Pinnacle Road	Long Creek Gauging Station
Friday Sites #1-1 and 1-2	Mauney Creek
Jenkins Site	Mike Moore Hill
Forney Rankin/Redlair Preserve	Penegar, Gastonia South
	Ferguson Ridge
	Ferguson’s Knob
	Unity Church Road
	Catawba Cove
	Rhyne Bluffs
	Thornburg Shoals Granitic Flatrock, Bottomland Forest
	Sumner Road
	Grant Hill
	Kenneth Oates Farm Forest (Area A)
	Kenneth Oates Farm Forest (Area B)
	Jack Moore Forest
	Falston Road
	Johnson Creek and Side Catawba

Source: Gaston County Natural Heritage Inventory, NC Natural Heritage Program and the Million Acre Initiatives in the Office of Conservation and Community Affairs. Information accessed on 5/16/08.

8.2 Natural Heritage Sites

There are few natural heritage sites out of those listed in Table 8.1 having the potential to be indirectly or cumulatively affected by the proposed project. Those having that potential are listed below.

Crowders Mountain State Park is located west of the Detailed Study Alternatives (See Figure 8.1) but within the ICE study Area. The State Park is the largest natural heritage site in the County. It covers over 3,000 acres of topographically, botanically, and zoologically diverse land. Six natural plant communities are found in the park, and the area supports a diversity of wildlife species. Some animals documented in the Park have not been documented elsewhere in the Country.

Crowders Mountain State Park is one of the best examples of Low Elevation Rocky Summit natural communities in North Carolina.¹⁰⁹ The Park includes habitat for one of a few populations of bear oak (*Quercus ilicifolia*) and dwarf juniper (*Juniperus communis var. depressa*) in the State. A number of other rare plants occur here, including Bradley's spleenwort (*Asplenium bradleyi*), Appalachian golden-banner (*Thermopsis mollis*), and Piedmont indigobush (*Amorpha schwerinii*). Several rare butterflies are present. North Carolina Department of Parks and Recreation owns part of this site the remaining land is privately owned.

Stagecoach Road Granitic Outcrop is significant for its good quality Granitic Flatrock natural community, the best in this section of the Piedmont.¹¹⁰ The gently sloping, smooth granite outcrop has bare rock with vegetation mats of typical flatrock species. This site is privately owned and located within the ICE Study Area. Stagecoach Road is located south of the Detailed Study Alternatives (See Figure 8.1) and within the ICE Study Area.

Penegar is located adjacent to Crowders Creek. The bulk of this floodplain forest has been destroyed by the erosion of woodland pasture. However, a large, frequently flooded area still exists and has a rich diversity of herbaceous aquatics. Penegar is located south of the Detailed Study Alternatives (See Figure 8.1) and within the ICE Study Area.

8.3 Air Quality

The proposed project ICE Study Area is within the Charlotte-Gastonia-Rock Hill 8-hour non-attainment area for ozone (as of October 10, 2007)¹¹¹. The Charlotte-Gastonia area had been designated as non-attainment for the 8-hour ozone designation. Both Gaston and Mecklenburg Counties are in attainment areas for Particulate Matter (PM-10) and Particulate Matter (PM-2.5) and the other criteria pollutants (carbon monoxide, oxides, nitrogen, etc.).

A project-level air quality assessment is a part of the environmental review for this proposed project and is currently underway. The Gaston Urban Area Metropolitan Planning Organization currently lists the proposed Gaston East-West Connector project as a non-tolled facility in the most recent air quality conformity report; the long-range transportation plan is being amended to show this project as a tolled facility.

8.4 Noise

Noise is defined as unwanted sound. It is emitted from many sources including airplanes, factories, railroads, power generation plants, and highway vehicles. The magnitude of noise is usually described by its sound pressure. Since the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to some common reference level, usually the decibel (dB). Sound pressures described in decibels are called sound pressure levels and are often defined in terms of frequency weighted scales (A, B, C or D) (NCDOT Noise Assessment).

A-scale levels are in current use in many community and city noise ordinances and in state and city highway or traffic noise codes (FHWA, 1980). Several examples of sound pressure levels (dBA) are listed in Table 8.2.

Table 8.2 Common Outdoor Noises

Outdoor Noises	Sound Pressure Level (dBA)
Jet Flyover at 300 meters	105
Gas Mower at 1 meter	95
Diesel Truck at 15 meters	85
Noisy Urban Daytime	80
Gas Lawn Mower at 30 meters	70
Commercial Area	65
Quiet Urban Daytime	50
Quiet Urban Nighttime	40
Quite Suburban Nighttime	35
Quiet Rural Nighttime	20

Source: FHWA, Highway Noise Fundamentals, Noise Fundamentals Training Document, 1980.

The degree of disturbance or annoyance of unwanted sound depends essentially on three things:

- 1) The amount and nature of the intruding noise.
- 2) The relationship between the background noise and the intruding noise.
- 3) The type of activity occurring when the noise is heard.

Data derived from Table 8.2 suggests that land use growth and development generally increase the level of ambient noise. Any community and/or wildlife habitat experiencing an increased level of activity (commercial or residential development, vehicle traffic) would have the potential to also experience an increased level of ambient noise. The habitat of various species, particularly birds, may be altered in an attempt to avoid areas with increased noise levels.

Preliminary ambient noise levels within the ICE Study Area range from the low 40's to high 60's in regards of dBA readings depending on the location of the measurement. ¹¹²

8.5 Cultural Resources

Cultural resources may be encroached upon where indirect land use effects occur. The assessment of the indirect effects must focus on the presence of National Register listed or eligible sites in the areas where induced development is anticipated to occur.

9.0 TRANSPORTATION (Step 3 continued)

Methodology Summary – This section provides information about the influences that past transportation actions have had on the ICE Study Area and actions that are deemed likely to occur that may have the potential to affect land use planning.

The completion of I-485 between I-85 South and I-85 North through western, southern, and eastern Mecklenburg County in early 2004 has strengthened the transportation network within the ICE Study Area. I-485 allows trucks to bypass central Charlotte and provides an alternate route to the Charlotte-Douglas International Airport.

Gaston County's transportation infrastructure includes three interstate highways intersecting Gaston County, Interstates 40, 85 and 77. There are also major US highways that run through Gaston County such as US Highways 29, 74 and 321. Major state highways traversing Gaston County include NC Highways 7, 16, 27, 161, 273, 274, 275, and 279.

Weaknesses in the current transportation infrastructure include:

- Excessive traffic volume through the City of Gastonia.
- Access to the interstate systems is limited.
- I-85 and US 321 interchange is poorly designed.¹¹³
- Need for additional crossings over Catawba River between Gaston and Mecklenburg Counties.

9.1 Transportation Actions

The following transportation actions, in addition to the Gaston East-West Connector, proposed within the ICE Study Area are included in the NCDOT Transportation Improvement Program (2007-2013):

- TIP# U-3405, Bessemer City, Gaston County. NC 274 (Gastonia Highway), SR 1484 (Maine Avenue) to NC 275. Widen to five lanes with curb and gutter. This project is funded and scheduled for construction in FY 09.
- TIP# U-2408, Gastonia, Gaston County. NC 274, NC 275 to US 29-74. Widen to multi-lanes. This project is funded and scheduled for construction in FY 07.

- TIP# U-2713, Gastonia, Gaston County. SR 1131 (Linwood Road), Crowders Creek to US 29-74-NC 274 (Franklin Boulevard), Widen to multi-lanes. This project is not currently funded
- TIP# R-2608, Gaston County, Garden Parkway, 1-85 west of Gastonia to US 321. Four lane divided freeway on new location.

The Charlotte-Douglas International Airport is expected to expand by adding a 9,000-foot runway at the western edge of the airport. This expansion is needed to provide sufficient airfield capacity during peak operating periods, and to also provide a means of reducing delay during peak periods.¹¹⁴ The expansion is expected to lead to increased employment, payroll, and expenditures due to expanded facilities and ability to accommodate projected growth in air travel. The expansion is expected to be completed in early 2010.¹¹⁵ The expansion of the airport will eventually expedite transfers of rail, air, and truck shipments.¹¹⁶ A new intermodal facility and logistics park is currently under consideration by both the City of Charlotte and the Charlotte-Douglas International Airport, according to the Resident Vice President for Norfolk Southern Corporation. The City of Charlotte envisions closing the present Norfolk Southern intermodal facility and replacing it with a new facility with sufficient room to accommodate future expansion.¹¹⁷

The Charlotte region, including Gaston and Cleveland counties, is an inland port and among the top choices for major distribution operations due to its ideal location for interstate and intrastate commerce.¹¹⁸ The Charlotte Region's distribution network links not only to local and regional markets but also to national and international ones. The region is currently served by three major interstate systems: I-77 north-south, I-85 north-south, and I-40 east-west. It also hosts an international airport with regional supporting airports in 15 surrounding counties, and is a hub to over 27,000 miles of freight rail.¹¹⁹

As part of the Charlotte-Douglas International Airport Expansion, parts of Old Dowd Road, Wallace Neel Road, and NC 160 will be moved. The airport has proposed to build two lanes of the new NC 160 from I-485 and Garrison Road east to Byrum Drive. The road will run along the existing Byrum Drive and connect to a new four-lane section from Byrum Drive and Yorkmont Road to where the existing NC 160 hits Horseshoe Lane.¹²⁰

The primary focus of rail transportation in Gaston County is freight. The main Norfolk Southern Rail line running between Atlanta and Baltimore, and the Amtrak¹²¹ Crescent Line from New Orleans to New York traverses Gaston

County. The CSX line between Wilmington, North Carolina and Louisville, Kentucky also traverses Gaston County.¹²²

Amtrak maintains passenger rail service daily to Gastonia.¹²³ The current Amtrak station in Gastonia has been proposed as a station location in the Macon-Charlotte Southeast High Speed Rail Corridor Plan as part of the proposed high-speed rail operation between Charlotte, North Carolina and Macon, Georgia.¹²⁴ The *2030 Long Range Transportation Plan* discusses a possibility of a high-speed rail project connecting Gastonia with other cities in the southeast.¹²⁵ The Macon-Charlotte Southeast High Speed Rail Corridor is part of a rapidly growing corridor with very good market potential for high-speed services. North Carolina Passenger Rail future service routes show this high-speed rail project passing through Gastonia.¹²⁶ There is currently no federal source for the capital funding of this segment of the proposed High-Speed Rail Project.

The Gastonia transit system has experienced a slight decline in ridership over the past few years. From FY 2000 to FY 2004, annual ridership dropped from 483,991 to 333,919. This decrease may be attributed to an increase in bus fares and revisions to service routes. There is also reason to attribute the decline as the result of higher unemployment rates in Gaston County, coupled with the change in the location of publicly-subsidized housing away from transit routes.¹²⁷

10.0 AGRICULTURAL LANDS/PRIME FARMLANDS (STEP 3 CONTINUED)

***Methodology Summary** – This section provides information about the influences of land use change on agricultural land uses including prime farmlands.*

ICE's on agricultural land, including farmland and undeveloped land with prime agricultural soils, occurs whenever land use is converted from farming to urban land uses. The conversion of farmland to urban land use would be expected to change the agricultural density in the southern portions of Gaston County. This change in density on a regional scale would be expected to reduce soil productivity in terms of the agricultural output process, but not to a notable degree. A map of farmland and prime agricultural soils is shown in Figure 10.1.

When considered on a much smaller scale, such as an individually owned farm, the loss of land due indirectly to urban development may equate to a reduction of soil productivity. This may especially be the case as land suitable for farming becomes a more valuable commodity to land developers. Soil degradation may also be result of additional urban development due in part to the cumulative effects of increasing amount of impervious surfaces and other non-point pollution sources.

11.0 SOCIOECONOMIC CHARACTERISTICS (STEP 3 CONTINUED)

Methodology Summary – Socioeconomic conditions in the ICE Study Area, including: population, job growth rates, environmental justice issues, per capita income, housing, commuting accessibility and tourism are discussed in detail in this section.

The following figures serve as a baseline for the discussion in subsequent subsections. The source of this information was primarily the US Bureau of the Census (2000 Census of the Population); 2007 (estimate) and 2012 (forecasted) figures were provided through the ESRI Business Center license maintained by The Louis Berger Group, Inc. Demographic profiles are provided for the following geographic areas:

- Gaston County, North Carolina;
- Cleveland County, North Carolina;
- Mecklenburg County, North Carolina;
- York County, South Carolina;
- All Four Counties Combined; and
- ICE Study Area (boundary shown on Figure 6.1).

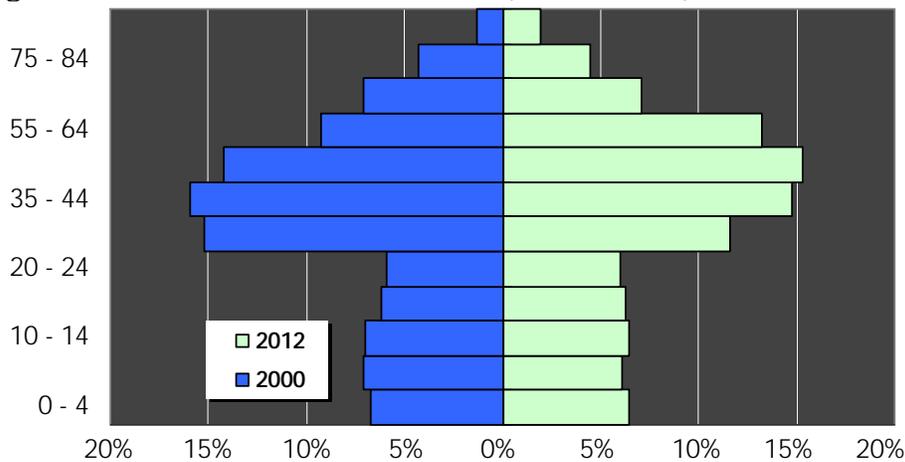
Figure 11.1. Gaston County Demographics

Basic Demographic Profile

Gaston	2000	2007	2012
Population	190,365	198,673	204,095
Households	73,936	78,291	80,968
Families	53,327	55,156	55,974
Average Household Size	2.53	2.50	2.48
Owner Occupied HUs	50,901	54,987	56,699
Renter Occupied HUs	23,035	23,304	24,269
Median Age	36.2	38.2	39.8

Annual Growth (2007-2012)	Gaston	National
Population	0.5%	1.2%
Households	0.7%	1.3%
Families	0.3%	1.0%
Owner HHs	0.6%	1.3%
Median Household Income	2.9%	3.3%

Age Cohorts, Year 2000 and 2012 (forecasted)



Racial Cohorts, Years 2000, 2007 (estimated) and 2012 (forecasted)

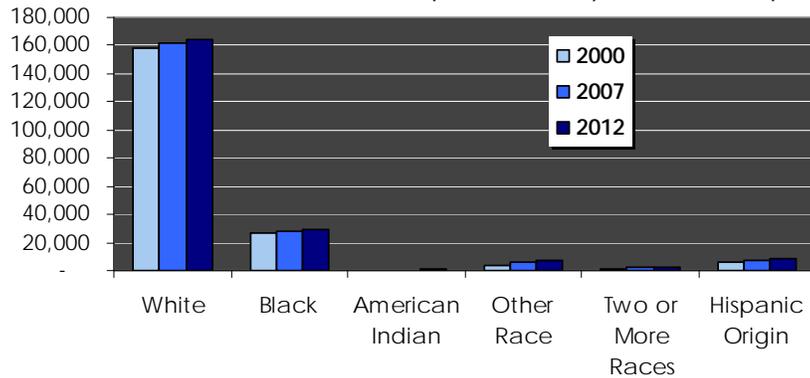


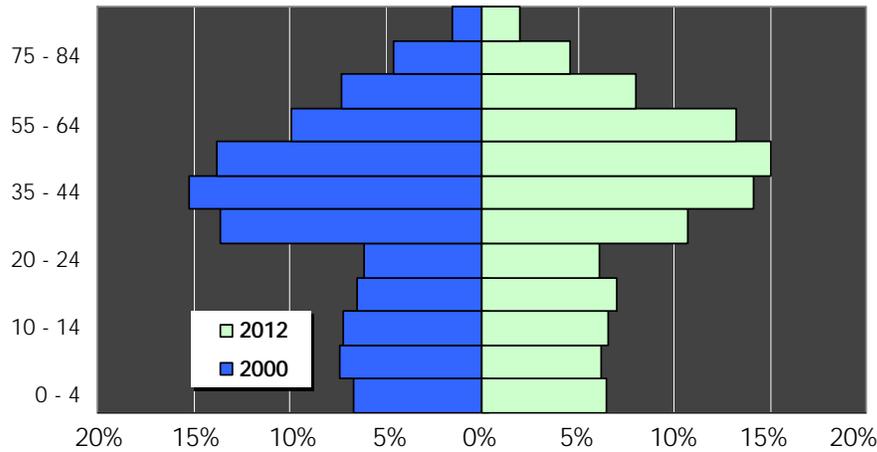
Figure 11.2. Cleveland County Demographics

Basic Demographic Profile

Cleveland	2000	2007	2012
Population	96,287	99,965	102,293
Households	37,046	38,911	40,011
Families	27,001	27,721	27,987
Average Household Size	2.53	2.50	2.49
Owner Occupied HUs	26,984	28,906	29,642
Renter Occupied HUs	10,062	10,005	10,369
Median Age	36.5	38.5	40.2

Annual Growth (2007-2012)	Cleveland	National
Population	0.5%	1.2%
Households	0.6%	1.3%
Families	0.2%	1.0%
Owner HHs	0.5%	1.3%
Median Household Income	2.5%	3.3%

Age Cohorts, Year 2000 and 2012 (forecasted)



Racial Cohorts, Years 2000, 2007 (estimated) and 2012 (forecasted)

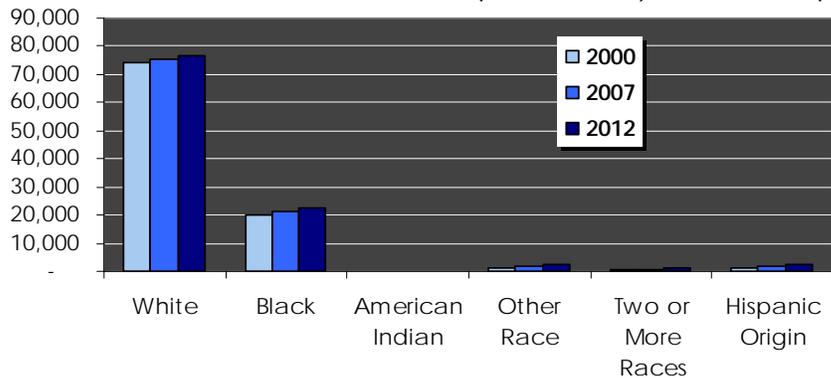


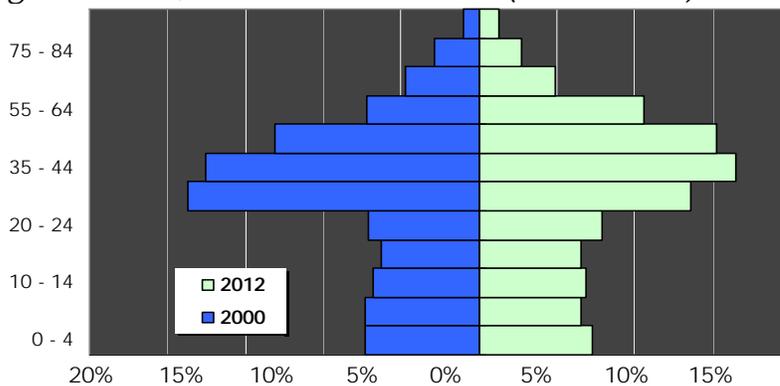
Figure 11.3. Mecklenburg County Demographics

Basic Demographic Profile

Mecklenburg	2000	2007	2012
Population	695,454	855,127	985,683
Households	273,416	341,708	395,670
Families	175,063	212,258	239,888
Average Household Size	2.49	2.46	2.45
Owner Occupied HUs	170,393	217,126	251,934
Renter Occupied HUs	103,023	124,582	143,736
Median Age	33.1	34.8	35.8

Annual Growth (2007-2012) Mecklenburg	National	
Population	2.9%	1.2%
Households	3.0%	1.3%
Families	2.5%	1.0%
Owner HHs	3.0%	1.3%
Median Household Income	3.6%	3.3%

Age Cohorts, Year 2000 and 2012 (forecasted)



Racial Cohorts, Years 2000, 2007 (estimated) and 2012 (forecasted)

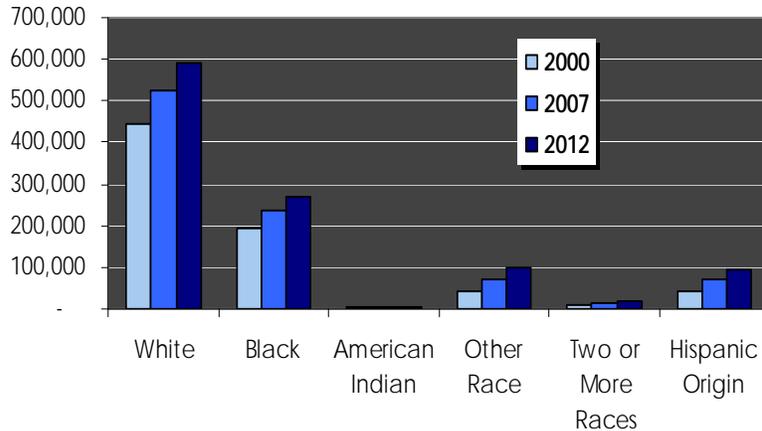


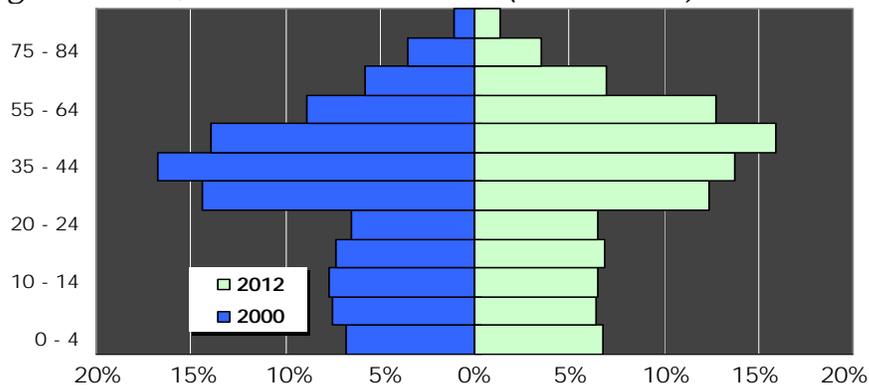
Figure 11.4 York County, S.C. Demographics

Basic Demographic Profile

York	2000	2007	2012
Population	164,614	203,817	236,493
Households	61,051	77,676	91,065
Families	44,915	55,375	63,391
Average Household Size	2.63	2.57	2.55
Owner Occupied HUs	44,629	58,109	68,207
Renter Occupied HUs	16,422	19,567	22,858
Median Age	34.9	37.3	38.5

Annual Growth (2007-2012)	York	National
Population	3.0%	1.2%
Households	3.2%	1.3%
Families	2.7%	1.0%
Owner HHs	3.3%	1.3%
Median Household Income	3.2%	3.3%

Age Cohorts, Year 2000 and 2012 (forecasted)



Racial Cohorts, Years 2000, 2007 (estimated) and 2012 (forecasted)

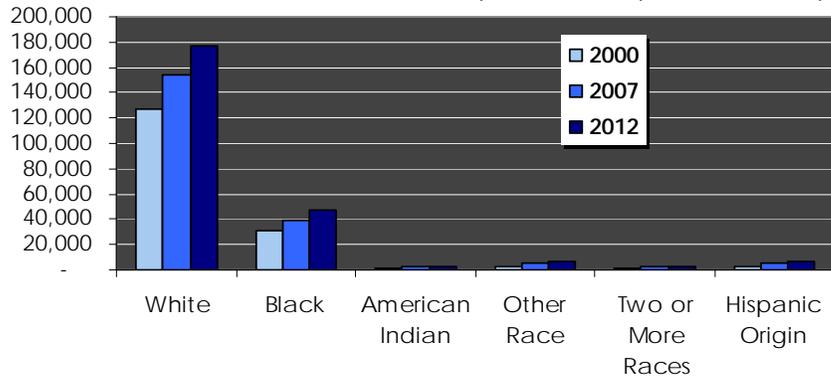


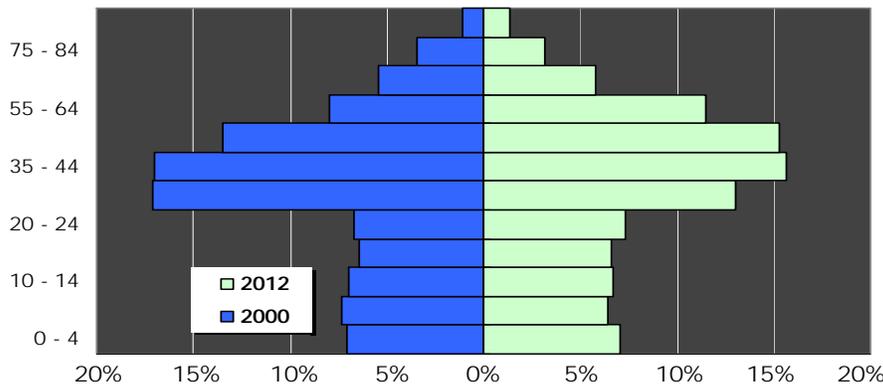
Figure 11.5. Gaston, Mecklenburg, Cleveland, York Demographics

Basic Demographic Profile

	2000		2007		2012	
	Four Counties	N.C.	Four Counties	N.C.	Four Counties	N.C.
Population	1,146,720	8,049,313	1,357,582	9,068,106	1,528,564	9,873,032
Households	445,449	3,132,013	536,586	3,583,756	607,714	3,924,768
Families	300,306	2,158,869	350,510	2,404,772	387,240	2,577,559
Average Household Size	2.52	2.49	2.48	2.45	2.47	2.45
Owner Occupied HUs	292,907	2,172,355	359,128	2,530,200	406,482	2,768,403
Renter Occupied HUs	152,542	959,658	177,458	1,053,556	201,232	1,156,365
Median Age	34.1	35.3	35.8	37.2	36.9	38.5

	2007 - 2012 Growth (est.)		
	Four Counties	N.C.	National
Population	2.40%	1.72%	1.22%
Households	2.52%	1.83%	1.27%
Families	2.01%	1.40%	1.00%
Owner HHs	2.51%	1.82%	1.29%
Median Household Income	3.47%	3.28%	3.29%

Age Cohorts, Year 2000 and 2012 (forecasted)



Racial Cohorts, Years 2000, 2007 (estimated) and 2012 (forecasted)

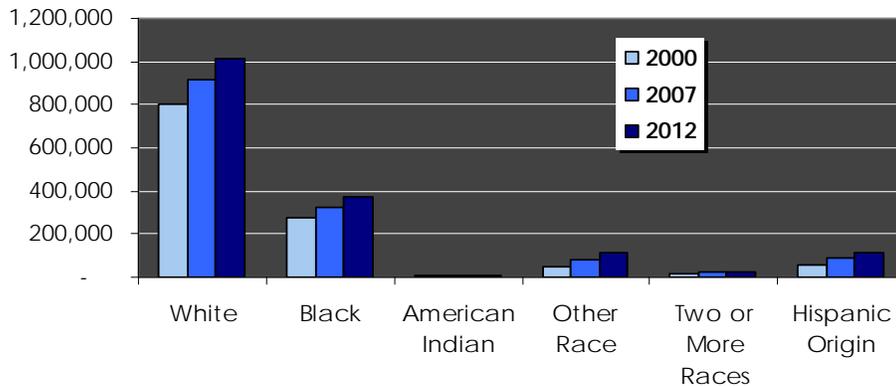
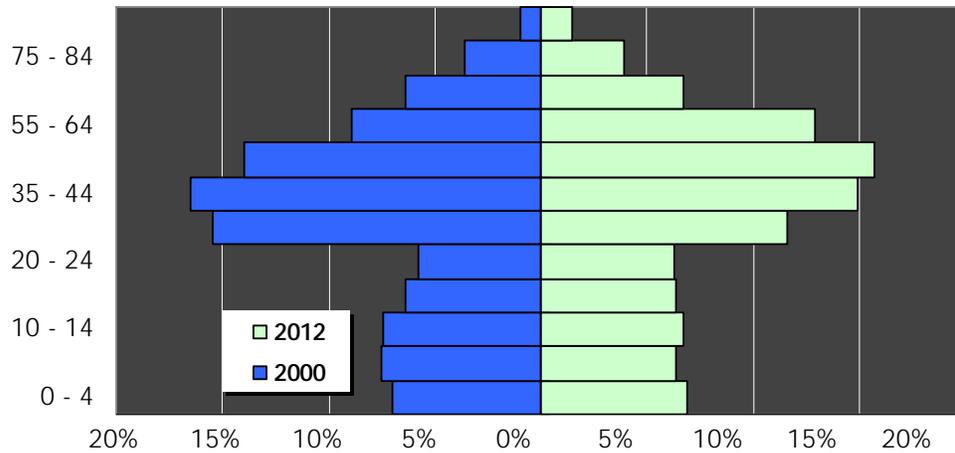


Figure 11.6. ICE Study Area Demographics

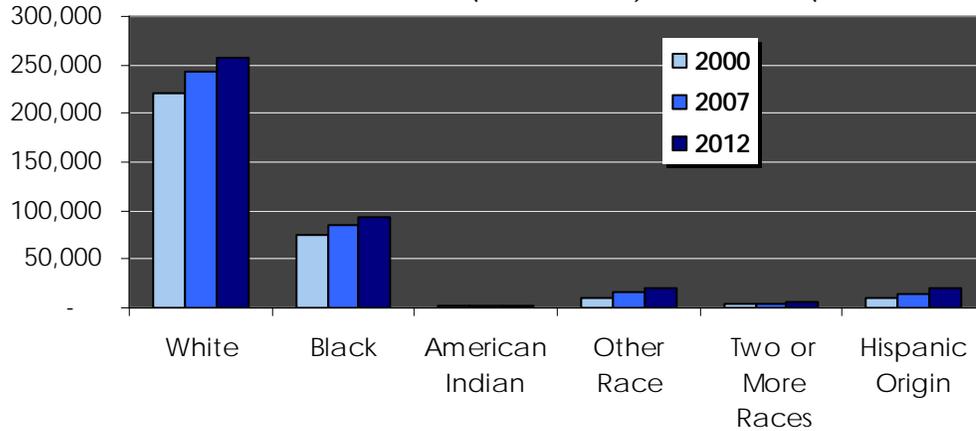
Basic Demographic Profile

	2000		2007		2012	
	ICE Study Area	N.C.	ICE Study Area	N.C.	ICE Study Area	N.C.
Population	309,245	8,049,313	349,634	9,068,106	380,121	9,873,032
Households	118,603	3,132,013	136,569	3,583,756	149,488	3,924,768
Families	85,276	2,158,869	95,401	2,404,772	102,075	2,577,559
Average Household Size	2.58	2.49	2.53	2.45	2.52	2.45
Owner Occupied HUs	81,589	2,172,355	96,387	2,530,200	105,814	2,768,403
Renter Occupied HUs	37,014	959,658	40,181	1,053,556	43,673	1,156,365
Median Age	35.3	35.3	37.5	37.2	38.9	38.5
2007 - 2012 Growth (est.)						
	ICE Study Area	N.C.	National			
Population	1.69%	1.72%	1.22%			
Households	1.82%	1.83%	1.27%			
Families	1.36%	1.40%	1.00%			
Owner HHs	1.88%	1.82%	1.29%			
Median Household Income	3.45%	3.28%	3.29%			

Age Cohorts, Year 2000 and 2012 (forecasted)



Racial Cohorts, Years 2000, 2007 (estimated) and 2012 (forecasted)



11.1 Population

Both Gaston County and Mecklenburg County experienced population growth between 1990 and 2000. Gaston County's population of 190,365 persons in 2000 was second only to Mecklenburg County (695,454) in the Charlotte MSA.¹²⁸

Gaston County has seen a steady population growth over the last forty years, but not as explosively as other Charlotte-area counties. This slower rate of growth is due in part to the Catawba River, which serves as a natural barrier to growth from the east. However, during the early 2000s, residential building permits more than doubled since the 1990s. Gaston County is beginning to see a sharp increase in growth due to the relatively easy commute into downtown Charlotte, the less expensive land cost, and one of the last areas available for significant growth in the region.¹²⁹ The City of Gastonia grew at a rate about equal to the State.

Between 1990 and 2000, the largest increases in population generally occurred south of Gastonia, along the edge of the municipal limits, followed by southeast and southwest Gaston County, and the southern districts in Mecklenburg County.¹³⁰ Among the identified districts within Gaston County, the population grew fastest between 1990 and 2000 in the Southeast from 57,958 to 66,905 persons.¹³¹ This equated to a growth rate of 15.4%. The northwest portion of Gastonia, which has the smallest population in Gaston County, increased by 11.6%, mainly because of the number of manufactured homes that were located there between 1990 and 2000. The Gaston County population is predicted to grow approximately 8.0% between 2000 and 2010 to 205,600 persons.

York County's population grew from 1990 to 2000 by 33,117 persons. This represents a 25% change gain in the total population over the span of one decade. Much of this growth is believed to be a reflection York County's proximity to the Charlotte region. Growth projections in York County suggest that between 2002 and 2025, population in York County may grow by over 100,000 persons.

11.2 Environmental Justice

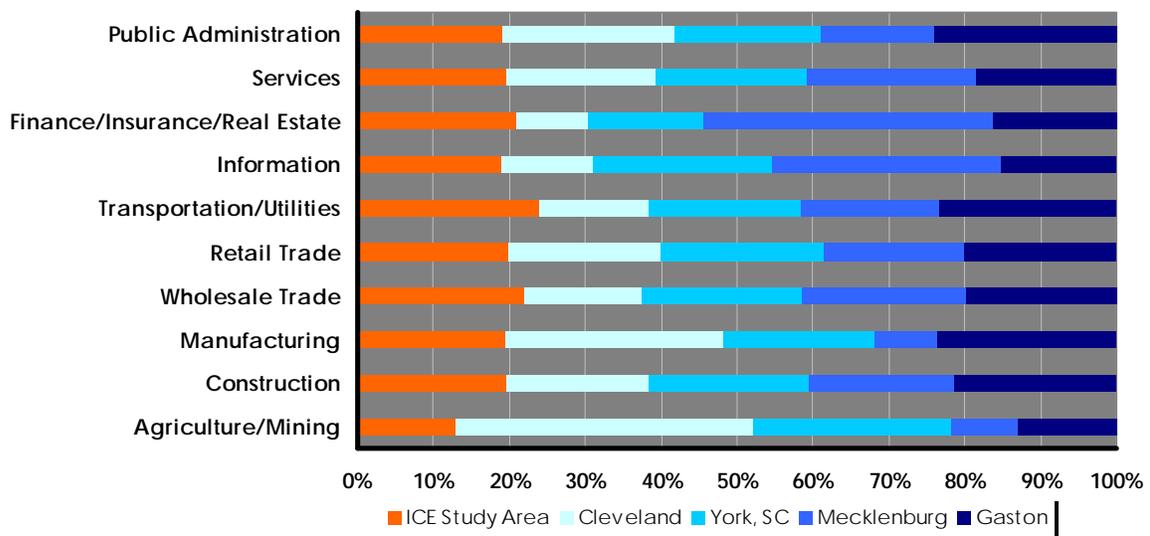
Census data at the block, county and national level from 2000 indicated that there are higher-than-average black populations within the ICE Study Area, located west of Bessemer City, west of Gastonia, and around the Charlotte-Douglas International Airport. These are generally the same locations where higher-than-average Hispanic/Latino populations also are

located.¹³² There do not appear to be any general areas where the population composition has higher-than-average senior or youth populations.¹³³ The lowest reported median incomes are generally located in the block groups concentrated south and west of Bessemer City, west of Gastonia, and around the Charlotte-Douglas International Airport.

11.3 Job Growth Rate

Gaston County's economy has historically been heavily linked to the textile industry. Decline in the textile industry over the past decade has resulted in a significant loss in basic manufacturing jobs.¹³⁴ Figure 11.7 indicates the existing employment composition of Gaston, Mecklenburg, Cleveland, and York counties, and compares the composition to the approximate ICE Study Area as a whole.

Figure 11.7 Employment Composition (2007 estimated)



Source: ESRI Business Analyst, December, 2007

As can be quickly seen from this figure, Cleveland County is still in the very early stages of the agriculture-to-services trend that has been seen in this Region as well as many others in the rest of the country. Gaston's economy is fairly evenly balanced, as is York County and the Region as a whole. Mecklenburg County, not surprisingly, has nearly completed a transition to a primarily service- and banking (or FIRE: Fire, Insurance, and Real Estate) economy, with an important contribution from the information technology sector. York and Gaston counties most closely mimic the ICE Study Area.

Over the past decade, Gaston County has seen an increase in the services and trade sectors while the manufacturing sector, largely tied to the textile industry, has lost employment. Employment, especially in the retail and service sectors, tends to follow new residential development. Gastonia is moving away from an industrial economy and shifting to service jobs, information-related jobs, and healthcare. Gaston Memorial Hospital is the only hospital in the County and is also one of the County's largest employers.¹³⁵ Between 1990 and 1999, Gaston County lost an estimated 7,702 manufacturing sector jobs, yet conversely gained approximately 7,713 jobs in the service and trade sectors.¹³⁶ The service industry in Gaston County is forecasted to represent 26.7% of the total employment for the County in 2010 with an estimated 87,300 workers by 2010.¹³⁷

Based on employment by sector projections between 1999 and 2010, an additional 1.3 million square feet of office and 1.6 million square feet of retail will be needed to meet the demand of the growing services and trade sectors. These forecasts are based on current market trends and do not reflect any major corporate or industrial relocation into Gaston County.¹³⁸

The employment projections for Gaston County presented in the *2030 Long Range Transportation Plan* show a drop in employment growth occurring between years 2000-2010 resulting from the many closings in the last several years.¹³⁹ According to GUAMPO projections, there will be some rebounding in the employment sector by 2030, although it is unlikely that the jobs will be in the textile industry.¹⁴⁰

Gaston County's five largest economic resources, in order of percent of total employment, are manufacturing; health care and social assistance; retail trade; accommodation and food services; and educational services.

Over 63% of the County's output and almost 43% of the employment in Gaston County can be clustered in eight groups:

- Motor vehicles;
- Textile;
- Construction;
- Chemicals & plastics;
- Regional medical;
- Wholesale & warehouse;
- Machinery & tools; and
- Basic metals.¹⁴¹

Gaston County has an excess of empty Class C industrial buildings (mostly abandoned textile-related mills) which have little potential for adaptive reuse except in urban areas like downtown Gastonia. More Class A and B facilities may need to be developed for recruiting new industry, and preserving undeveloped land for future industrial use instead of it being subdivided into smaller parcels by uncoordinated residential developments.¹⁴² Based on the industrial demand forecast presented in the *Cleveland-Gaston Comprehensive Economic Development Strategy* (July 2003), approximately 138,000 square feet annually between 2006 and 2012 could be required to accommodate industrial growth.¹⁴³ Industrial vacancy is directly tied to manufacturing and wholesale trade job growth. The textile industry is projected to continue shrinking, although at a significantly reduced rate from the last decade. As a result, the Gaston County Class C office vacancy rate will likely continue to climb, but at a slower pace than that of the previous decade.¹⁴⁴ According to the *Cleveland-Gaston Comprehensive Economic Development Strategy*, Gaston County's overall office vacancy rate is well within acceptable trade standards for development. Gaston County could begin to emerge as a viable multi-tenant office market by 2012 based in growth in transportation infrastructure, including the proposed project, favorable market conditions in Mecklenburg County, and increased levels of higher-income households.¹⁴⁵ The study has identified the following locations that are likely to support new office development, with the type of space described within the parentheses:

- I-85 and NC-273, near Belmont and Mt. Holly (regional park);
- Gaston Memorial Hospital (medical); and
- Union Road between Hudson Boulevard and the Gaston County Municipal Airport (small professional buildings).

Charlotte-Mecklenburg has a strong record of economic vitality, of new jobs, and an expanding tax base.¹⁴⁶ The employment boom has been led by sales and services, which tend to lag behind other sectors when comparing income. Mecklenburg County's *Strategic Business Plan 2008-2015* indicated that Mecklenburg County was experiencing positive net growth in terms of employment, and that the job growth rate in Mecklenburg for fiscal year 2006 had increased by 2.05 percent overall.

Mecklenburg County is very different from Gaston County due to the presence of North Carolina's largest city, Charlotte. Mecklenburg County's five major economic resources are retail trade; finance and insurance;

health care and social assistance; accommodation and food service; and administrative and water services.¹⁴⁷

York County has a higher percentage of its population in the labor force when compared to other counties in South Carolina, and enjoys low unemployment. Projected labor force data shows a growing labor force for York County to 2025.¹⁴⁸ York County's largest employment sector is manufacturing, employing 15% of all workers in the County. Other large employment sectors include retail trade; health care and social assistance; accommodations and food service; and local government.

Table 11.1. Population and Employment Included in the ICE Study Area

County	Employment 1990	Employment 2000	Employment Projection 2030	CHANGE (1990-2030)	Population 1990	Population 2000	Population Projection 2025	CHANGE (1990-2025)
Mecklenburg	362,936	514,223	948,291	161%	511,163	695,454	1,328,298	160%
Gaston	79,434	77,176	96,753	22%	175,104	190,365	229,697	31%
Cleveland	36,219	37,310	39,962	10%	84,702	96,287	99,040	17%
York, SC	47,983	60,749	119,161	148%	131,497	164,614	253,760	93%
Four-County Total	526,572	689,458	1,204,167	129%	902,466	1,146,720	1,910,795	112%

Sources: (1) 2000 data - US Census 2000

(2) 2007 data – ESRI Business Center (data service license maintained by The Louis Berger Group, Inc.)

(3) Employment Projection: Metrolina Regional Travel Demand Model Traffic Analysis Zones, 2006 (from Martin-Alexiou-Bryson, LLC)

(4) North Carolina State Office of Budget and Management, Projected Annual County Population Totals 2020-2029, website accessed 12.17.2008 (www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/cpa2020p.html)

(5) South Carolina Office of Research and Statistics, South Carolina State and County Population Projections 2020-2025, website accessed 12.17.2008 (www.sccommunityprofiles.org/census/proj2025.php)

11.4 Per Capita Income

Per capita income in Gaston County has lagged behind most of the ICE Study Area, with wage levels dropping, transfer payments¹, and poverty rates increasing (see Table 11.1). Mecklenburg County is the only county within the ICE Study Area with an above-state average per capita income.¹⁴⁹

¹ A transfer payment is a payment of money from a government to an individual for which no good or service is required in return.

Table 11.2 Per Capita Income

	North Carolina	South Carolina	Gaston County, North Carolina	Cleveland County, North Carolina	Mecklenburg County, North Carolina	York County, South Carolina
Per capita income in 1999	20,307	18,795	19,225	17,395	27,352	20,536

Source: American FactFinder, Census 2000

11.5 Housing Stock Mix and Value

The southeastern portion of Gaston County is estimated to surpass other portions of the County in regards to housing units. By 2010 the southeast portion of Gaston County is estimated to grow by 3,800 housing units. This volume of housing stock is followed by the northeast portion of the County that is estimated to grow to 1,900 units by 2010.¹⁵⁰

Outside the municipal boundaries, the land uses in southern Gaston County are predominately rural, with residential subdivisions scattered among large tracts of undeveloped and agricultural land. The shores of the Catawba River and the South Fork Catawba River in both Gaston and Mecklenburg counties have attracted high-end residential development.¹⁵¹

The Gaston Urban Area Metropolitan Planning Organization developed future socioeconomic projections as part of the *2030 Long Range Transportation Plan*. According to this Plan, projections for residential development opportunities indicate that during the horizon years of 2020 and 2030, the proposed Gaston East-West Connector will be instrumental in attracting housing units. It will also be instrumental in decisions to provide water and sewer lines to the southeastern portion of the County, specifically in Mount Holly, Belmont, and southeast Gastonia.¹⁵²

Median home values in York County have increased 23.5% over the six-year period 2000 to 2006, with a median home now valued at \$129,575.¹⁵³ York County's growing home values are expected to continue. Only the figures for the Charlotte region topped York County's median home values.

Mecklenburg County has reported in their 2015 Plan that Charlotte is losing their historical edge on housing affordability. Charlotte has become one of the most expensive southern cities in which to purchase a house.¹⁵⁴ Table 11.2 below indicates that Mecklenburg has the highest median housing value in the ICE Study Area.

Table 11.3 Median Housing Value

Median Housing Value	95,800	83,100	86,600	77,600	139,000	104,900
-----------------------------	--------	--------	--------	--------	---------	---------

Source: American Factfinder, Census 2000

11.6 Commuting and Accessibility

Knowing the number of people living and working in Gaston, as well as their travel behavior to and from work, is useful to describe the level of interaction between Gaston County and neighboring counties. The level of commuting interaction in turn helps to describe a “catchment” area or “commuteshed” for Gaston County residents and workers, an important consideration for developing an ICE spatial boundary.

Table 11.4 contains information on the commuting characteristics of Gaston County workers and residents.

Table 11.4 Commute Statistics for Gaston County, 1990 and 2000

Commuting	1990	2000	Change
People Who Work in Gaston County	81,326	75,116	-8%
<i>Live and Work in Gaston County</i>	64,827	56,321	-13%
<i>Live Someplace Else and Work Here</i>	16,499	18,795	14%
% workforce commuting in	20%	25%	25%
People Who Live in Gaston County and Work Elsewhere	22,854	33,020	44%
% resident workers commuting out	26%	37%	42%
Counties Where Gaston Workers Live**	1990	2000	
Gaston County	64,827	56,321	-13%
Cleveland County	4,910	5,963	21%
Mecklenburg County	3,596	3,948	10%
Lincoln County	3,421	3,166	-7%
York County, SC	2,745	2,526	-8%
Counties Where Gaston Residents Work*	1990	2000	
Gaston County	64,827	56,321	-13%
Mecklenburg County	16,624	23,101	39%
Cleveland County	2,108	2,442	16%
Lincoln County	1,458	1,868	28%
York County, SC	917	1,602	75%

* NOTE: Only Gaston and the next four counties are indicated; the counties with the next-highest number of commuters were much lower than any of the counties shown here. For example, the county with the next-highest number of residents that worked in Gaston County was Cabarrus County with 400 commuters.

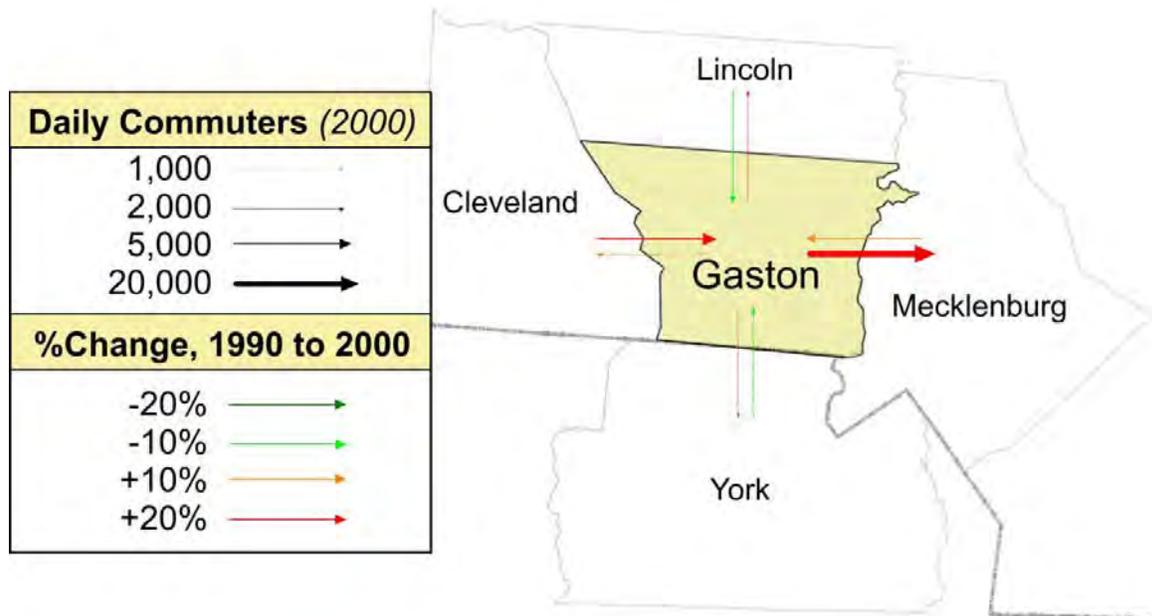
Source: US Census 2000 and Knight-Ridder

As demonstrated in Figure 11.8, Gaston County was a net exporter of workers in the 2000 U.S. Census; that is, more people live in Gaston County and work elsewhere (33,020) than commute into Gaston County (18,795). Most of the workers recorded in the U.S. Census in 2000 actually lived *and*

worked in Gaston County (56,321), although that number decreased from 1990 (64,827). The number of workers in Gaston County actually declined between 1990 and 2000 which, combined with a rapid (42%) increase in the percentage of residents that work outside of Gaston County, may be indicative of a further trend towards a reliance on external work locations for Gaston County residents. This opinion was validated by some of the local expert interviews. For the purposes of this study, the generally sharp increase of commuter interaction between Gaston and surrounding counties supplies an important indicator of an appropriate ICE Study Area.

Figure 11.8 also illustrates the same daily commuter flow information as a “desire line” map; the thickness of the arrows indicates the proportion of commuters coming into and out of Gaston County each day, while the color red represents increases in flow, and the color green represents reductions in flows between the 1990 and 2000 census periods.

Figure 11.8 Daily Commuter Flows (2000) & Percent Change (1990 – 2000)



Source: US Census 2000 and Knight-Ridder

A number of interviewees cited the increased land accessibility that the proposed Gaston East-West Connector would offer as a primary benefit of or concern associated with the project, including representatives of the Daniel Stowe Botanical Garden, Crowders Mountain State Park, and Charlotte-Mecklenburg transportation and planning staff.

A common technical method of considering changes in accessibility is to use a gravity-based travel demand model (if available) that can produce travel times from each Traffic Analysis Zone (TAZ) to every other TAZ (as well as the more typical product of forecasted traffic volumes on major roadways). Gravity models assume that the willingness of travelers to go to any destination in the modeled area is dependent on (A) the distance, or impedance, between the origin and the destination; and (B) the "attractiveness" of the destination, usually measured by number of jobs, shopping, education opportunities, etc. in each TAZ. The limitations of travel demand models, including the Metrolina Regional Travel Demand Model (MRTDM) used for this assessment, are fairly well-known: travel behaviors are assumed to be very similar to those that we see today; the model is strongly calibrated against known, recent traffic count data; and the socioeconomic data used in traditional four-step travel models are subject to inaccuracies, particularly during the attempt of forecasting new development. Nevertheless, these models are commonly accepted by the transportation industry; represent a considerable effort to obtain accuracy by a number of involved parties in the Region (for example, over \$2.5 million was invested to help provide data inputs to the 2005-2006 version of the MRTDM);¹⁵⁵ and are the best tools available for considering land accessibility changes produced by proposed transportation infrastructure improvements in most regions of the country.

Two versions of the MRTDM were considered for this study: one is the older 2006 model ("2006 MRTDM") and the newer 2007 MRTDM. Although the newer edition is better calibrated in the vicinity of the Gaston East-West Connector project, the former model has a longer history and allowed a rapid build/no-build comparison of travel times to be created, shown in Figure 11.9.

This figure suggests that the greatest travel time savings are in those geographic areas where the transportation network is the least dense and will offer the least east-west connectivity in the year 2030 under the No-Build alternative, namely York County and southern Gaston County. However, some areas around interchanges will also see improved travel time savings in the range of three to fifteen minutes. This map supports the study framework concepts of including York County in the analysis (although the travel time effects are probably overstated due to the southern geographic limits of the MRTDM). Specifically, limiting the study area limits to the west in Cleveland County; south of I-85 in Gaston and Mecklenburg counties; and tightening the eastern extents of the study area somewhat in Mecklenburg County.

Travel time isochrones – lines on a map that connect equal travel times from a single origin point – are also useful in examining the effect radius of mobility created by a proposed transportation project. In Figure 11.10, the 2007 version of the MRTDM was utilized to show the travel times near the east end of the project, and another point near the west end (shown as green dots). The maps shown in Figure 11.10 should only be used to provide another qualitative piece of information relating the potential effects of the proposed project to the surrounding communities.

The average commute time for Gaston County (as well as Charlotte) residents in 2000 was approximately 25 minutes; the average transit rider's trip length was about 36 minutes. Hence, a reasonable, maximum commuted time would be at approximately the 40-minute isochrone (marked in red dashes in Figure 11.10). The travel time isochrones clearly show some deformation around the proposed Gaston East-West Connector project, indicating that the project is influencing mobility levels in the 2030 model environment. The deformation is extended along the interchange areas, providing justification for paying special attention to those areas during the assessment of Indirect and Cumulative Effects.

11.7 Tourism

The Daniel Stowe Botanical Garden is a 450-acre tourist attraction located on NC 279 (New Hope Road) south of Belmont near Lake Wylie. Daniel Stowe Botanical Garden has been in existence for 12 years, attracting as many as 30,000 visitors per year before opening their new gardens in 1999 with an investment exceeding \$20 million. Since that time, the Daniel Stowe Botanical Garden has attracted 50,000 to 75,000 visitors per year. According to Daniel Stowe Botanical Garden's Executive Director, the Garden has the potential to attract as many as 500,000 visitors per year.¹⁵⁶ Some of those interviewed noted that the Garden management has been supportive of the Gaston East-West Connector project, noting that it would provide much better access to the property than what currently exists.

Crowders Mountain State Park covers over 3,000 acres of topographically, botanically, and zoologically diverse land and is a tourist attraction of regional notability. Six natural plant communities are found in the park, and the area supports a diversity of wildlife species. Some animals documented in the Park have not been documented elsewhere in the Country.

12.0 IDENTIFY POTENTIAL INDIRECT AND CUMULATIVE EFFECTS (STEPS 4 & 5)

Methodology Summary – This section of the report addresses potential indirect and cumulative effects of the No-Build Scenario (absence of the project), and the proposed Detailed Study Alternatives.

12.1 Indirect and Cumulative Land Use Effects

The following discussion summarizes some of the information contained in previous sections of this report, highlighting and detailing those elements that would potentially influence (or be influenced by) the Gaston East-West Connector Project. Speculation in these descriptions is kept to a minimum to emphasize the effects that are deemed likely to occur. Primarily, the descriptions rely on:

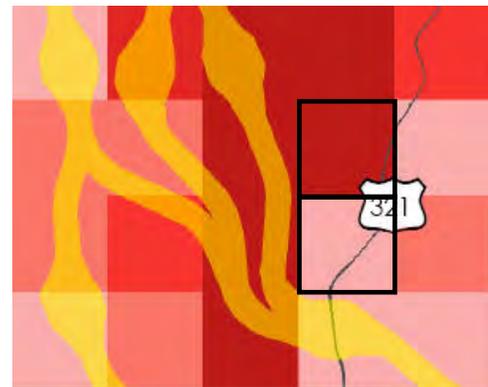
- local expert interviews;
- the policy context reviews conducted during this study as well as the Community Characteristics Report conducted earlier for this project by PBS&J (August, 2007) ;
- the review and inventory of community and habitat notable features; and
- Spatial grid analysis and mapping
 - Figure 12.1, Human and Natural Environment Sensitivity;
 - Figure 12.2, Cumulative Growth Potential; and
 - Figure 12.3, Composite of Cumulative Growth Potential and Human/Natural Environment Sensitivity;

Spatial Grid Analysis and Mapping

The spatial grid analysis addresses two key elements of indirect effects: sensitivity of the human and natural environment to change, and cumulative potential for future growth. In order to compare differences in these elements across the ICE Study Area, an analysis was conducted by dividing the study area into a grid (each square one mile per side) then using the grid cells to summarize data layers that capture sensitivity and cumulative growth potential. We first created two separate indices, one for natural and human environment sensitivity (Figure 12.1), and one for cumulative growth potential (Figure 12.2), then combined them to create a composite index (Figure 12.3). The data layers that went into each index are listed in Table 12.1, and a complete technical description of the methodology follows the table. The following is a general description and interpretation of the analysis.

To create Figure 12.1 (Human and Natural Environment Sensitivity), we collected data layers that represent aspects of the community to which negative impacts should be minimized. Data layers representing human environment sensitivity include community resources (illustrated in Figure 12.4) such as schools, churches, historic sites and historic districts, and lower-income and minority areas. Human sensitivity was combined with environmental sensitivity (e.g. floodplain, wetlands, impaired streams, etc). In total, 17 data layers were combined to create the Human and Natural Environment Sensitivity index illustrated in Figure 12.1. These layers and a full technical description of how they were combined are included in Table 12.1 and the text that follows.

In interpreting Figure 12.1, a 1-mile-square grid cell with a light shade of pink would have less sensitivity to impacts from growth than a square with dark red. For example, the light pink square outlined in black in the thumbnail graphic to the right contained two historic sites and 0.2 miles of rivers; and its land area included 40% wildlife habitat (forest + grassland/shrub), 2% floodplain and 10% prime agricultural soils. The adjacent dark red square outlined in black contained two schools, 1.1 miles of rivers, and one 303(d) impaired stream; is within the lowest quintile of household income in the study area and the highest quintile of nonwhite residents in the study area; and its land area included 14% wildlife habitat, 8% floodplain, and 14% prime agricultural soils.



To create Figure 12.2 (Cumulative Growth Potential), we collected data layers that indicate how much development could occur at a given location. These layers include the availability of public water and sewer services (illustrated in Figure 12.5), the amount of developable land (illustrated in Figure 12.6), projected population growth, presence of major roadways, and how recent nearby development was (i.e. average age of houses in the area, illustrated in Figure 12.7). Such data layers help indicate the *cumulative or general* potential for growth in an area; we also included layers representing the potential for growth specifically in response to or as an indirect effect of the proposed project. Those layers included the results from interviews where we asked participants to rate growth potential with and without the roadway (for more information on data collected in the interviews, see Appendix D), and the modeled reduction in travel time after

the proposed roadway is constructed (for more information about travel time modeling, see Section 11.6 and Figure 11.9). The full list of layers and a technical description of how they were combined are included in Table 12.1 and the text that follows.

In interpreting Figure 12.2, a 1-mile-square grid cell with a light shade of blue would have lower cumulative growth potential than a square with dark blue. For example, the land area of the light blue square outlined in black in the thumbnail graphic to the right included only 17% with access to public water services, zero access to public sewer services, and 28% developable land (either vacant or large parcels with one building); the area had an average travel time savings with the proposed project of nearly 8 minutes. The land area of the adjacent dark blue square outlined in black included 96% with access to public water services, 87% with public sewer access, and 43% developable land; the area had a travel time savings of nearly 5 minutes. Both squares contained no major roadways and had about the same difference in growth potential with and without the roadway according to interviewees.

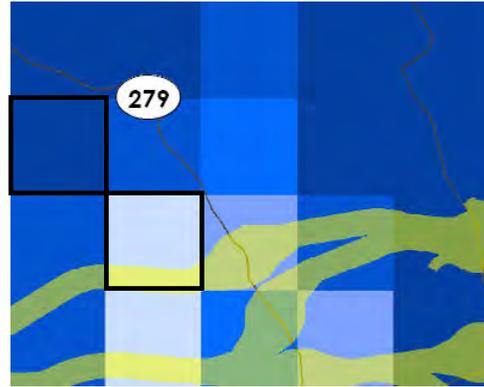


Figure 12.3 was created by combining the Human and Natural Environment Sensitivity and Cumulative Growth Potential figures. Darker squares represent areas that are both highly sensitive and have a high potential for growth. These areas may be considered at greater risk for effects from the proposed project. Lighter squares could have low sensitivity and cumulative growth potential, or high sensitivity and zero growth potential (or vice versa).

Table 12.1 Data Layers Used to Calculate Grid Indices

			Units	Min	Max
Human and Natural Environment Sensitivity					
Community resources (schools, churches, cemeteries, hospitals)	Vector point (various)	ESRI, Four counties	Number present	0	8
Historic places (sites and districts)	Vector point and polygon	Community Characteristics Report (PBS&J)	Number present	0	6
Above average % non-white population	Vector polygon	U.S. Census	Yes/no	0	1
Above average % Hispanic population	Vector polygon	U.S. Census	Yes/no	0	1
Lowest 20% of median household income	Vector polygon	U.S. Census	Yes/no	0	1
Prime agricultural soils	Vector polygon	USDA (soils), Four counties (parcels)	% of undeveloped land area	0	0.64
Wildlife habitat (forest and grassland/shrub)	Raster	NLCD 2001, corrected with 2005 and 2006 aerials from four counties	% of land area	0	0.98
Farmland	Raster	NLCD 2001, corrected with parcels from four counties	% of land area	0	0.43
Natural Heritage Element Occurrence*	Vector point	Natural Heritage Program (NCDENR)	Number present	0	8
303(d) listed stream or lake	Vector line	NCDENR, SCDNR	Yes/no	0	1
Rivers	Vector line	ESRI, Four counties	Miles	0	2.98
Critical habitat	Vector polygon	NCDENR	Yes/no	0	1
Water supply watershed II*	Vector polygon	NCDENR	Yes/no	0	1
Water supply watershed IV*	Vector polygon	NCDENR	Yes/no	0	1
Lakes	Vector polygon	ESRI, Four counties	% of area	0	0.74
Floodplain	Vector polygon	NC Floodmap, York County	% of land area	0	0.35
Wetlands	Vector polygon	National Wetlands Inventory	% of land area	0	0.31

Table 12.1 Data Layers Used to Calculate Grid Indices (Cont'd)

Layer	File Type	Data Sources	Unscaled Values		
Cumulative Growth Potential					
Public water service (current and proposed)	Vector polygon	NC Center for Geographic Information & Analysis, NC Rural Center, Gaston County, York County, City of Gastonia, Towns of Clover and Belmont, Carolina Water Services	% of land area	0	1
Public sewer service (current and proposed)	Vector polygon		% of land area	0	1
Developable parcels	Vector polygon	Four counties	% of land area	0	0.95
Difference in growth potential with and without roadway: by district	Vector polygon	Stakeholder interviews (see Appendix D)	Score	0.1	1.52
Difference in growth potential with and without roadway: by interchange	Vector polygon	Stakeholder interviews (see Appendix D)	Score	0	1.45
Recent development (average age of houses by parcel)*	Vector polygon	Three counties (Gaston, Mecklenburg, Cleveland)	Years	1939	2004
Primary roads	Vector line	NCDOT	Miles	0	5.75
Projected population growth (difference between 2000 actual and 2030 projected populations)	Vector polygon	Metrolina Travel Demand Model	People	0.26	5053
Decrease in travel time with road	Vector polygon	Metrolina Travel Demand Model	Minutes	0.01	15.08

* Layers only applicable to/available in North Carolina (absent in York County)

To create the indices, values for each data layer were calculated for the one-mile grid cells. Depending on the original data layer, the resulting values may be binary (e.g., yes/no for presence of critical habitat) or continuous (e.g., percentage of land area designated as wetlands). Table 12.1 indicates for each data layer both the units and the unscaled values. To compile the index, each data layer was rescaled to have values of zero to one (i.e. the maximum value was set equal to one, the minimum value was set equal to zero, and other values were calculated as percentages of the maximum value). For example, miles of primary roads is part of the

cumulative growth potential, so the maximum unscaled value of 5.75 miles was set to equal one. A grid cell with an unscaled value of two miles would then have a scaled value of 0.35. In this way, data layers with diverse metrics can be combined to allow relative comparisons between grid cells within the study area.

The scaled values for variables included for environmental sensitivity and for cumulative growth potential were then summed separately, and are shown in Figures 12.1, and 12.2, respectively. Grid cells with higher index values indicate that more of the data layers had high values in that area. For this initial analysis, the various data layers were not weighted in any way – each layer has equal weight in the overall value. The two indices were then separately scaled again and combined to form the composite map in Figure 12.3, again weighing the environmental sensitivity and cumulative growth potential equally. Grid cells with high values in the composite map indicate areas of relatively high sensitivity as well as high cumulative growth potential. These areas may be considered at greater risk for effects from the proposed project.

Protected lands, specifically Crowder Mountain State Park and Daniel Stowe Botanical Gardens, are shown as white/blank areas in Figures 12.2 and 12.3 because they are permanently protected from development (thus there is no cumulative growth potential). Developed land is included in the analysis since it has the potential to be redeveloped more intensively. Undeveloped land is given priority over developed land in the analysis by inclusion of the developable parcels layer, as well as the projected population growth layer (which would give lower values for already-developed areas and higher for those currently vacant).

With three exceptions, all data layers were available for the entire ICE Study Area. Two exceptions are Natural Heritage Element Occurrences and Water Supply Watersheds, which occur in North Carolina but have no corresponding programs in South Carolina. Thus, there are no values for these layers in York County. An additional exception is Recent Development, which was calculated based on the year built contained in the parcel databases. Although the parcel database for York County was acquired, year built data was not available at the time this analysis was conducted. As a result of the lower potential maximum value in York County, steps were taken to avoid potential bias against that area. In the display of Figures 12.1, 12.2 and 12.3, values for York County were scaled separately from those of other counties. Therefore, the maximum value in

York County is shown as the same color/quintile as the maximum value in other counties, although the numeric values may be different.

The following descriptions cover the four counties in the ICE Study Area, with subsections for county-level indirect effects, then within indirect effects a discussion of specific district and interchange-level indirect effects; and county-level cumulative effects. The interchanges discussed in this chapter are illustrated in Figure 12.8 Alternative Interchanges.

12.1.1 York County

Indirect Effects. Of the entire study area, York County tends to be the most rural in its northern reaches which, although in a different state, are in closer proximity to the majority of the project than other, adjacent North Carolina counties. The staff of the York County government (interviewed on October 18, 2007) did indicate some concerns about indirect effects, but generally stated that the project would not alter the pace or character of development. Also noted was the change in travel patterns, which might influence some travelers from North Carolina to not drive through South Carolina for certain destinations. However, in terms of measurable accessibility (2007 Metrolina Regional Travel Demand Model), the project would influence regional travel times in some areas in double-digit minutes saved.

The proposed Gaston East-West Connector is consistent with initiatives established in York County including programs such as *Pennies for Progress* in that it provides an improved transportation system for York County residents and businesses that may want to travel into Gaston or Mecklenburg Counties in North Carolina.

District and Interchange-Level Effects. While no interchanges are located in York County, preliminary accessibility and mobility assessments indicate that reductions in travel time will occur in both of the two districts (Districts 9 and 10) in York County. Conversations with the planning, engineering, and management staff of York County suggested that the interchanges of the proposed project are too distant to have much influence in York County; this is especially true of the northern alignment options. When asked if the study area could be reduced to the north side of Clover, they responded that they could see no reason why that would influence the quality of the ICE study.

Cumulative Effects. York County staff noted that other roadway projects, such as improvements to US 321 and SC 49, were much more responsible

for influencing and contributing to secondary development in the area. A surplus of water and sewer capacities (more the former) have helped push growth in the few areas where public utilities are available (e.g., Clover, South Carolina). York County's low tax rate and quality of life aspects were felt to be strong attractors for new growth and development. South Carolina and York County do have some tools for managing growth, such as an Adequate Public Facility Ordinance (APFO) that is being developed now. The County Manager made a specific point of stating that concerns about development / stormwater effects from development in York and Mecklenburg / Gaston counties would contribute to water quality degradation in York County and the Catawba River, specifically.

Water quality within the Catawba River Basin is likely to be affected cumulatively as development contributes to the current trend of increased impervious surfaces in the York County portion of the ICE Study Area. Water resources having the potential to be cumulatively affected by non-point source pollution resulting from other actions associated with the proposed project includes the Catawba River, Lake Wylie, and Crowders Creek, a Section 303(d)-listed stream.

12.1.2 Cleveland County

Indirect Effects. Interviews conducted during the project indicated that those interviewed believed that Cleveland County would not be influenced by the Project to any discernable degree in terms of accelerating or changing development patterns. Cleveland County is already undergoing a significant trend toward suburbanization. Travel times from Cleveland County would be affected by the Project for destinations to the east, particularly "long-haul" trips that would use the entire project; for example, trips to and from the Charlotte-Douglas International Airport or Daniel Stowe Botanical Garden.

The proposed Gaston East-West Connector is consistent with Cleveland County's Land Use Plan in that it would provide an improved transportation network to residents traveling to and from destination to the east of the county.

District and Interchange-Level Effects. None of the proposed interchanges for any alternative alignment are within Cleveland County, and the sole district that was considered as a part of the ICE Study Area is too distant from the proposed project (according to those interviewed that spoke about Cleveland County) to feel any indirect economic effect.

Cumulative Effects. This assessment did not identify any potential cumulative impacts associated with other actions occurring or likely to occur in portions of Cleveland County included in the ICE Study Area.

12.1.3 Mecklenburg County

Indirect Effects. Mecklenburg County, as it has done for several years, continues to develop at a fast pace, which includes a greater proportion of infill development as the outer limits of the County are being reached. Historically, the west side of the County has been the slowest to develop in part due to the presence of the airport. However, growth produced from the Gaston East-West Connector is expected to be very minimal, although the roadway would potentially accelerate non-residential construction plans, again, most particularly in the area of the airport.

The proposed Gaston East-West Connector is consistent with Charlotte-Mecklenburg *2015 Plan* and Mecklenburg County's *2008-2010 Strategic Business Plan* in that it will contribute to the accommodation of transportation needs that are anticipated with expected growth in the western portion of the county including non-residential construction plans.

District and Interchange-Level Effects. Mecklenburg County has two districts: District 5 (north of I-85 and NC 74) and District 6 (south of I-85 to the county/state line). The northern-most district (5) was cited as an area of rapid residential and commercial growth, sponsored not by any anticipation of the proposed project, but by other roadway improvements well to the north of the proposed Gaston East-West Connector. District 6 is dominated by the Charlotte-Douglas International Airport, as discussed previously. However, the demand for homes on the east side of the Catawba River has increased, which may contribute more to stormwater runoff contributions in this watershed.

Interchange K (K3C; K1D; K4A) with Dixie River Road and the interchange with I-485 (terminus of the Gaston East-West Connector) are located within Mecklenburg County (see Figure 12.9). The interviewees did not provide much distinction between the two Interchange K options. In general, having additional transportation access in this general location would serve burgeoning non-residential development around I-485 as well as the high-end housing that is starting to appear around the waterfront areas.

Cumulative Effects. The western side of Mecklenburg County has been growing rapidly in recent years, as other parts of the County (particularly the north and southeast) have reached near-capacity for the preferred

type of single-family, detached dwelling units, and demand for moderately-priced housing has pushed demand to the formerly slow-growing west side. An important generator of cumulative effects is Charlotte-Douglas International Airport, which is currently expanding (A) roadway access points; (B) adding a fourth runway on the west side of the facility; and (C) creating a new intermodal (rail switching area) facility on the existing airport site. Additionally, new storage, flex-space, and distribution facilities will be added with or without the presence of the Gaston East-West Connector, contributing to passenger and freight traffic; associated emissions; secondary support employment opportunities; and demand for moderately-priced housing and retail shopping opportunities.

Actions including the airport expansion, residential and commercial development and infrastructure improvements in Mecklenburg County have the potential to cumulatively impact water quality through erosion and stream sedimentation in the absence of stormwater management regulations requiring Best Management Practices. Water resources having the potential to be cumulatively affected by non-point source pollution include the Catawba River, Beaverdam Creek; Legion Lake and Shoaf Lake and Section 303(d) listed streams located in the southwest portion of the county. Section 303(d) streams with the potentially to be cumulatively affected include:

- Irwin Creek;
- Little Sugar Creek;
- McAlpine Creek; and
- Dallas Branch.

Construction of the proposed project also has the potential to add to forest fragmentation and wildlife habitat disturbance in the southwest section of the County.

12.1.4 Gaston County

Indirect Effects. Growth and development is prevalent in Gaston County. Historically, many of Gaston County's municipalities such as Cramerton and Belmont have served as bedroom communities to Charlotte. Development in these areas has been predominantly residential and retail oriented. This growth trend has been carried into the present. One notable reason for this growth trend is limited access across the Catawba River. The construction of the Gaston East-West Connector would provide another access route across the Catawba River in the southeast portion of Gaston County, potentially facilitating more growth and development in the southeast and southern portions of the County. The project would also provide better

access to the west and northwest portion of the County, potentially changing the existing growth pattern that today is primarily residential and commercial to more light industry growth.

The Gaston East-West Connector is consistent with the stated need in the *2030 Long-Range Transportation Plan* to provide significant infrastructure in Gaston County to accommodate existing and future growth. The proposed Gaston East-West Connector has been included in Gastonia's *2010 Comprehensive Plan* and is consistent with land use strategies to manage existing and anticipated new growth in Gastonia.

District and Interchange-Level Effects. Mecklenburg County has two districts: District 5 (north of I-85 and NC 74) and District 6 (south of I-85 to the county/state line). The northern-most district (5) was cited as an area of rapid residential and commercial growth, sponsored not by any anticipation of the proposed project, but by other roadway improvements well to the north of the proposed Gaston East-West Connector. District 6 is dominated by the Charlotte-Douglas International Airport, as discussed previously. However, the demand for homes on the east side of the Catawba River has increased, which may contribute more to stormwater runoff contributions in this watershed.

The only service interchanges on the east (Mecklenburg) side of the Gaston East-West Connector are Dixie River Road Interchange and the I-485 Interchange. The interviewees did not provide much distinction between the interchange options; however, the additional access clearly would serve burgeoning non-residential development around the interchange as well as the high-end housing that is starting to appear around the waterfront areas.

For the purposes of this report, Gaston County was split into districts (shown in Figure 3.2). The potential effects of each district with and without the proposed project are discussed below.

- District 2 (north of I-85, includes Bessemer City) is an area characterized by high residential and commercial development north of I-85. According to planning officials, an industrial parkway that would connect industrial development to Bessemer City is in the planning stages. Gaston County's Economic Development Council is currently working with Bessemer City to attract light industry to the area. Construction of the proposed project would benefit Bessemer

City's attempts to attract industrial growth in the City by improving access to the Charlotte Region.

Future growth patterns in Bessemer City in the absence of the proposed project would likely follow existing patterns and consist of mixed residential and commercial growth, particularly in the Edgewood Road area.

- District 3 (north of I-85, includes Lowell, McAdenville, Ranlo and Spencer Mountain) has high residential potential, especially in the vicinity of Spencer Mountain. The proposed Gaston East-West Connector has the potential to improve roadway capacity on US 74 and I-85 to allow more development to occur in this District.

Future residential growth patterns in this district in the absence of the proposed project would likely occur adjacent to access roads north and south of I-85.

- District 4 (north of I-85 and west of the Catawba River) has existing mixed use residential and commercial development. Future growth in this district is restrained due to current sewer capacity issues. Construction of the proposed project is anticipated to have negligible effects on this District.
- District 7 (south of I-85 and west of the Catawba River, including Belmont and Cramerton) is experiencing rapid residential growth, especially near the waterfront and in coves of the Catawba River and South Fork Catawba River. The proposed Gaston East-West Connector would improve access to developable land in this District and provide travel time savings for those wanting to live in Gaston County and commute to the Charlotte Region. The anticipated growth in this District would be predominantly residential, but there is some opportunity for commercial and light industry as well. Future growth in this District is relatively restrained due to the need for utility infrastructure expansion and the need for more schools.

This area is anticipated to continue to grow without the construction of the proposed project, but not as rapidly.

- District 8 (south of I-85, east of Crowders Mountain State Park and south of Bessemer City) is experiencing rapid residential growth. Industrial or commercial growth in this area is unlikely due to its close

proximity of segments in these Detailed Study Alternatives to cultural resource sites. Crowders Mountain State Park and the desire of community leaders to keep this area more pristine. The proposed project site is near Crowders Creek, a 303(d) listed stream, and wetlands which could restrain future development.

This area is anticipated to continue to grow without the construction of the proposed project, but not as rapidly.

The interviewees did not provide much distinction between interchange options in most cases, which allowed the grouping of interchanges when assessing potential effects. The potential indirect effects associated with the proposed interchanges follows.

- Interchange A (H1A; H2A, I-85 Interchange) has some existing commercial land use and areas that are being redeveloped (see Figure 12.10). If the proposed project is constructed, this interchange area is anticipated to develop more commercially than it is currently.
- Interchange B (H1A; H2C; H3, Interchange NC 29/NC 74) has experienced some recent residential development near the interchange locations stemming from Bessemer City (see Figure 12.10). If constructed, the Gaston East-West Connector could change land use in the future from predominately residential to more commercially oriented land use. Construction of an interchange in this area may affect water resources, including wetland areas and Crowders Creek, a Section 303(d) listed stream.
- Interchange C (H1A; H2C; H3, Linwood Road) has some residential development and adequate utility infrastructure (see Figure 12.11). It is unlikely that any development other than residential will occur here in the future due to these interchange areas being a part of the scenic landscape of Crowders Mountain State Park. Currently, zoning regulations accommodate residential development in these areas. Construction of the proposed project may hasten the rate in which residential development occurs due to improved access. Construction of an interchange in this area would improve access to Crowders Mountain State Park.
- Interchange D (H1C, Lewis Road) has residential development (see Figure 12.12) at the luxury end of the housing market for the area. Much of the developable land is zoned residential due to its proximity to Crowders Mountain State Park. Construction of the proposed Gaston East-West Connector may hasten the rate in which residential development occurs due to improved access to the Charlotte

Region. Construction of an interchange in this area would improve access to Crowders Mountain State Park.

- Interchange E (J1A; J4A, Interchange NC 321) area land use consists of some single family residential developments; numerous mobile home parks and industrial development (see Figure 12.12). Much of the existing development is adjacent to US 321. Areas in the vicinity of the proposed interchange of the Gaston East-West Connector and US 321 south of Gastonia are suitable for infill development and redevelopment that enhances existing industrial uses.¹⁵⁷ With the opening of the interchange, traffic patterns will shift and accessibility to the area will improve. New development that includes a variety of office, distribution and light industrial space could be strengthened in this area as an employment center.¹⁵⁸

County officials indicated during interviews that there was a planned mobile home park near the interchange area. Construction of the proposed Gaston East-West Connector may accelerate the rate at which residential development occurs due to improved access.

- Interchange F (J1C; J2C/J2D, Robinson Road) is located amongst developable land parcels (see Figure 12.13). The potential for residential development is moderate due to sewer pumping issues, which may limit residential and commercial development. A poultry processing plant is located southeast of proposed J1C, which may limit development in areas that are downwind of the plant. Construction of the proposed Gaston East-West Connector may accelerate the rate in which residential development occurs due to improved access.
- Interchange G (J2D; J1C, Bud Wilson Road) is sparsely developed for residential use (see Figure 12.13). Development in the future with or without the construction of the Gaston East West Connector is limited due to difficulty in getting public water and sewer services provided in the area.
- Interchange H (K1C; K3A; K2A, Union Road) is experiencing rapid growth with mixed use, residential, commercial and residential land uses (see Figure 12.14). The development trend is anticipated to continue in the future with or without the proposed project due in large part to this area being a gateway into Daniel Stowe Botanical Gardens. Gaston County recently approved a large site plan (residential) in the proposed Detailed Study Alternatives. Construction of an interchange in this area would improve access to Daniel Stowe Botanical Gardens. The expected increase in tourism is likely to add additional pressure in this area for additional retail and other commercial commerce.

- Interchange I (K2A; K3A; K1C, New Hope Road) is experiencing a notable amount of new residential development, especially adjacent to US 279 (see Figure 12.15). A small portion of this development is believed to be in anticipation of the proposed East-West Connector. By and large, the recent residential development trends in this area have been spurred by other transportation improvements, such as the recent completion of I-485. Future development with or without the project is anticipated to be mixed use, residential and commercial, although the proposed project would hasten the rate of development in this interchange area. Construction of an interchange in this area has the potential to affect water resources, including wetland areas and Catawba Creek, a Section 303(d) listed stream.
- Interchange J (K4A; K1D; K1X, South Point Road) is experiencing rapid residential development adjacent to New Hope Road (see Figure 12.15). With or without the Gaston East-West Connector, future development is anticipated to be mixed-use. Proposed interchange K1D may promote potential commercial uses.

Cumulative Effects. The northwest, south and southeast portions of Gaston County have historically grown in a sprawl-like pattern branching out from the City of Gastonia. Recent growth along US 273, NC 274 and NC 279 provides evidence of this pattern. Residential development has been relatively strong near the waterfront and coves of the Catawba River and South Fork Catawba River. In addition to the availability of developable land, an important generator of cumulative effects in Gaston County is its proximity to the Charlotte Region and the Charlotte-Douglas International Airport. The proposed project would improve accessibility to potentially developable land in the southern and western portions of the County. If constructed, the Gaston East-West Connector would reduce travel times from those potentially developable parcels of land to the Charlotte Region and hence is anticipated to attract more residential development to the County.

The effect of growth and development is putting increased pressure on the County's water and sewer infrastructure and school system. According to planning officials, Gaston County is currently looking at potential build sites for at least one new school in the southern portion of the County.

Actions including residential and infrastructure improvements in Gaston County have the potential to cumulatively impact water quality through erosion and stream sedimentation in the absence of stormwater

management regulations requiring Best Management Practices. Increasing levels of non-point source pollution associated with increasing impervious surfaces and land disturbing activities are anticipated with the construction of the proposed project. Water resources having the potential to be cumulatively affected by non-point source pollution include the Catawba River and the following Section 303(d) streams:

- Abernathy Creek;
- Catawba Creek;
- Crowders Creek;
- McGill Creek; and
- Blackwood Creek.

The construction of the proposed intermodal facility at Charlotte-Douglas International Airport would also support such land use. Construction of a proposed inter-modal facility at Charlotte-Douglas would be expected to increase truck traffic and automotive traffic in the vicinity of the Airport, especially between the inter-modal facility and the I-485/West Boulevard Interchange and the proposed Gaston East-West Connector. Other cumulative effects such as increased noise levels from rail, truck and automobile traffic would be possible.

Construction of the proposed project also has the potential to add to forest fragmentation and wildlife habitat disturbance in both the southern and western portions of the County.

12.2 Surface Water Resources and Aquatic Habitat Effects

Non-Point Source Pollution

Indirect Effects. Potential direct effects to riparian buffers may have indirect effects on the functionality of a riparian buffer system as a whole. Riparian buffers help to preserve water quality and aquatic habitats by filtering nutrients and sediment from non-source pollution that would otherwise reach a water resource. Interrupting the contiguity of the riparian buffer system will reduce the nutrient and sediment removal efficiency range depending on the amount of buffer that is modified or removed.

Indirect effects to wetlands associated with the proposed Gaston East-West Connector are likely to be caused by land use modification within contributing drainage areas to wetlands.¹⁵⁹ Both upland development and downstream crossings could change the hydrologic regime of a wetland, resulting in a greater magnitude of non-point source pollutants than predevelopment or existing conditions.¹⁶⁰

Detailed Study Alternatives numbered 58; 64; 65; 68; 76; 77; 78; and 81 (shown in Figure 1.3) would have comparable levels of indirect effects on water quality and aquatic habitat as a result of induced development. The proximity of segments H2A, H3 and H2B to portions of Crowders Creek in the west area (generally west of US 321) of proposed alternatives would be expected to have the greatest amount of stormwater runoff effects in the absence of Best Management Practices for Detailed Study Alternatives numbered 4; 5; 6; 9; 22; 23; 24 and 27. The longevity of indirect impacts is dependent on the magnitude and duration of upstream hydrologic events including sediment inputs (in absence of local stormwater ordinances and BMPs), flooding, land use change (including changes in land use regulations) and, ultimately, watershed stability.

Detailed Study Alternatives with segment K4A in the eastern portion of Gaston County, (generally east of NC 279 or the South Fork Catawba River) upstream of York County, have a greater potential to indirectly affect National Wetland Inventory (NWI) areas. These Detailed Study Alternative numbers are 5; 23; 64; and 77. Detailed Study Alternatives numbered 4; 6; 9; 22; 24; 27; 58; 65; 68; 76; 78; and 81 would have comparable level of indirect effects and cumulative effects to NWI wetlands.

Residential and commercial/retail development is anticipated to continue within the ICE Study Area in the absence of the proposed project; thus it is likely that the No-Build alternative (absence of the project) would involve future degradation of water quality, but not as quickly or to the magnitude of any one of the Detailed Study Alternative scenarios.

Cumulative Effects. Anticipated growth associated with the construction of the Gaston East-West Connector is expected to increase the amount of impervious surfaces within the ICE Study Area. Water quality of the Catawba River is likely to be affected cumulatively as development reveals a pattern of increased impervious surfaces through the construction of buildings, parking areas and roadways.¹⁶¹ The volumes of non-point source pollution expected from the anticipated increase in impervious surfaces can be quantitatively analyzed to determine the significance of this effect. A quantitative analysis is outside the scope of the current study, yet the effect of increased impervious surfaces is believed to be substantial based solely on the amount of land having the potential to be developed as identified in this report.

The proposed project and associated growth and development in the ICE Study Area will increase the amount of soil disturbing activities, thus

increasing the risk of stream sedimentation and turbidity from construction-related erosion.

Atmospheric deposition from increased vehicle traffic and hydrocarbon and chemical runoff from the proposed project that are deemed likely to occur in the ICE Study Area will add cumulatively to non-point source pollution in the south and southwestern portions of Gaston County. The anticipated relief of traffic congestion within the municipal boundaries of Gastonia may lessen the effects of non-point source pollution from vehicle traffic in Gastonia.

Increased non-point source pollution from impervious surface runoff and atmospheric deposition could overload a water resources assimilative capacity and consequentially result in the deterioration of water quality and aquatic habitat.¹⁶²

Detailed Study Alternatives numbered 58; 64; 65; 68; 76; 77; 78; and 81 (shown in Figure 1.3) would have comparable levels of cumulative effects to water quality and aquatic habitat as a result of other actions increasing the level of impervious surfaces. The proximity of segments H2A, H3 and H2B to portions of Crowders Creek in the west area (generally west of US 321) of proposed alternatives would be expected to have the greatest amount of stormwater runoff effects in the absence of Best Management Practices for Detailed Study Alternatives numbered 4; 5; 6; 9; 22; 23; 24 and 27.

12.3 Terrestrial Community Effects Associated with Induced Growth and Land Use Change

Indirect Effects. Indirect effects to terrestrial communities include forest fragmentation and the conversion of forest habitat due to land use changes.¹⁶³ Fragmentation refers to the process of intact forest landscapes being divided into smaller pieces. In some cases, fragmentation is used to describe the effects of a species being isolated or cut off from one another or from new habitats. Fragmentation is assumed to have the potential to occur where a Detailed Study Alternative is proposed on new location in forested areas and other terrestrial communities that provide habitat for wildlife species.

Approximately 40% of the land area in Gaston County and the southwestern portion of Mecklenburg County remain undisturbed as woods or forest.¹⁶⁴ As discussed in the Natural Resources Technical Report (NRTR)

for this project seven terrestrial communities were identified within the project area:

- Agricultural;
- Clearcut;
- Hardwood forest;
- Mesic mixed hardwood forest;
- Mixed pine-hardwood forest, pine forest, pine plantation;
- Successional; and
- Disturbed.

Each build Detailed Study Alternative has the potential to indirectly affect terrestrial communities through fragmentation. The degree of effect would vary depending on the various species specific factors including their modes of mobility and range of habitat. This fragmentation is anticipated to be the product of road construction and associated land use change. The degree of effect associated with fragmentation is based on the amount of habitat edge that is added to an intact forest landscape. Introduction of additional habitat edge may alter the composition of natural communities and the wildlife species that inhabit those communities. While the alteration of a forest landscape may benefit some species residing in a community (i.e. predatory species) it can be detrimental to other species and may lead to the loss of their foraging and breeding habitats. Animal species may also be displaced into surrounding communities.¹⁶⁵ These effects are anticipated to be both long term and short term.

Detailed Study Alternatives with segments H1C, J1C, K1A and K4A have a greater potential to indirectly affect upland species due to fragmentation in that they are located the farthest distance away from previously fragmented forestland. These Detailed Study Alternatives are: 5; 6; 23; 24; 27; 58; 64; 65; 68; 77; 78; and 81 (shown in Figure 1.3). Detailed Study Alternative numbers 4; 9; 22; and 76; would have comparable level of indirect effects due to habitat fragmentation.

Residential and commercial/retail development is anticipated to continue within the ICE Study Area in the absence of the proposed project; thus it is likely that the (absence of the project) Alternative would involve future degradation of wildlife habitat, but not as quickly or to the magnitude of any one of the Detailed Study Alternative scenarios.

Cumulative Effects. Habitat lost to wildlife is a result of not only transportation actions but also timber harvesting, agricultural conversion

and urban and residential development and other actions. Considering that much of the ICE Study Area has some degree of fragmentation due to existing roadways, utility corridors and residential, industrial and commercial development, it is likely that the proposed project and its associated development will substantially affect terrestrial communities in the ICE Study Area when added cumulatively to other land altering actions (see Figure 12.16).

12.4 Effects to Threatened and Endangered Species

Indirect Effects. An assessment of potential effects to threatened and endangered species was completed as part of the environmental/NEPA review of the proposed project and included in the project's Natural Resources Technical Report (NRTR, August 2007). Federally listed threatened or endangered species in the ICE Study Area include:

- Bog turtle;
- Carolina heelsplitter;
- Michaux's sumac;
- Schweinitz's sunflower; and
- Smooth coneflower.

This assessment indicated that out of the five species on record of occurring within NRTR study area boundaries, only one, the Schweinitz's sunflower (*Helianthus schweinitzii*) had the potential to be directly affected by the proposed project, yet not adversely.¹⁶⁶ One population of Schweinitz's sunflower was found within the study boundary of one project Detailed Study Alternative segment (K2A).¹⁶⁷ The habitat for this species includes power line easements, roadsides and open areas. Implementation of the Detailed Study Alternatives may indirectly modify existing habitat for the Schweinitz's sunflower through land use change and/or may create new habitat areas along side of the proposed roadway or other roadways association with anticipated growth and development. Detailed Study Alternatives with segment K2A have a greater potential to indirectly modify existing habitat for the Schweinitz's sunflower through land use change and /or may create new habitat areas along side of the proposed roadway or other roadways associated with anticipated growth and development. These Detailed Study Alternatives are: 4, 22, 58, and 76 (shown in Figure 1.3).

The No-Build Alternative has the potential to affect the habitat of the Schweinitz's sunflower but not as rapidly or to the degree of any one of the Detailed Study Alternatives.

Cumulative Effects. The potential exists for the bog turtle to be affected by the proposed build Detailed Study Alternatives to an equal degree due to the cumulative effects of habitat fragmentation and cumulative effects of land use change. Bog turtles require open wetland habitats. According to the project's NRTR, potential habitat exists for this species in the NRTR study area. When added cumulatively with past land use change from wetlands to agricultural and other land uses, construction of the proposed project and related land use change poses a threat to the existing conditions of waterways and wetland complexes that may serve as habitat for the bog turtle. The No-build alternative has the potential to cumulatively affect the habitat of the Bog turtles but not as rapidly or to the degree of any one of the Detailed Study Alternatives.

The project NRTR indicates that the Carolina Heelsplitter does not occur in the project vicinity. The North Carolina Natural Heritage Program (NCNHP) does not list any known populations up or downstream of the proposed project site. There are no known occurrences in the Catawba River and Beaverdam Creek. Therefore, no ICE on the Carolina Heelsplitter are anticipated to occur with any one of the Detailed Study Alternatives or the No-build alternative.

Potential habitat for Michaux's sumac occurs throughout the ICE Study Area. No population of Michaux's sumac was found during biological field assessments conducted as part of the project NRTR. NCNHP records did not document the location of any known populations of the sumac in or immediately adjacent to the proposed Detailed Study Alternatives. According to the US Fish and Wildlife Service in the 100 years following its discovery in 1895, half of all the historic occurrences were extirpated, largely due to habitat conversion to agriculture and other uses. Other ongoing threats include the nearly universal suppression of natural fires within this species' range, hybridization with other species, geographic fragmentation and isolation of small, single-sex populations, and the potential for accidental destruction of roadside and other vulnerably situated populations.¹⁶⁸ Implementation of any one of the Detailed Study Alternatives has an equal potential to cumulatively affect this species when considered with other actions that have adversely affected the sumac habitat. These effects are anticipated to be negligible in terms of severity. The No-build alternative has the potential to affect Michaux's sumac habitat in a cumulative fashion but not as rapidly or to the degree of any one of the Detailed Study Alternatives.

Habitat for the smooth coneflower is present in the project area, yet this plant was not found during field investigation conducted as part of this project's NRTR. NCNHP records did not document the location of any known populations of the smooth coneflower in or immediately adjacent to the NRTR project area. The proposed Detailed Study Alternatives have the potential to cumulatively affect this species to an equal degree when considered with other actions that have adversely affected the smooth coneflower habitat. These effects are anticipated to be negligible in terms of severity. The No-build alternative has the potential to affect smooth coneflower habitat in a cumulative fashion, but not as rapidly or to the degree of any one of the Detailed Study Alternatives.

12.5 Socioeconomic Effects

Indirect Effects. Indirect economic effects include the economic effects of potential land use changes, the potential economic gains of various communities and the economic travel time savings to residential and business users in the ICE Study Area.

Gaston County is likely to continue to see sharp increases in growth with or without the construction of the proposed project. Municipal sewer service and water infrastructure has not been extended too many unincorporated areas in Gaston County. The unincorporated areas that have public water and sewer services include multiple locations along the southern side of the Garden East-West Connector and north of Mount Holly. Although the type of growth and the areas that grow are likely to be substantially different in consideration of the Build and No-Build Detailed Study Alternatives. This growth is likely to place pressure on the existing infrastructure and community systems.

Cumulative Effects. As Gaston, Mecklenburg and Cleveland Counties continue to grow, there will be more of a burden placed on local school systems and Emergency Management Services. Currently, Gaston County is in the planning stages of constructing new schools for the southern portions of the County.

The proposed project is likely to bring with it more opportunities for economic growth. The Charlotte Region's distribution network links not only to local and regional markets but also to national and international ones. The region is currently served by three major interstate systems: I-77 north-south, I-85 east-west, and I-40 east-west. Construction of the proposed project would better support the established network links by providing an additional link across the Catawba River. The proposed project is

expected to benefit municipalities such as Bessemer City that are actively seeking to attract commercial and industrial growth.

12.6 Ambient Noise Assessment

Indirect Effects. Construction of the proposed Gaston East-West Connector on new location in southern Gaston County and in the southwestern portions of Mecklenburg County is expected to introduce larger volumes of traffic than current traffic volumes that are being experienced today. Increased traffic volumes would be expected to generally increase ambient noise levels within the ICE Study Area.

Cumulative Effects. Future land use development would also be expected to change the current rate of activity within the ICE Study Area and would also be expected to increase ambient noise levels. Project level noise assessments will be completed to evaluate the assessment noise effects associated with the Detailed Study Alternatives for the project in compliance with the National Environmental Policy Act (NEPA) and in accordance with FHWA guidance.¹⁶⁹

12.7 Air Quality Effects

The proposed Gaston East-West Connector is included in GUAMPO's 2030 Long-Range Transportation Plan and Transportation Improvement Program (TIP) 2007-2013.

A regional conformity analysis covering the ICE Study Area for ozone, PM-10, PM-2.5 and the other critical pollutants (carbon monoxide, oxides, nitrogen) was carried out that includes the Gaston East-West Connector and all reasonably foreseeable and financially constrained regional projects for at least 20 years from the date that the analysis was started. Based on the results of the 2007-2013 TIP Conformity Determination Report, the 2030 Long-Range Transportation Plans for GUAMPO, RPO and MUMPO, and their latest, representative Transportation Improvement Programs are in conformance with North Carolina State Implementation Plan (SIP). The 2030 LRTPs were adopted by the Gaston Urban Area MPO on May 25, 2007 and by Mecklenburg-Union MPO on May 16, 2007.¹⁷⁰

12.8 Indirect Effects to Cultural Resources

Indirect Effects. The assessment of the indirect effects on identified cultural resources focuses on the presence of National Register listed or eligible sites.

Detailed Study Alternatives 58, 64, 65, and 68 have the highest potential to indirectly affect sites that are listed on the National Register or eligible to be listed. These alternatives have the highest potential impact due to the close proximity of segments in these Detailed Study Alternatives to cultural resource sites that are located in areas having the potential to experience future growth associated with the proposed project and other likely foreseeable actions. The remaining Detailed Study Alternative numbers 4, 5, 6, 9, 22, 23, 24, 27, 76, 77, 78, and 81 have the potential to indirectly affect cultural resources, but at a lower rate and magnitude than those listed above.

Cumulative Effects. Future growth and development in the ICE Study Area in the absence of the proposed project has the potential to indirectly affect cultural resources, but at a lesser rate and/or magnitude than any one of the Detailed Study Alternatives.

12.9 Indirect Effects to Prime Farmland

Indirect Effects. Farmland located within the ICE Study Area is already beginning to be converted to other uses, primarily residential development. This trend is anticipated to continue even without the construction of the Gaston East-West Connector but at a slower rate than what is expected with the proposed Detailed Study Alternatives. Indirect farmland effects may result from the potential conversion of farmland, not protected through a conservation easement, to developed land uses due to induced growth around the proposed highway and its interchanges. Generally, all Detailed Study Alternatives currently under consideration would make areas where development is already occurring more accessible to an equal degree.

Cumulative Effects. The ICE Study area is experiencing an increased demand for housing and is anticipated to negatively impact farmland and contribute to the cumulative impact of farmland in the area. Residential development along US 273, NC 274, NC 279 and near waterfronts and coves of the Catawba River and South Fork Catawba River have the potential to reduce the amount of farmland in the project area.

Findings

The summations of findings for this ICE report are provided at county, District and Interchange levels of geography in Tables 1.3 through 1.8. Findings on a Detailed Study Alternative level of geography are provided in Table 1.7. The findings provided in this report evaluate the indirect and cumulative effects of the

Detailed Study Alternatives for the project in compliance with the National Environmental Policy Act (NEPA).

Table 12.2 Summary of Potential Indirect and Cumulative Effects by County

County in ICE Study Area	Potential for improved mobility, access and connectivity	Potential for cumulative effects related to land use change	Potential for accelerated growth as a result of the project	Detailed Study Alternatives which contribute to overall indirect and cumulative effects
Gaston, NC	High	Moderate	High	All
Mecklenburg, NC	High	Moderate	Moderate	All
Cleveland, NC	Low	Low	Low	None
York, SC	Low-Moderate	Low	Moderate	All

Table 12.3 Potential ICE's in York County

Indirect Effects

The rate of development in York County is not anticipated to change due to the construction of the proposed Gaston East-West Connector. There would be no discernible difference in development rates between the construction of any one of the Detailed Study Alternatives and the No-Build Alternative.

In terms of measurable accessibility (2007 Metrolina Regional Travel Demand Model), the project would influence regional travel times in some areas in double-digit minutes saved.

On a more local level, interchanges of the proposed Detailed Study Alternatives are too distant to have much influence in York County.

The No-Build Alternative would not offer any travel time saving or improve accessibility for those traveling from or to portions of York County included in the ICE Study Area.

Cumulative Effects

In the absence of local stormwater ordinances and BMPs in York County and upstream locations including Gaston and Mecklenburg Counties, effects to water quality in York are anticipated to be greater with the construction of any one of the proposed Detailed Study Alternatives than with the No-Build Alternative. The longevity of indirect impacts that contribute cumulatively to water quality degradation in York County when considered with other actions is dependent on the magnitude and duration of upstream hydrologic events including sediment inputs (in absence of local stormwater ordinances and BMPs), flooding, land use change (including changes in land use regulations) and, ultimately, watershed stability. There has been water quality degradation in the portions of York County that have been included in the ICE Study Area as evidenced by the amount of 303(d)-listed water resources that have the potential to be affected by this proposed project.

Water resources having the potential to be cumulatively affected by non-point source pollution occurring upstream of and within York County include the Catawba River, Lake Wylie and Crowders Creek, all of which are Section 303(d)-listed streams.

Detailed Study Alternatives numbered 58; 64; 65; 68; 76; 77; 78; and 81 would have comparable levels of indirect effects and cumulative effects to water quality and aquatic habitat as a result of induced development. These potential effects would be greater than those associated with the No-Build Alternative, but less than potential effects associated with Detailed Study Alternative numbers 4; 5; 6; 9; 22; 23; 24 and 27(see Figure1.3).

The proximity of segments H2A, H3 and H2B to portions of Crowders Creek upstream of York County (generally west of US 321) would be expected to have the greatest amount of stormwater runoff effects in the absence of Best Management Practices for Detailed Study Alternatives numbered 4; 5; 6; 9; 22; 23; 24 and 27.

Detailed Study Alternatives with segment K4A in the eastern portion of Gaston County, (generally east of NC 279 or the South Fork Catawba River) upstream of York County, have a greater potential to indirectly affect National Wetland Inventory (NWI) areas. These Detailed Study Alternative numbers are 5; 23; 64; and 77. Detailed Study Alternatives numbered 4; 6; 9; 22; 24; 27; 58; 65; 68; 76; 78; and 81 would have comparable level of indirect effects and cumulative effects to NWI wetlands.

No direct or indirect effects to water resources are expected under the No-Action Alternative.

Table 12.4 Potential ICE's in Cleveland County

Indirect Effects

Rates of development in Cleveland County are not anticipated to change in correlation to the construction of the proposed Gaston East-West Connector. There are no distinguishable difference in development rates anticipated between the construction of any one of the proposed Detailed Study Alternatives and the No-Build Alternative.

Implementation of any one of the Detailed Study Alternatives would improve accessibility to the Charlotte Region, especially in the easternmost portion of the County.

The No-Build Alternative would not offer any accessibility benefits for Cleveland County.

Interchanges of the proposed Detailed Study Alternatives are too distant to have much influence in District 1, yet offer more in regards to accessibility and travel time savings than the No-Build Alternative. The level of traffic modeling conducted under the scope of this qualitative ICE assessment did not indicate any conspicuous differences between the proposed Detailed Study Alternatives, yet it is reasonable to assume due to proximity of the proposed interchange that Detailed Study Alternatives numbered 58; 64; 65; and 68 (shown in Figure 1.3) have the potential for the greatest influence on accessibility and travel time savings, followed by Detailed Study Alternative numbers 76; 77; 78 and 81. Detailed Study Alternatives numbered 4; 5; 6; 9; 22; 23; 24; and 27 would have the least effects on accessibility and travel times.

The No-Build Alternative would not offer any travel time saving for those traveling from or to portions of Cleveland County included in the ICE Study Area.

Cumulative Effects

Based on information obtained during the interviews in adjacent communities in Gaston County; low growth rates and potential for new growth associated with the proposed project; and small changes in accessibility that would accrue to the proposed Gaston East-West Connector, there were no cumulative effects associated with the proposed Gaston East-West Connector identified in Cleveland County.

Table 12.5 Potential ICE's in Mecklenburg County

Indirect Effects

Development related to the proposed Gaston East-West Connector is expected to be only minimally greater than what would occur with the No-Build Alternative. The proposed roadway could potentially accelerate non-residential construction plans, most particularly in the area of the Charlotte-Douglas International Airport. As District 6 continues to develop there will be more of a burden placed on local school systems and Emergency Management Services. There were no apparent differences identified between the 16 various Detailed Study Alternatives.

The proposed Gaston East-West Connector would provide improved accessibility to Gaston, York and Cleveland Counties especially in the western portion of the County.

The No-Build Alternative would not offer any accessibility benefits for Cleveland County.

The additional access provided by the Detailed Study Alternatives in Districts 5 and 6 (see Figure 3.2) would serve increasing levels of non-residential development around the proposed interchange as well as the high-end housing that is starting to appear around the waterfront areas in Mecklenburg County. There is no distinction of effects between the various Detailed Study Alternative interchange options.

Cumulative Effects

In the absence of local stormwater ordinances and BMPs, water quality effects are likely to occur. Water resources having the potential to be cumulatively affected by non-point source pollution includes the Catawba River, Beaverdam Creek, Legion Lake, Irwin Creek, Little Sugar Creek, McAlpine Creek and Dallas Branch. There is no discernible difference in the potential for water quality effects between the Detailed Study Alternatives.

Detailed Study Alternatives with segment K4A in the eastern portion of Gaston County, (generally east of NC 279 or the South Fork Catawba River) upstream of York County, have a greater potential to indirectly affect National Wetland Inventory (NWI) areas. These Detailed Study Alternative numbers are 5; 23; 64; and 77. Detailed Study Alternatives numbered 4; 6; 9; 22; 24; 27; 58; 65; 68; 76; 78; and 81 would have comparable level of indirect effects and cumulative effects to NWI wetlands.

No direct or indirect effects to water resources are anticipated with the No-Action Alternative.

Increased traffic volumes in the southern portions of Mecklenburg County would be expected to generally increase ambient noise levels to a greater degree than the No-Build Alternative within the ICE Study Area. There would be no discernible differences in ambient noise levels between the Detailed Study Alternatives.

The assessment of the indirect effects on identified cultural resources focuses on the presence of National Register listed or eligible sites in the county where induced growth and other land use change is anticipated to occur. Construction of any one of the proposed Detailed Study Alternatives has the potential to affect cultural resource sites to a greater degree than the No-Build Alternative. There is no appreciable difference between the Detailed Study Alternatives in regards to the effects to cultural resources because the noted cultural resource sites are in the vicinity of the proposed interchange of the Gaston East-West Connector with I-485.

Table 12.6 Potential ICE's in Gaston County

Indirect Effects

All Detailed Study Alternatives provide equal access across the Catawba River. The construction of the Gaston East-West Connector would provide another access route across the Catawba River into the southeast portion of Gaston County, potentially facilitating faster growth and different kinds of development in the southeast and southern portions of the County. The proposed project would also provide better access to the west and northwest portion of the County, potentially changing the existing growth pattern in Bessemer City that is primarily residential and commercial to more light industry growth. As the County continues to grow there will be more of a burden placed on local school systems and Emergency Management Services.

The No-Build Alternative would not offer any accessibility benefits for Gaston County.

Habitat fragmentation within the ICE Study Area is anticipated to continue correspondingly with land use change. The proposed project and its associated development are anticipated to affect terrestrial communities to a greater degree than what would be expected to occur with the No-Build Alternative.

Detailed Study Alternatives with segments H1C, J1C, K1A and K4A have a greater potential to indirectly affect upland species due to fragmentation in that these segments are located the farthest distance away from previously fragmented forestland. The Detailed Study Alternatives including these segments and having the greatest potential for habitat fragmentation are: 5; 6; 23; 24; 27; 58; 64; 65; 68; 77; 78; and 81 (shown in Figure 1.3). Detailed Study Alternatives numbered 4; 9; 22; and 76; would have comparable level of indirect effects due to habitat fragmentation.

The proposed project and its associated development will affect habitat of the Schweinitz's sunflower (*Helianthus schweinitzii*), a federally endangered species, to a greater degree than what would occur with the No-Build Alternative. Detailed Study Alternatives with segment K2A have a greater potential to indirectly modify existing habitat for the Schweinitz's sunflower through land use change and /or may create new habitat along side of the proposed roadway or other roadways associated with anticipated growth and development. Detailed Study Alternatives including segment K2A are 4, 22, 58, and 76.

The potential exists for the smooth coneflower (*Echinacea laevigata*), a federally endangered species, to be affected to a greater degree by the Detailed Study Alternatives than the No-Build Alternative due to the cumulative effects of habitat fragmentation and land use change. Potential habitat for this species occurs throughout the ICE Study Area.

The potential exists for the bog turtle (*Clemmys muhlenbergii*) a federally threatened species, to be affected to a greater degree by the Detailed Study Alternatives than the No-Build Alternative due to the cumulative effects of habitat fragmentation and land use change.

The potential exists for Michaux's sumac (*Rhus michauxii*) a federally endangered species, to be affected to a greater degree by the Detailed Study Alternatives than the No-Build Alternative due to the cumulative effects of habitat fragmentation and land use change. Potential habitat for this species occurs throughout the ICE Study Area.

Significant Natural Heritage Areas in Gaston County that are threatened by existing and future development pressures associated with the proposed Detailed Study Alternatives include Crowders Mountain State Park, Stagecoach Road Granitic Outcrop and Penegar. Detailed Study Alternatives numbered 58; 64; 65 and 68 have the greatest potential to indirectly affect SNHAs due to their close proximity of these sites.

The No-Build Alternative is not anticipated to have indirect or cumulative effects on Natural Heritage Sites.

The assessment of the indirect effects on identified cultural resources focuses on the presence of National Register listed or eligible sites in the County where induced growth and other land use change is anticipated to occur. Construction of any one of the proposed Detailed Study Alternatives has the potential to affect cultural resource sites to a greater degree than the No-Build Alternative. Detailed Study Alternatives numbered 58; 64; 65; and 68 have the highest potential to indirectly affect sites that are listed on the National Register or eligible to be listed due to the close proximity of segments in these Detailed Study Alternatives to cultural resource sites. These sites are located in areas having the potential to experience future growth associated with the proposed project and other likely foreseeable actions. The remaining Detailed Study Alternatives numbered: 4; 5; 6; 9; 22; 23; 24; 27; 76; 77; 78; and 81 have the potential to indirectly affect cultural resources, but at a lower rate and magnitude than those listed above.

Construction of any one of the proposed Detailed Study Alternatives in District 2 would provide improved access between Bessemer City and the Charlotte Urban Area which is supportive of the City's desire to attract commercial/industrial growth to the area. Construction of any one of the Detailed Study Alternatives is likely to increase the rate of development in the County, especially in the southern and southeastern portions when compared to the No-Build Alternative. There would be no distinguishable difference in development rates between any one of the Detailed Study Alternatives.

City officials have expressed noted concerns with any Detailed Study Alternative that would remove interchange access to Edgewood Road, which currently serves as a gateway to the City and is used by local residents. Growth patterns in District 2 in the absence of the proposed Gaston East-West Connector (No-Build Alternative) would likely follow existing patterns and consist of mixed residential and commercial growth, particularly in the Edgewood Road area.

When compared to the No-Build Alternative, the proposed Gaston East-West Connector has much greater potential to increase roadway capacity on US 74 and I-85 in District 3 allowing more growth to occur in this District. Future residential growth patterns in this district in the absence of the proposed project would likely occur adjacent to access roads north and south of I-85. There would be no distinguishable difference in roadway capacity improvements among the Detailed Study Alternatives.

Areas in District 7 & 8 are anticipated to experience continued land use change and residential development without the construction of the proposed Gaston East-West Connector (No-Build Alternative), but not as rapidly as with construction of any one of the Detailed Study Alternatives. There would be no distinguishable difference in development rates between the Detailed Study Alternatives. Construction of any one of the Detailed Study Alternatives would discernibly increase the suitability for infill development and redevelopment that enhances existing industrial uses. Commercial and residential development near Robinson Road and Bud Wilson Road may be slowed due to the level of difficulty in getting public water and sewer services provided in those areas (see Section 12.1.4).

Cumulative Effects

The proposed Gaston East-West Connector would provide greater access

to potential developable land in the southern and western portions of the County when compared to the No-Build Alternative. Detailed Study Alternatives numbered 58; 64; 65; and 68 would provide the greatest access to the southern and western portions of Gaston County. Access to potential developable land to the western portion of Gaston only would be improved to an equivalent degree through the construction of any one of the following Detailed Study Alternative numbers: 58; 64; 65; 68; 76; 77; 78; and 81. Access to potential developable land to the southern portion of Gaston only would be improves to an equivalent degree through the construction of any one of the following Detailed Study Alternative numbers: 58; 64; 65; and 68. The remaining proposed Detailed Study Alternatives (4; 5; 6; 9; 22; 23; 24 and 27) would offer the least improvement to potential developable land located in the southern and western portions of Gaston County.

The growth and development related to the proposed Gaston East-West Connector is expected to add cumulatively to existing pressures on Gaston County's infrastructure as the County struggles to keep pace with recent growth and development.

In the absence of local stormwater ordinances and BMPs, effects to water quality are anticipated with the construction of the proposed Gaston East-West Connector. Water resources having the potential to be cumulatively affected by non-point source pollution includes the following 303(d) listed water resources: Catawba River, Abernathy Creek, Catawba Creek, Crowders Creek, McGill Creek, and Blackwood Creek.

Detailed Study Alternative numbers: 58; 64; 65; 68; 76; 77; 78; and 81 would have comparable level of indirect effects and cumulative effects to water quality and aquatic habitat as a result of induced development. The proximity of segments H2A, H3 and H2B to portions of Crowders Creek in the west area (generally west of US 321) of proposed alternatives would be expected to have the greatest amount of stormwater runoff effects in the absence of Best Management Practices for Detailed Study Alternative numbers: 4; 5; 6; 9; 22; 23; 24 and 27.

Detailed Study Alternatives with segment K4A in the eastern portion of Gaston County, (generally east of NC 279 or the South Fork Catawba River) upstream of York County, have a greater potential to indirectly affect National Wetland Inventory (NWI) areas. These Detailed Study Alternative numbers are 5; 23; 64; and 77. Detailed Study Alternative numbers 4; 6; 9; 22; 24; 27; 58; 65; 68; 76; 78; and 81 would have

comparable level of indirect effects and cumulative effects to NWI wetlands.

No direct or indirect effects to water resources are anticipated with the No-Action Alternative.

Anticipated cumulative effects associated with the construction of any one of the proposed Detailed Study Alternatives may include terrestrial community alteration effects relating to land use change, including fragmentation and wildlife habitat loss beyond that which has already occurred in the ICE Study Area and the No-Build Alternative.

Increased traffic volumes in the southern portions of Gaston County would be expected to generally increase ambient noise levels within the CIA Study Area to a greater degree than the No-Build Alternative. There would be no discernible differences in ambient noise levels between the Detailed Study Alternatives.

Future growth in the ICE Study Area in the absence of the proposed project (No-Build Alternative) has the potential to convert important farmlands that are protected through a conservation easement but at a lesser rate and /or magnitude of any one of the Detailed Study Alternatives.

Construction of the proposed project would improve access to developable land in both District 7 and 8, and provide travel time savings for those wanting to reside in Gaston County and commute to the Charlotte Region. The level of traffic modeling conducted under the scope of this qualitative ICE assessment did not indicate any conspicuous differences between the proposed Detailed Study Alternatives, yet it is reasonable to assume that since Detailed Study Alternative numbers 58; 64; 65, and 68 follow a more southeasterly direction than the other Detailed Study Alternatives that the travel time savings would be slightly less than that experienced with the other Detailed Study Alternatives. There is no distinction of effects between the various Detailed Study Alternative interchange options.